



**Wisconsin Geological
and Natural History Survey**
DIVISION OF EXTENSION
UNIVERSITY OF WISCONSIN-MADISON

Wisconsin Groundwater-Level Monitoring Network Improvements, 2022–2024

Final report to the U.S. Geological Survey

Project activities: well drilling (objective 5) and purchase of equipment to support continuous water-level data collection (objective 6)

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Introduction

Wisconsin Groundwater-Level Monitoring Network

The Wisconsin Geological and Natural History Survey (WGNHS) is part of the Division of Extension at University of Wisconsin–Madison. Our mission is as follows:

“The WGNHS conducts earth-science surveys, field studies, and research. We provide objective scientific information about the geology, mineral resources, water resources, soil, and biology of Wisconsin. We collect, interpret, disseminate, and archive natural resource information. We communicate the results of our activities through publications, technical talks, and responses to inquiries from the public. These activities support informed decision making by government, industry, business, and individual citizens of Wisconsin.”

As part of our mission, the WGNHS and U.S. Geological Survey’s Upper Midwest Water Science Center (USGS-UMWSC) have collaborated for decades to operate, maintain, and manage the Wisconsin Groundwater-Level Monitoring Network (WGLMN). The WGLMN is a cooperative monitoring network that dates to 1946, when the Wisconsin State Legislature requested that the WGNHS and U.S. Geological Survey (USGS) formally establish a groundwater monitoring network. In recent decades, the Wisconsin Department of Natural Resources (WDNR) has become more involved and today serves as a critical partner in supporting the ongoing operation, maintenance, and management of the WGLMN. Today the WGLMN is operated, maintained, and managed by the WGNHS, USGS-UMWSC, and WDNR. Water levels collected from the network help scientists and managers evaluate effects of well pumping, the response of groundwater levels to drought or increased precipitation, and effects of land-use change on groundwater resources. These data are also routinely used in the development of regional groundwater flow models, as long-term water-level measurements serve as reliable calibration targets.

During the late 1940s and 1950s the WGLMN rapidly grew to 270 wells, before stabilizing at around 200 wells from the 1960s through the 1980s. Beginning in the late 1980s, the number of wells decreased rapidly as funding support decreased, and wells were filled and sealed or fell into disrepair. While the USGS-UMWSC, WGNHS, and WDNR have continued to maintain, operate, actively manage, and add new wells to the WGLMN, there are only 103 Core Network long-term monitoring wells as of the end of this grant period (July 2025). The recommended minimum is 133, and many of the wells require re-evaluation, rehabilitation, or replacement.

National Groundwater Monitoring Network

The National Groundwater Monitoring Network (NGWMN) was established in 2009 and is focused on Principal and Major Aquifers of the United States. Because the USGS uses the terms “Principal,” “Major,” and “National” aquifers interchangeably, we have opted to consistently refer to them as “national” aquifers throughout this report. This also helps distinguish national aquifers from “local” aquifers, which are also referenced throughout the report. The primary goal of the NGWMN is to *“provide information needed for planning, management, and*

development of groundwater supply to meet current and future water needs and ecosystem requirements through the compilation of groundwater data from local, State, and Federal organizations”.

The 103 WGLMN Core Network long-term monitoring wells that represent the NGWMN in Wisconsin (fig. 1**Figure 1**) provides a consistent, long-term record of fluctuations in water levels in several shallow and deep national aquifers. As of July 2025, there are 39 wells monitoring the “Sand and gravel” aquifers (N100GLCIAL), 8 wells monitoring the “Silurian-Devonian” aquifer system (N400SLRDVN), 54 wells monitoring the “Cambrian-Ordovician” aquifer system (S300CAMORD), and 2 wells monitoring the “Other” aquifer systems (N9999OTHER), which represents the Precambrian aquifer system in northern Wisconsin.

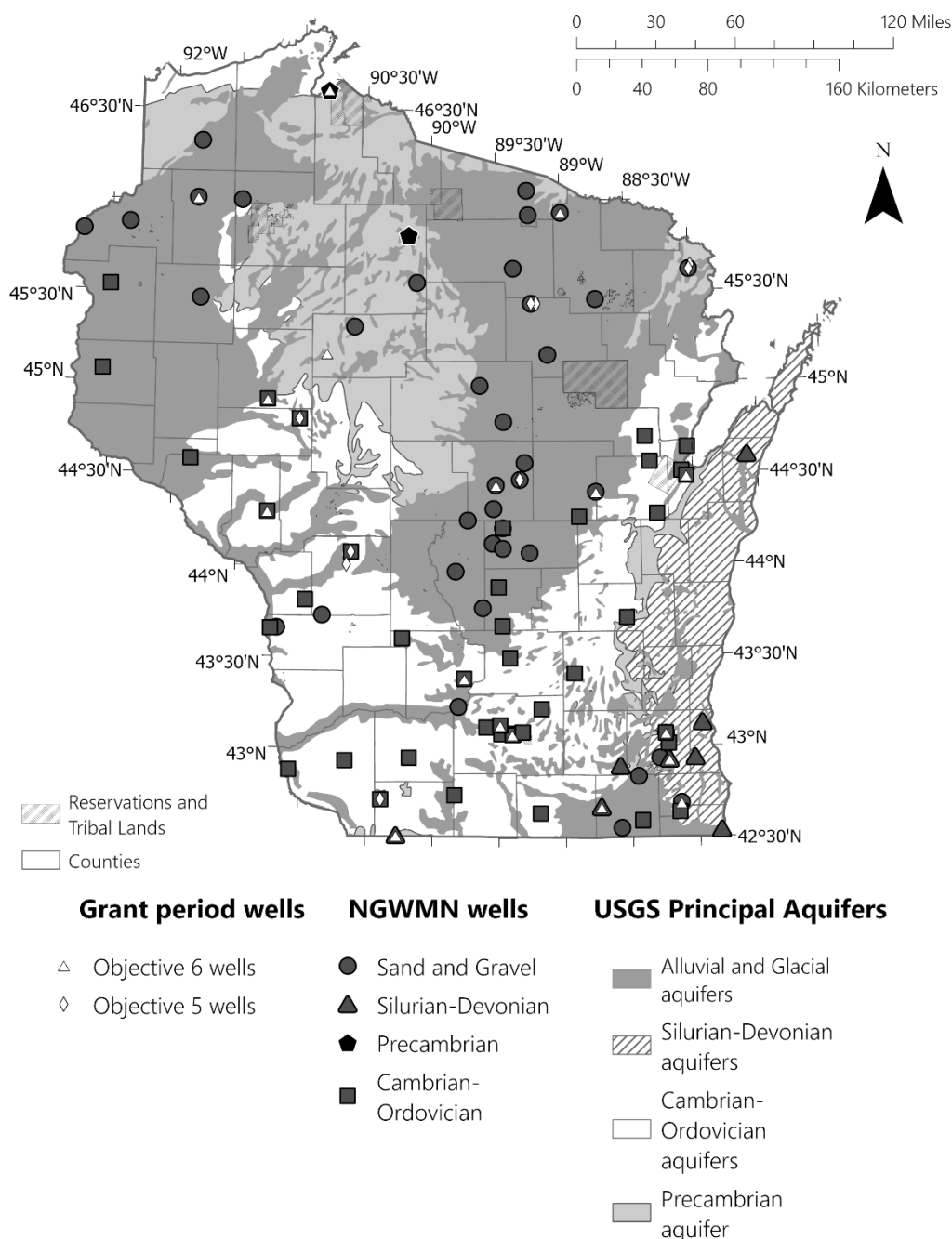


Figure 1. Locations of all monitoring sites in the WGLMN (and NGWMN) as of July 2025. The base map depicts the spatial extent of the USGS national aquifers in Wisconsin. Wells are symbolized by national aquifer and represent the locations of the long-term Core Network wells, which comprise the NGWMN in Wisconsin. Objective 5 and 6 wells are denoted with white diamonds and triangles, respectively. Spatial extents of national aquifers are derived from the USGS's Ground Water Atlas of the United States data (<https://doi.org/10.3133/ha730>), which was published as part of the National Atlas in 1998, revised 2003. Political boundaries from Wisconsin Department of Natural Resources, 2011. Tribal land

(continued from previous page) boundaries from U.S. Geological Survey National Atlas, 2016. Wisconsin Transverse Mercator projection, 1991 Adjustment to the North American Datum of 1983 (NAD 83/91); EPSG 3071.

Methods

Historical records review

For each objective 4 and objective 5-replacement well site, a thorough search for, and review of, relevant historical records was completed by the WGNHS. Relevant documents were compiled from a variety of sources, including the USGS, WDNR, and WGNHS, and are included in appendices 1 through 6 of this report. Some of the most common documents include USGS well schedules, WGNHS geologic logs, and WDNR well construction reports. Supplemental WGNHS documents have also been included, which often contain sketches and maps of monitoring sites as well as plots of historical water-level trends and miscellaneous notes. During the records review, several discrepancies were found, particularly with respect to reported well depth and casing depth measurements. In the well sections below, which outline work details, WGNHS reconciled discrepancies where possible, and noted uncertainties when appropriate. Sources for our presented well measurements are listed in each section. The historical documents were left unedited, even when discrepancies were found.

Geophysical logs

The WGNHS' borehole geophysical logging equipment is contained in a dedicated geophysical logging van and transported directly to the well site. For this report, a full suite of geophysical logs includes natural gamma, single point resistivity (SPR), spontaneous potential (SP), caliper, fluid temperature, fluid conductivity/resistivity, and optical borehole image (OBI) logs. Geophysical logs were run on wells with boreholes open to the aquifer (typically lithified), but not in wells constructed with PVC well screens. Geophysical data were collected using the following models of slimline tools, all manufactured by Mount Sopris Instrument Co.:

- Temperature/Fluid resistivity/3-Armed Caliper, probe model: 2CAA-1000F
- Natural gamma/Single Point Resistivity/Spontaneous Potential, probe model: 2PGA-1000
- Optical borehole imaging tool, probe model: OBI40Mk5

To collect the logs, a tripod outfitted with a pulley is positioned and secured directly above the open well casing. The logging cable, with tool(s) attached, is run through the pulley and lowered down the well using a level-winding electric winch equipped with a depth encoder. Logging tools are slowly lowered down the well (5–20 ft/min); as the tool descends, it collects measurements with depth and relays them via the logging cable to the Mount Sopris Instruments MATRIX data acquisition system at the surface. The logging process is monitored and recorded on a laptop computer. Depth measurements are made relative to the top of casing, which is the benchmark elevation datum for all the geophysical logging tools. The

slimline tools vary in length and are of larger diameter than the weighted line (aka, tagline or tape) used to measure well depths. The larger diameter slimline tools may not pass obstructions or borehole wall irregularities that the tagline can, which can lead to differing depth measurements from those by the tagline. Once the geophysical data set is collected, it is processed using WellCAD v5.3 software and a draft log is generated. The draft log is checked for accuracy and completeness and put into a standardized format for publication. The published log is then added to the WGNHS statewide subsurface database, which is actively maintained and available to the public through the WGNHS website (<https://data.wgnhs.wisc.edu/data-viewer/>). Geophysical logs completed for this grant period are available through the above website. When appropriate, links are provided in the individual well sections.

Borehole video

Wells with open boreholes or suspected blockages were evaluated using a Laval Underground Surveys R-CAM 1300 portable borehole camera with both down-facing and side-facing cameras. A depth encoder records the depth of the camera, and the depth is displayed as it collects a continuous video image of the well. Depth measurements are made relative to the top of the well casing, which is the benchmark elevation datum for borehole videos and geophysical logging tools. In general, the geophysical logs have better depth recording accuracy than the borehole video logs because the video camera does not have a level-winding winch and the depth encoder is less precise.

Both cameras can rotate, which allows for complete examination of wells through which the camera can pass. The camera is 1.9 inches in diameter; however, the best results are obtained when the camera is used with centralizers set to the nominal well diameter. After zeroing the depth encoder with the camera at the top of the well casing, the camera is slowly lowered over a pulley into the well with an electric winch. The speed and direction of the camera, as well as which camera is recording (side-facing/borehole wall or down-facing camera), is controlled at the surface by the operator. The videos are recorded in a digital format and stored on WGNHS servers for future reference. The videos are used to determine the nature of obstructions or debris in the well, in addition to the integrity of the casing and borehole. Still images from the footage are also useful for documenting cascading water above the static water level and can sometimes show water movement below the static water level within the well.

RTN-GPS

The WGNHS coordinates with the USGS-UMWSC to survey the latitude, longitude, and land surface elevation (at an established land surface datum) of each well using Real-Time Network GPS surveying (RTN-GPS). RTN-GPS uses a network of reference stations that broadcast real-time corrections to the user. The Wisconsin Department of Transportation maintains the network of reference stations in Wisconsin, which is called the Wisconsin Continuously Operating Reference Station (WISCORS) Network.

The USGS-UMWSC uses a Topcon GR-5 GPS receiver, with an FC-5000 tablet running Magnet Field software, to collect data at each survey point (each well). The Magnet Field software automatically corrects the data using the real-time data correction broadcasted from the WISCORS network. Benchmarks were also shot in with the RTN-GPS. Published benchmark locations were compared with locations from the GR-5 to confirm the accuracy of the survey. Vertical accuracy is 0.1 ft and horizontal location confidence is 1 ft (0.3 m).

In situations where there was poor GPS signal at the wellhead, a temporary point away from the well was shot in with the GPS. A differential level was then used to carry the elevation from the temporary point to the well. Latitude and longitude were determined by measuring the distance between the wellhead and the temporary point and using Google Earth Pro to manually identify the location of the well in relation to the temporary point. In this case, horizontal location confidence is 10 ft (3m). For more information, see Global Positioning System (U.S. Geological Survey, 2016).

Well development and redevelopment

Wisconsin Administrative Code NR141 requires that all newly installed monitoring wells be developed with a goal to produce water free of sediment and to remove all drill cuttings and drilling fluids. The depth of the water, well size, and well location determined which well development method was used. Approved development methods include surging and purging of water from within the well bore, and pumping. Surging is any procedure that forces water from the well bore out into the aquifer, and purging is the removal of water and sediment from the well bore. Wells completed for this report were surged with either a check-valve fitted bailer or with the pump body and discharge line of a submersible pump. Purging methods included pumping (with submersible, peristaltic, or oscillating inertial pump), bailing (with steel or PVC bailer), and air lifting. Air lifting is a method of purging water, sediment, and debris by delivering compressed air to the bottom of the borehole. As the compressed air escapes up the casing (or a tremie pipe), water and sediment are entrained and removed from the well.

In wells where excessive sediment and/or debris had accumulated, or a blockage had been detected, the methods described above were often performed to try and remove the buildup or dislodge the blockage.

Slug tests

Slug tests were performed by the USGS-UMWSC by quickly lowering a solid PVC slug into the water column. Slugs of various sizes are used depending on the well diameter. Water levels are recorded during the process using a submersible pressure transducer. The change in water level over time is then plotted and used to evaluate the well-aquifer connection.

As part of the USGS-UMWSC routine monitoring, wells are periodically slug tested. If the slug response for a well changes over time, the well is flagged for evaluation. In some instances, redevelopment may be necessary to restore connectivity to the aquifer.

Groundwater-level measurements

All groundwater-level measurements collected by the USGS-UMWSC, or its cooperators, follow strict quality assurance procedures. The USGS report titled “Groundwater Technical Procedures of the U.S. Geological Survey” (Cunningham and Schalk, 2011) provides detailed technical procedures that are followed.

The following summarizes some of the most important procedures. To start, all measuring devices that are used to take manual discrete groundwater-level measurements are sent in for calibration at the USGS Hydrologic Instrumentation Facility. The tape corrections, if any exist, are added to the measurement before they are entered into the USGS’s database. Each well also has a physically marked measuring point (MP) that serves as a reference point from which all water-level depths are measured. A permanent land surface datum (LSD) is also established at each well and commonly corresponds to the top elevation of a bolt secured into the base of the steel well casing or a steel bar driven into the ground. The exact location of the LSD is determined by GPS surveying (see RTN-GPS section above for details). The distance between the LSD and the MP is subtracted from the tape-down measurement. The MP distance is periodically checked using a folding ruler to ensure nothing has moved. Some wells are also equipped with instruments that collect continuous water-level data, usually at 15- or 60-minute intervals. Either a shaft encoder or submersible pressure transducer is used to collect and record the data. The equipment is periodically checked against a discrete tape-down measurement with electronic tape or steel tape. If the equipment reads differently than the discrete tape-down, the USGS corrects the continuous data. Continuous data are initially set to provisional status when entered into USGS’s web-based National Water Information System (NWIS) (U.S. Geological Survey, 2022). The data are reviewed by separate individuals before they are set to an approved status. For this study, depth-of-water measurements reported on newly collected geophysical logs incorporate USGS tape-downs.

Routine monitoring and maintenance

During site visits, the main objective is for the USGS-UMWSC to perform manual tape-down measurements of depth-to-water in the monitoring well and download continuous water-level data where available. These data are subsequently analyzed and approved as part of the USGS’s quality-assurance/quality-control process and published to the NWIS.

As part of these routine visits, the USGS-UMWSC also verifies that the wellhead is secure and protected from environmental factors (e.g., rain, snow) and ensures the proper functioning of all monitoring equipment. When necessary, well covers, shelters, or monitoring equipment may be repaired or replaced. The hydraulic connection of the monitoring well to the surrounding aquifer is verified by performing slug tests, analyzing hydrograph data, and making total depth checks. USGS tape-downs of well depth are incorporated into well depth measurements and used to calibrate geophysical logs when appropriate.

Project summary

The project proposal submitted in January 2022, included 24 work items in fulfillment of objective 5 (well drilling), and objective 6 (purchase equipment to support continuous water-level data collection) as outlined in the program announcement (USGS funding opportunity G22AS00002). Seven new wells were installed, representing an important expansion of the NGWMN in Wisconsin, and the purchase and deployment of updated monitoring equipment was completed at 17 well sites. While Figure 1 depicts these wells in relation to all NGWMN wells in Wisconsin, Figure 2 only shows the location of the 24 wells that were worked on as part of this funding opportunity.

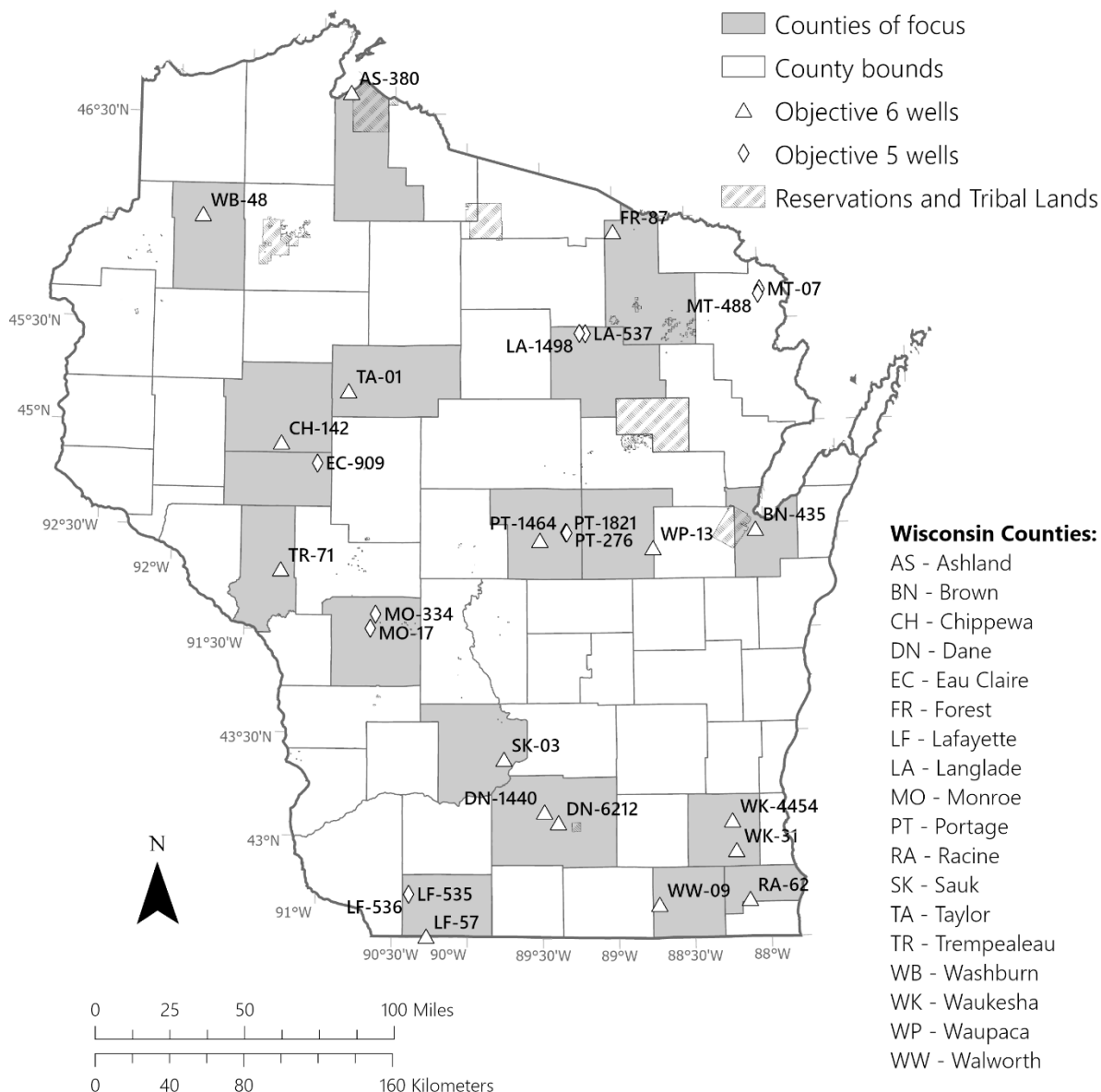


Figure 2. Locations and site names of all monitoring wells in the WGLMN (and NGWMN) that were worked on as part of this funding opportunity. Objective 5 and 6 wells are denoted with white diamonds and triangles, respectively. Site names referenced here are short-hand names for the full WGNHS well identifying numbers (WIDs). Full WIDs are provided in each respective well section in the Project details section of this report. Political boundaries from Wisconsin Department of Natural Resources, 2011. Wisconsin Transverse Mercator projection, 1991 Adjustment to the North American Datum of 1983 (NAD 83/91); EPSG 3071.

At the conclusion of this project, these work items were successfully completed as originally proposed. At some monitoring sites, the work plan changed due to information gained from reviewing historical documents and/or performing well evaluations. A summary of the activities originally proposed, the work completed between August 1, 2022, and July 2025, and the status of the well sites as of July 2025 is presented in table 1. The grant was originally approved as a two-year project, from August 1, 2022, to July 31, 2024, but was later extended under a one-year no-cost extension until July 31, 2025. This extension was needed due to an unexpected decrease in available drillers.

The following section of the report termed “Project details” presents all relevant information associated with each monitoring site worked on as part of this grant. Details about each monitoring site are structured under the headings: (1) Well information, (2) Initial work plan, (3) Description of work completed, and (4) Suggestions for future work. When applicable, slug tests and concurrent water-level monitoring results, along with fieldwork photos and stills from borehole video logging, are presented as figures in the “Description of work completed” sections.

Table 1. Work activities proposed, work completed, and status of well sites as of July 2025

Well	Objective ¹	Goal ²	Outcome	Status of Well ³
EC-909 Eau Claire Co.	5	Drill new well	Work successfully completed.	EC-909 drilled Aug. 2023; depth = 78; national aquifer = S300CAMORD USGS, WDNR, and WGNHS will evaluate if this well will be added to the long term NGWMN in the future.
LF-493 Lafayette Co.	5	Drill two new wells, one shallow and one deep.	Instead of drilling two wells, LF-535 and LF-536 were installed inside the well boring of LF-493.	LF-535 added to network Nov. 2024; depth = 74; national aquifer = S300CAMORD LF-536 added to network Nov. 2024; depth = 300; national aquifer = S300CAMORD USGS-UMWSC to continue routine monitoring and maintenance. Work on adding LF-535 to the CRN Network Region 7.
LA-537 Langlade Co.	5	Replace well	Work successfully completed, well replaced by LA-1498. Due to use by the well owner, LA-537 was not abandoned.	LA-1498: added to network June 2024; depth = 139; national aquifer = N100GLCIAL USGS-UMWSC to continue routine monitoring and maintenance.
MT-07 Marinette Co.	5	Replace well	Work successfully completed, well replaced by MT-488. Due to inaccessibility, MT-07 was not abandoned.	MT-488: added to network June 2024; depth = 36; national aquifer = N100GLCIAL USGS-UMWSC to continue routine monitoring and maintenance.
MO-17 Monroe Co.	5	Replace well	Work successfully completed, well replaced by MO-334. MO-17 was successfully abandoned.	MO-334: added to network Sept. 2024; depth = 205; national aquifer = S300CAMORD USGS-UMWSC to continue routine monitoring and maintenance.

Wisconsin Groundwater-Level Monitoring Network Improvements, 2022–2024

Well	Objective ¹	Goal ²	Outcome	Status of Well ³
PT-276 Portage Co.	5	Replace well	Work successfully completed, well replaced by PT-1821. PT-276 was successfully abandoned.	PT-1821: added to network July 2023; depth = 25.5; national aquifer = N100GLCIAL USGS-UMWSC to continue routine monitoring and maintenance.
AS-380, BN-435, CH-142, DN-1440, DN-6212, FR-87, LF-57, SK-03, TA-01, TR-71, WB-48, WK-31, WK-4454, WP-13	6	Install updated continuous monitoring equipment	Work successfully completed.	USGS-UMWSC to continue routine monitoring and maintenance.
PT-1464	6	Update continuous monitoring to real-time	Work successfully completed.	USGS-UMWSC to continue routine monitoring and maintenance.
RA-62, WW-09	6	Upgrade discrete monitoring to continuous	Work successfully completed.	USGS-UMWSC to continue routine monitoring and maintenance.

¹ Objective 5: Well Drilling; Objective 6: purchase equipment to support continuous water-level data collection

² Drilling new wells (including replacements) included well characterization = full suite of geophysical logs and well construction evaluation; well-aquifer connection is evaluated with a slug test; borehole video was not done due to equipment malfunction

³ Date added to network is date the level logger was installed; All depths are reported as feet below land surface datum (ft blsd); N100GLCIAL = glacial sand and gravel aquifer system; N400SLRDVN = Silurian-Devonian aquifer system; S300CAMORD = Cambrian-Ordovician aquifer system

Project details

EC-909 (Eau Claire County, Wisc.) – new well

USGS Site Number: 444820091010201

USGS Site Name: EC-27/05W/20-0909

WGNHS Well ID: 18000909

WDNR Well Number: ABB776

Well information

EC-909 was drilled as a new WGLMN and NGWMN well on July 21, 2023, by Midwest Well Drilling & Hydrofracking LLC^[1]. The well is located on property owned by Eau Claire County, Wisc., approximately 240 ft east of County Highway (CTH) G near the town of Wilson, Wisc. (fig. 3). The well was drilled to 78 feet below land surface datum (ft blsd) and cased to 38 ft blsd^[1,2]. The 6-in.-diameter borehole is left open to the local sandstone bedrock aquifer. Monitoring began September 2023^[3], and the well is currently in good condition. Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory/?site_no=444820091010201&agency_cd=USGS

Latitude, longitude: 44°48′20.01″, –91°01′02.26″ (NAD83)^[3]

Current land surface datum: 1068.94 feet above mean sea level (NAVD88)^[3]

Hydrologic Unit (USGS Watershed Code): 070500060302^[3]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 372MNSN (Mount Simon Sandstone)^[3]

Current well depth: 80 ft-BTOC (78 ft blsd)^[2]

Current casing depth: 40 ft-BTOC (38 ft blsd)^[2]

^[1] Well details obtained from 2023 well construction report completed by the well driller (form 3300-077A)

^[2] Well details obtained from work completed for this funding opportunity; well depth incorporates 9/14/23 USGS-UMWSC tape-down and 11/6/24 WGNHS geophysical logs; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.93 ft; land surface datum is a bolt in the well casing

^[3] Well details obtained from the USGS

Documentation for this well is included in appendix 1.

Geophysical logs collected on November 6, 2024, for this grant period can be viewed and downloaded from: <https://data.wgnhs.wisc.edu/data-viewer/view/18000909>



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Figure 3. Location of well EC-909 (red marker) in Eau Claire County, Wisc. The site is located on County property, approximately 240 ft east of County Highway (CTH) G near the town of Wilson, Wisc., which is approximately 25 miles east of Eau Claire, Wisc.

Initial work plan

This well was initially proposed under objective 5 for well drilling. Work planned to include drilling a new well approximately 60 ft blsd into the shallow sandstone bedrock aquifer. Borehole cuttings were to be collected, processed, used to generate a lithologic log, and archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. Following the completion of the drilling, the plan of work for this site also included characterization of the well, with a full suite of geophysical logs, and a slug test to evaluate the well-aquifer connection. This new well was designed to fill a data gap within the USGS Climate Response Network (CRN) for Wisconsin’s CRN Region 4.

Description of work completed

In December 2022, the WGNHS established a written land-access agreement with Eau Claire County, represented by its Parks and Forest Director, to place a new well on their property. Drilling of EC-909 was completed on July 21, 2023, by Midwest Well Drilling & Hydrofracking LLC using mud and air rotary. The borehole was completed to a total depth of 78 ft blsd. A 6-in.-diameter steel casing was subsequently installed to a reported depth of 38 ft blsd, below which the borehole was left open to the local Cambrian sandstone aquifer (fig. 4a). The well was finished with a locking protective well cover (fig. 4b). The well was completed in compliance

with Wisconsin Administrative Code NR812. EC-909 was developed on July 21, 2023 (see WCR completed by driller).

Drill cuttings were collected every 5 ft and used to generate a lithologic description of the well borehole (see WCR completed by driller and soil boring form 4400-122 completed by WGNHS). Cuttings were archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc.

To fulfill reporting requirements with the WDNR, the well construction report, form 3300-077A, and soil boring log, form 4400-122, were submitted to the WDNR.

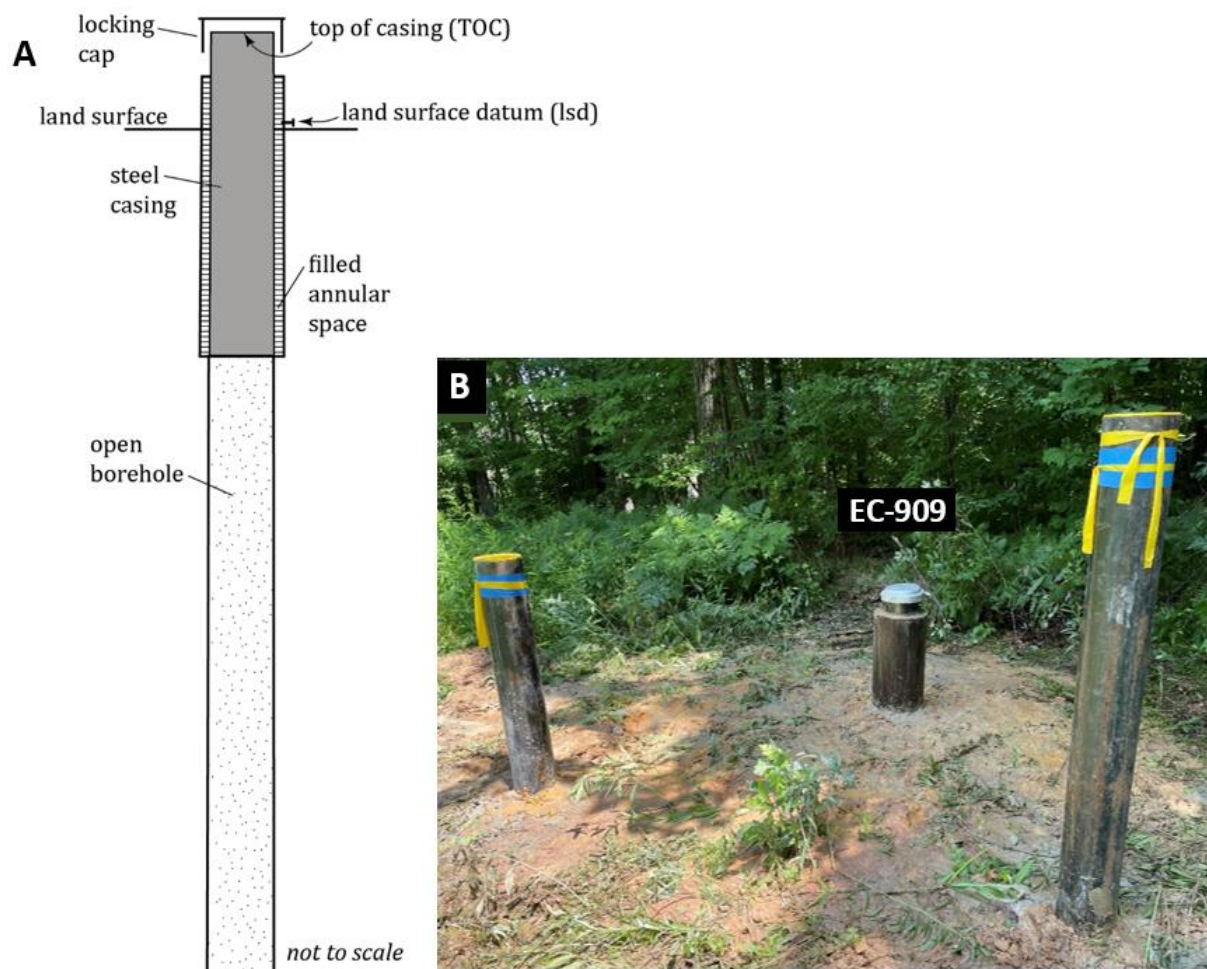


Figure 4. Panel A, simplified well construction diagram for EC-909. The diagram is not to scale. Panel B, newly completed well EC-909 with locking wellhead protector and two protective bollards. Photo courtesy of USGS-UMWSC.

In September 2023, the USGS-UMWSC surveyed the well using RTN-GPS, completed a slug test to test the well-aquifer connection, and installed a pressure transducer to begin recording continuous water-level data.

The slug test was completed using a 3-in.-diameter by 5 ft long cylindrical solid PVC slug and the results show a good connection to the aquifer (fig. 5). The water column was displaced by approximately 1 ft and showed a rapid hydraulic response, suggesting that it is well connected to the surrounding aquifer.

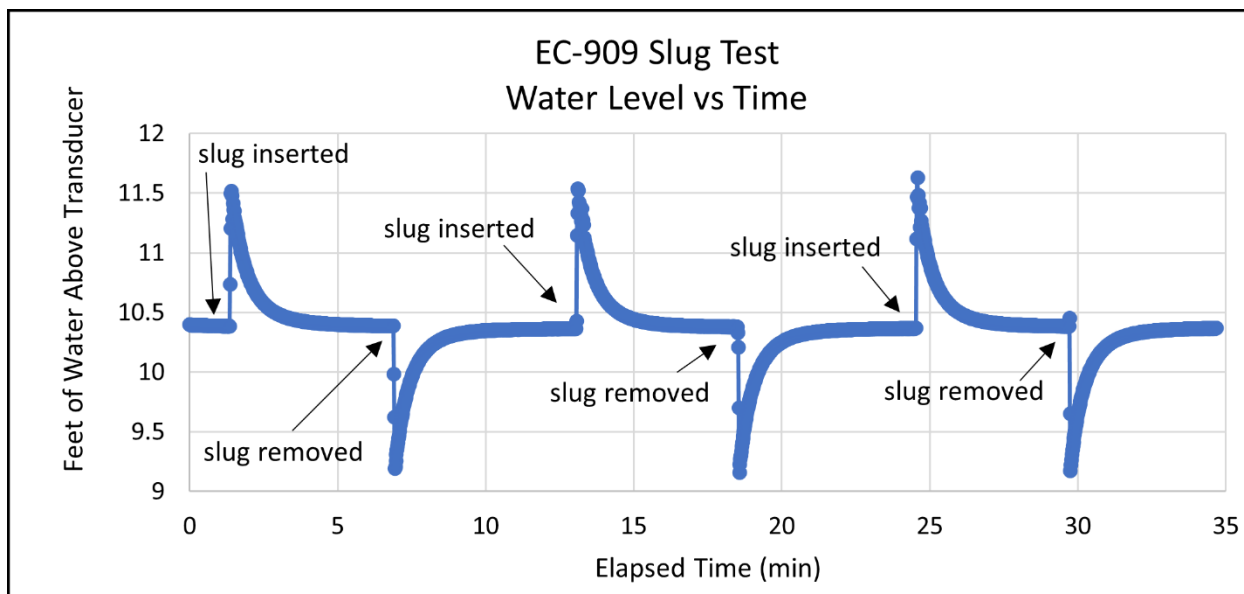


Figure 5. Slug test results for EC-909. Slug testing was performed on September 14, 2023, and shows a good hydraulic response. Data courtesy of USGS-UMWSC.

Monitoring for EC-909 began September 14, 2023.

November 6, 2024, WGNHS collected a full suite of geophysical logs (<https://data.wgnhs.wisc.edu/data-viewer/view/18000909>). A borehole video was not collected due to technical issues with the borehole video logger at the time of geophysical logging.

Analysis of the cuttings and the geophysical logs indicate that approximately 2.8 ft of unconsolidated soil, silt, and sand overlies approximately 67 ft of Cambrian quartz sandstone with intermittent red, brown, or gray clay beds, and silty to shaly sandstone. Drilling encountered 10 ft of red granite at the bottom of the borehole underlying the Cambrian sedimentary rocks. The Cambrian sequence is interpreted as the Mount Simon Formation.

The USGS-UMWSC will not apply for funding through the federally funded Climate Response Network (CRN) for long-term operation and maintenance costs for EC-909, because this well does not meet the requirement of minimal anthropogenic influence. Water levels for this well show unexpected effects of nearby pumping.

Suggestions for future work

No future work is anticipated for this well. USGS, WDNR, and WGNHS will evaluate if budgets allow for this well will be added to the long term NGWMN in the future.

LF-493 (Lafayette County, Wisc.) – converted well

USGS Site Number: N/A

USGS Site Name: N/A

WGNHS Well ID: 33000493

WDNR Well Number: AAI372

Well information

LF-493 was drilled on April 12, 2021, by Faherty & Son Well Drilling LLC as a monitoring well for a separate WGNHS project. The well is located at Pioneer Farm, which is owned and operated by the University of Wisconsin–Platteville (UW–Platteville) (fig. 6). The well was drilled using air and foam rotary^[1]. An 11-in. borehole was drilled to a reported total depth of 7 feet below land surface (ft bls), followed by a 10-in. borehole from 7 to 40 ft bls, below which, a 6-in. borehole was drilled from 40 to approximately 304 ft bls. A 6-in.-diameter steel casing was installed and cemented-in to a reported depth of 40 ft bls, below which the borehole was left open to the local bedrock (Sinnipee Group and St. Peter Formation). In October 2024 this well was retrofitted with two wells inside the open borehole: one water table well open to the Galena Formation and one deep piezometer open to the St. Peter Formation.

Latitude, longitude: 42°43′03.59″, –90°23′07.15″ (NAD83)^[2]

Current land surface datum: 1,111 feet above mean sea level (NAVD88)^[2]

Hydrologic Unit (USGS Watershed Code): 070600050302^[2]

Well completed in: USGS national aquifer 300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 365STPR (St. Peter Sandstone)^[2]

Current well depth: 303.5 ft-BTOC (301.5 ft blsd)^[3]

Current casing depth: 40.6 ft-BTOC (38.6 ft blsd)^[3]

^[1] Well details obtained from the 2021 well construction report completed by the well driller (form 3300-077A)

^[2] Well details obtained from the USGS

^[3] Well details from April 20, 2021, WGNHS geophysical log; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; NOTE that during the retrofit of LF-493 on October 1, 2024, stick up changed from 2 ft to approximately 3 ft, and the land surface datum was changed from the bottom of the wellhead to a square in the concrete pad surrounding the well

Documentation for this well is included in appendix 2.

Geophysical logs collected on April 20, 2021, for another WGNHS project, can be viewed and downloaded from: <https://data.wgnhs.wisc.edu/data-viewer/view/33000493>

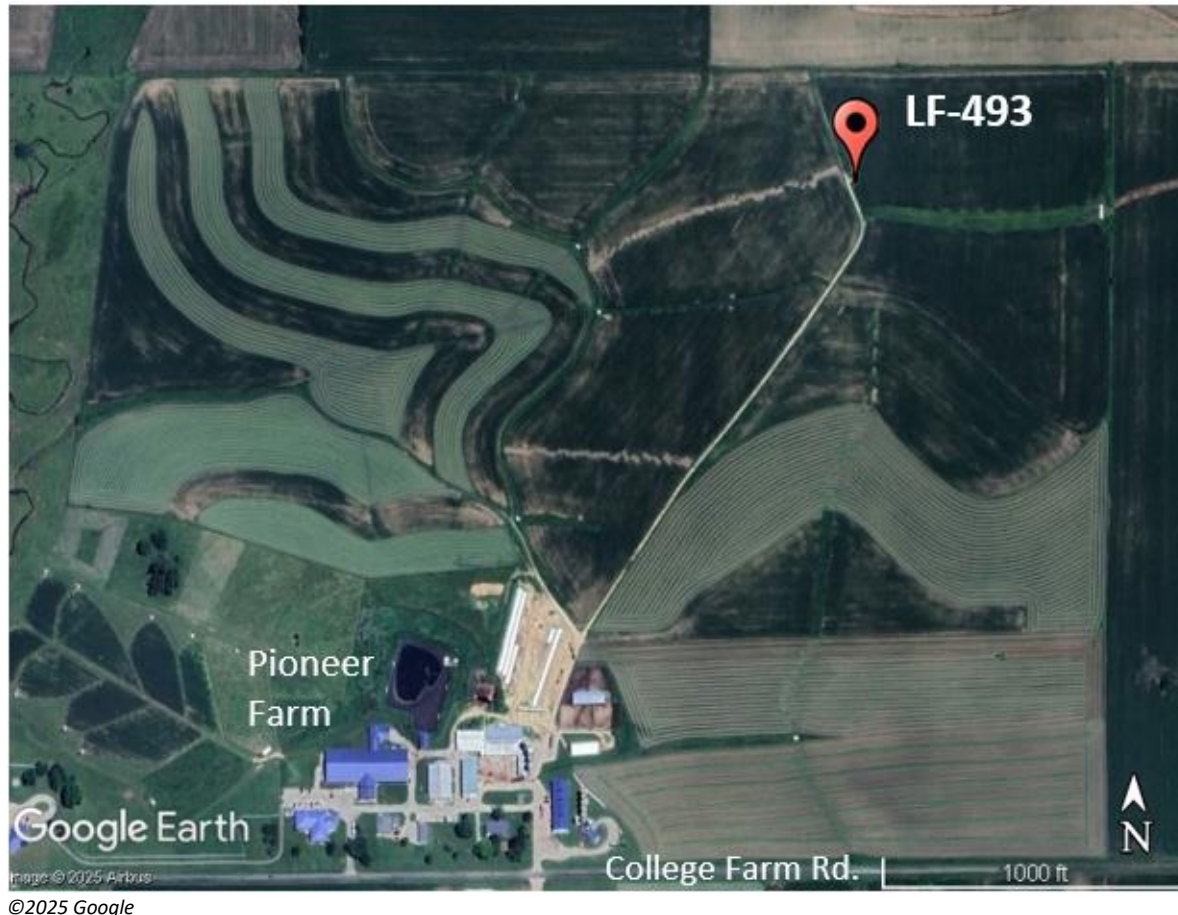


Figure 6. Location of well LF-493 (red marker) in Lafayette County, Wisc. The site is located on property owned by UW–Platteville Pioneer Farm, approximately 5 miles southeast of Platteville, Wisc.

Initial work plan

LF-493 was not in the initial proposal. Instead, two wells were proposed under objective 5 for well drilling. Work planned to include drilling two wells: one shallow well, to approximately 80 ft bldsd, open to an Ordovician carbonate aquifer, and one deep well, to approximately 300 ft bldsd, open to an Ordovician sandstone aquifer. Both new wells were designed to fill a data gap within a region of intensifying water use that is also home to sensitive surface water features. Furthermore, the pairing of two wells at the same site is a unique opportunity to target the discrete aquifer systems in a part of the state with few monitoring wells. The shallower well was designed to fill a data gap within the USGS’s Climate Response Network (CRN) for Wisconsin’s CRN Region 7.

Description of work completed

In 2023, through discussions between WGNHS, UW–Platteville, WDNR, and USGS, LF-493 was identified as a potential well to retrofit with two monitoring wells inside the borehole of LF-493. This would still meet our original objective of installing two monitoring wells, one shallow and

one deep, to target the discrete aquifer systems in part of the state. WGNHS obtained approval from UW–Platteville Pioneer Farms to complete the retrofit and establish an NGWMN/WGLMN well on their property. On October 1, 2024, two wells (LF-535 and LF-536) were installed in LF-493. Details of the retrofit of LF-493 and construction of LF-535 and LF-536 are presented below.

Suggestions for future work

In October 2024, LF-493 was converted into a well nest. No future work is anticipated for this well.

LF-535 & LF-536 (Lafayette County, Wisc.) – wells inside LF-493 borehole

USGS Site Number: 424304090230701

USGS Site Name: LF-03/01E/21-0535

WGNHS Well ID: 33000535

WDNR Well Number: WA238

USGS Site Number: 424304090230702

USGS Site Name: LF-03/01E/21-0536

WGNHS Well ID: 33000536

WDNR Well Number: WA239

Well information

On October 1, 2024, LF-535 and LF-536 were installed by Water Wells Inc. inside the well boring of LF-493, which was originally drilled in 2021 ^[1,2]. Both new wells were constructed with a 2-in.-diameter PVC casing. LF-535 was installed as a shallow water table well with a 15-ft screened interval open to the Galena Formation ^[1]. LF-536 was installed as a deep piezometer with a 5-ft screened interval open to the St. Peter Formation. The wells are located at Pioneer Farm, which is owned and operated by the University of Wisconsin–Platteville (UW–Platteville) ^[3] (fig. 7). Monitoring began in November 2024, and the wells are currently in good condition.

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=424304090230701

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=424304090230702

Latitude, longitude: 42°43′3.59″, –90°23′07.15″ (NAVD83) ^[4]

Current land surface datum: 1,111 feet above mean sea level (NAVD88) ^[4]

Hydrologic Unit (USGS Watershed Code): 070600050302 ^[4]

Wells completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and LF-535 in local aquifer 365GLEN (Galena Formation); LF-536 in local aquifer 365STPR (St. Peter Sandstone) ^[3,4]

Current screened interval (LF-535): 62 to 77 ft-BTOPC (59.4 to 74.4 ft blsd) ^[2,5]

Current screened interval (LF-536): 298 to 303 ft-BTOPC (295.5 to 300.5 ft blsd) ^[5]

Current well boring depth: 303.5 ft-BTOC (301.5 ft blsd) ^[4]

^[1] Well details obtained from LF-493 2021 well construction report completed by the well driller (form 3300-077A)

^[2] Well details obtained from 2024 well construction reports completed by the WGNHS (form 4400-113A)

^[3] Well details obtained from work completed for this funding opportunity

^[4] Well details obtained from the USGS; ft-BTOC = feet below top of steel casing; well casing stick up is 3 ft; land surface datum is a square notch next to well in cement pad

^[5] Well boring depth interpreted from April 20, 2021 WGNHS geophysical logs completed on the open hole of LF-493; well depth interpreted from WGNHS geophysical logs and March 8, 2022 USGS-UMWSC tape-down; ft-BTOPC = feet below top of PVC casing; ft blsd = feet below land surface datum; well casing stick up for LF-535 is 2.56 ft; well casing stick up for LF-536 is 2.46 ft; land surface datum is a square notch next to well in cement pad

Documentation for this well is included in appendix 2.

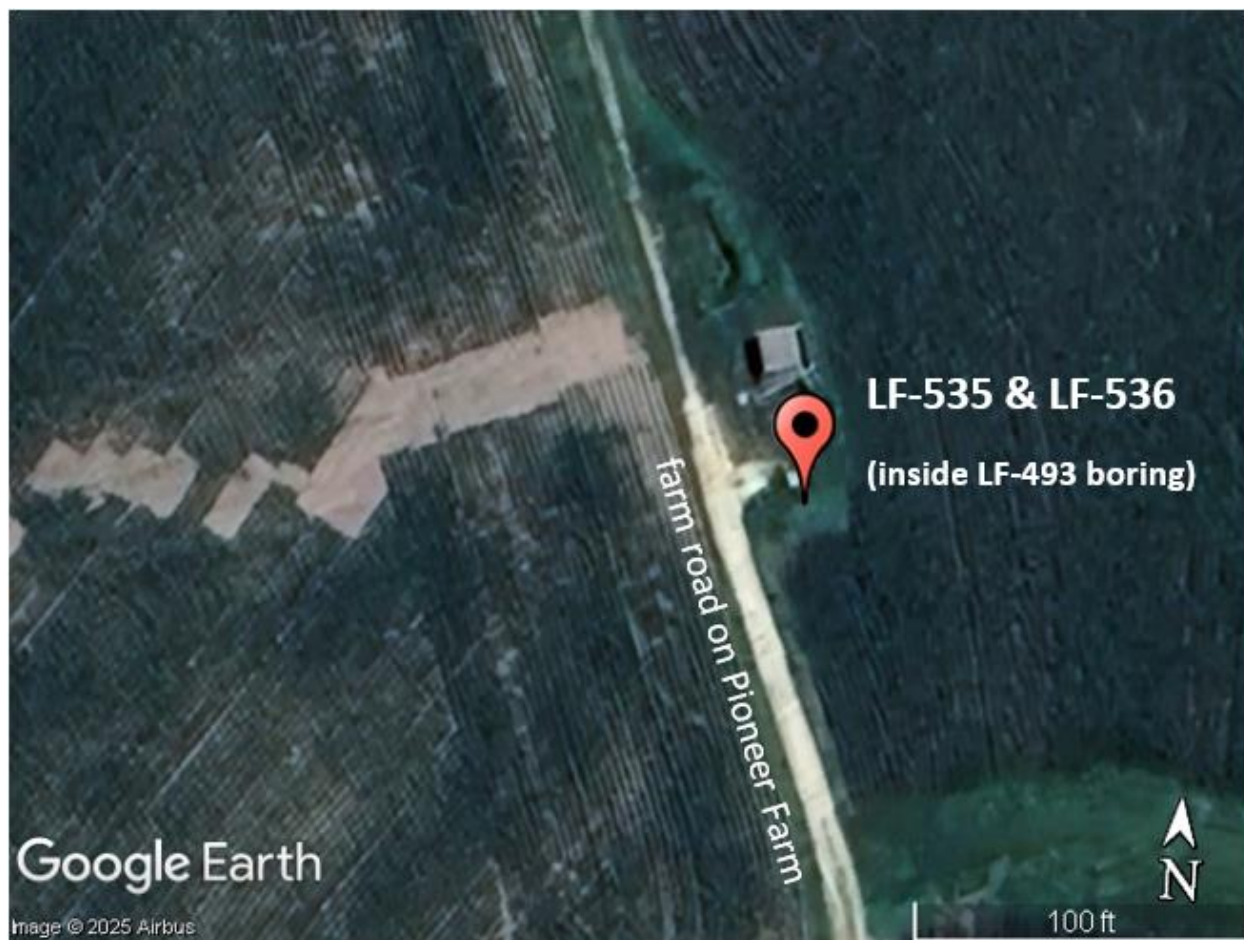


Figure 7. Location of wells LF-535 and LF-536 (red marker) in Lafayette County, Wisc. The site is located on property owned by UW–Platteville Pioneer Farm, approximately 5 miles southeast of Platteville, Wisc. Both wells are constructed inside the boring of LF-493 (fig. 6).

Initial work plan

LF-535 and LF-536 were initially proposed under objective 5 for well drilling. Work planned to include drilling two wells: one shallow well, to approximately 80 ft bldsd, open to an Ordovician carbonate aquifer in the Galena Formation, and one deep well, to approximately 300 ft bldsd, open to an Ordovician sandstone aquifer in the St. Peter Formation. Both new wells were designed to fill a data gap within a region of intensifying water use that is also home to sensitive surface water features. Furthermore, the pairing of two wells at the same site is a unique opportunity to target the discrete aquifer systems in a part of the state with few monitoring wells. The shallower well was designed to fill a data gap within the USGS’s Climate Response Network (CRN) for Wisconsin’s CRN Region 7.

Borehole cuttings were to be collected, processed, used to generate a lithologic log, and archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount

Horeb, Wisc. Following the completion of the drilling, the plan of work for this site also included characterization of the wells with borehole videos, full suites of geophysical logs, and slug tests to evaluate the well-aquifer connections.

Description of work completed

In 2023, through discussions between WGNHS, UW–Platteville, WDNR, and USGS, LF-493 was identified as a potential well to retrofit with two monitoring wells inside the borehole of LF-493. This would still meet our original objective of installing two monitoring wells, one shallow and one deep, to target the discrete aquifer systems in this part of the state. WGNHS obtained approval from UW–Platteville Pioneer Farms to complete the retrofit and establish an NGWMN/WGLMN well on their property. On September 30, 2024, the WGNHS pumped several well-volumes from LF-493, and on October 1, 2024, two wells (LF-535 and LF-536) were installed inside LF-493 (fig. 8).

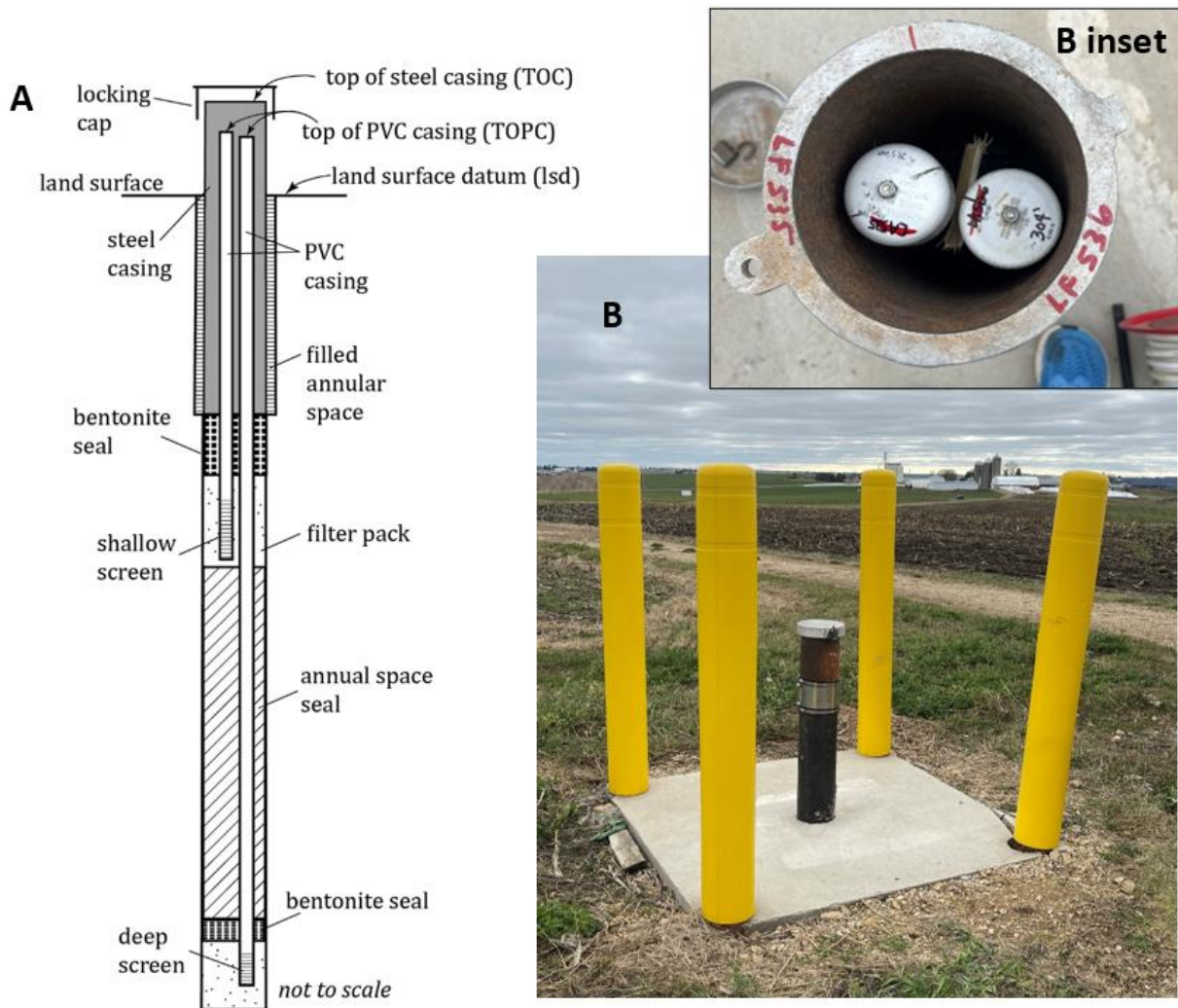


Figure 8. Panel A, simplified well construction diagram for LF-535 (shallow well) and LF-536 (deep well). Both wells were constructed inside the boring for LF-493. The diagram is not to scale. Panel B, newly (continued from previous page) completed well nest containing LF-535 & LF-536 with locking wellhead

protector and four protective yellow bollards. Panel B inset shows a top-down view into the well boring. Note that during construction, the wellhead was extended, and a new land surface datum was established. Photos courtesy of USGS-UMWSC.

The retrofit of LF-493 was completed by Water Wells Inc. Both wells were constructed using a 2-in.-diameter PVC casing. LF-536 was fitted with a 5-ft screen installed from approximately 295.5 to 300.5 ft blsd, into the St. Peter Formation sandstone aquifer (figs. 8a and 9). The borehole was backfilled with filter pack to approximately 287 ft blsd. A bentonite seal was then added to 74 ft blsd. LF-535 was fitted with a 15-ft screen installed from approximately 74 to 59 ft blsd, into the Galena Formation carbonate aquifer (figs. 8a and 9). The borehole was backfilled with filter pack from 75 to 52 ft blsd, and a second bentonite seal was then added to 1 ft blsd. The well was fixed with a locking, protective, steel wellhead and four protective bollards (fig. 8B). To fulfill reporting requirements with the WDNR, monitoring well construction forms 4400-113A were completed by WGNHS and submitted to the WDNR for each new well.

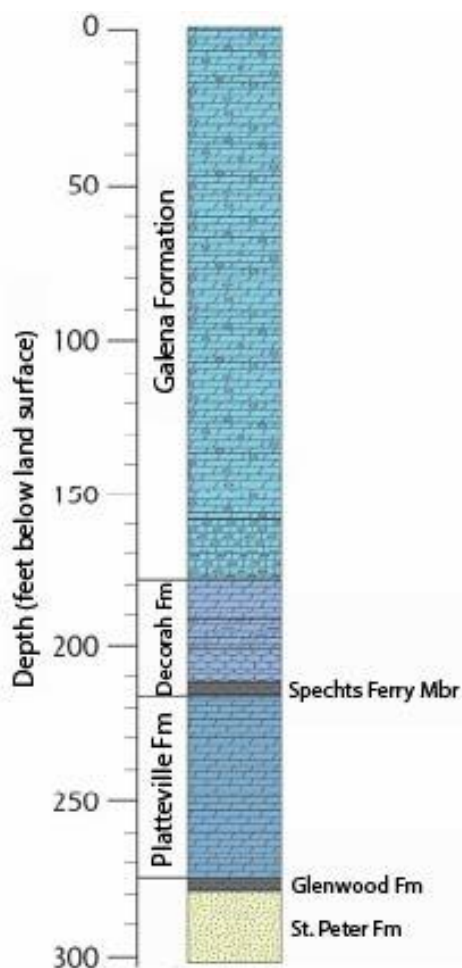


Figure 9. Geology for borehole (LF-493). Interpretation by WGNHS based on cuttings collected during drilling of well on April 12, 2021 (for a different WGNHS project) and borehole geophysical logs (including OBI), collected on April 20, 2021. Fm = formation; Mbr = member.

November 12, 2024, the USGS-UMWSC surveyed the well using RTN-GPS, completed a slug test on both wells to test the well-aquifer connection, and installed pressure transducers to begin recording continuous water-level data. The slug tests were both performed using a 1-in.-diameter, 4-ft-long solid PVC slug. The slug was inserted and removed once per well and the water level responded relatively quickly (fig. 10). The slower response of LF-535 is due to the tight carbonate aquifer. The slug tests indicate a good connection to both the shallow and deep bedrock aquifers.

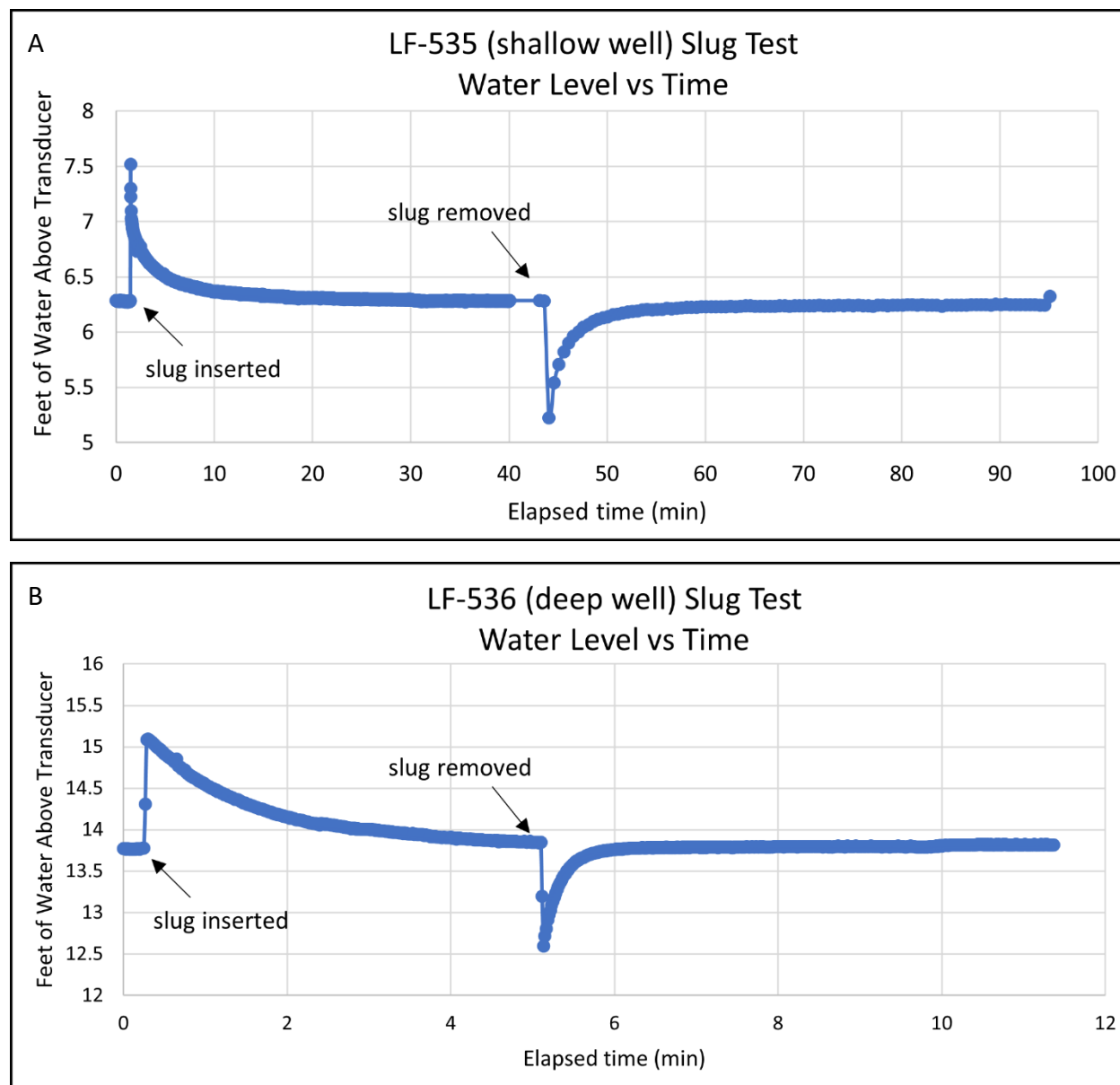


Figure 10. Slug tests performed on wells LF-535 (Panel A) and LF-536 (Panel B) by the USGS-UMWSC on November 12, 2024. The rapid response of the water level indicates a good connection to both aquifers. Data courtesy of the U.S. Geological Survey.

No geophysical logs were collected for well LF-535 or LF-536 due to their 2-in.-diameter PVC casing and bentonite seals. WGNHS collected geophysical logs on well LF-493 April 20, 2021, as part of a different project. See the above well section for LF-493.

Suggestions for future work

No future work is anticipated for these wells except for routine monitoring and maintenance by the USGS-UMWSC.

The USGS-UMWSC plans to apply for funding through the federally funded Climate Response Network (CRN) for long-term operation and maintenance costs to add LF-535 to the CRN Network Region 7.

LA-537 (Langlade County, Wisc.) – replaced by LA-1498

USGS Site Number: 452603089111601

USGS Site Name: LA-34/10E/13-0537

WGNHS Well ID: 34000537

WDNR Well Number: unknown

Well information

LA-537 was drilled in September 1981^[1] and completed to a reported total depth of 97 feet below land surface (ft bls). A 5-in. hole was drilled to 97 ft bls using a cable tool. A 5-in.-diameter steel casing was installed to a reported depth of 94 ft bls with a 5-in.-diameter stainless screen installed from 94 to 97 feet below land surface (ft bls). The well is located on private property in Elcho, Wisc. (fig. 11), and cannot be accessed due to its use as a private supply well, complete with a pump. Monitoring began in 1983^[2]. Due to the well's status as a privately owned potable-supply well, the WGLMN/NGWMN management team has decided to discontinue monitoring and drill a replacement well on public property. LA-537 was effectively replaced in both the WGLMN and NGWMN by LA-1498 in November 2023^[3]. Monitoring of LA-537 ended in July 2022 as it can no longer be accessed or opened. LA-537 was successfully replaced by LA-1498 in November 2023. Historical water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=452603089111601

Latitude, longitude: 45°26'03.39", -89°11'16.39" (NAD83)^[2]

Current land surface datum: 1629.0 feet above mean sea level (NAVD88)^[2]

Hydrologic Unit (USGS Watershed Code): 040302020202^[2]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 100SDGV (Sand and Gravel Aquifer)^[2]

Casing depth before monitoring discontinued: unknown, pump in well prohibits measuring^[3]

Well depth before monitoring discontinued: unknown, pump in well prohibits measuring^[3]

^[1] Well details obtained from 1981 well construction report (form 3300-15)

^[2] Well details obtained from the USGS

^[3] Well details obtained from work completed for this funding opportunity; well casing stick up was 0.47 ft; land surface datum was a 1" pipe driven into ground about 10" northeast of well

Documentation for this well is included in appendix 3.



Figure 11. Location of well LA-537 (red marker) in Langlade County, Wisc. Site is located on private property in southwestern Elcho, Wisc.

Initial work plan

This well was initially proposed under objective 5 for well replacement. Work planned to include drilling a replacement well nearby in the same aquifer. Prior to discontinuing monitoring, work also planned to include concurrent monitoring of the two wells to establish an overlapping water-level record. The ability to collect concurrent water levels was assumed to be limited due to use of LA-537 as a private potable-supply well. Because LA-537 is a private supply well, WGNHS planned to contract with a licensed water well driller to ensure a bacteria-free sample after discontinuing monitoring and removing the water level measurement instrumentation.

Description of work completed

WGNHS obtained approval to drill a replacement well for LA-537. When LA-537 was visited for this grant period, it was discovered to be inaccessible as the well could not be opened (fig. 12). Therefore, concurrent monitoring could not be completed, nor could measurements be performed on LA-537. LA-537 was not abandoned due to the landowner wanting to keep the well; however, it was removed from both the WGLMN and NGWMN. Monitoring of LA-537 was discontinued on July 14, 2022. A replacement well (LA-1498) was drilled in November 2023.

Details of the replacement well are presented below.



Figure 12. Panel A, LA-537 before initial visit for this grant period showing poor access due to compression fitting with original pump discharge plumbing. Panel B, further modifications on LA-537, making it inaccessible. Photos courtesy of U.S. Geological Survey.

Suggestions for future work

LA-537 was dropped from the NGWMN network in Wisconsin in July of 2022; it is no longer accessible. Due to use by the well owner, LA-537 was not abandoned. No future work remains.

LA-1498 (Langlade County, Wisc.) – replaces LA-537

USGS Site Number: 452610089134101

USGS Site Name: LA-34/10E/15-1498

WGNHS Well ID: 34001498

WDNR Well Number: ABQ837

Well information

LA-1498 was drilled as a replacement well for LA-537 in November 2023, by Drews Well Drilling Inc. ^[1] The well is located on Langlade County property at Moccasin Lake Cross Country Ski and Snowshoe Trails, approximately 2 miles west of LA-537 in Elcho, Wisc. (fig. 13). The 6-in.-diameter steel casing has a 3-ft-long screened interval that is open to the local unconsolidated sand and gravel aquifer ^[2]. Monitoring began in June 2024 and the well is currently in good condition.

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=452610089134101

Latitude, longitude: 45°26′09.71″, –89°13′41.25″ (NAD83) ^[3]

Current land surface datum: 1749.00 feet above mean sea level (NAVD88) ^[3]

Hydrologic Unit (USGS Watershed Code): 040302020202 ^[3]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 100SDGV (Sand and Gravel Aquifer) ^[3]

Current well depth: 141 ft-BTOC (139 ft blsd) ^[2]

Current depth of screened interval: 138 to 141 ft-BTOC (136 to 139 ft blsd) ^[1,2]

^[1] Well details obtained from 2023 well construction report completed by the well driller (form 3300-077A)

^[2] Well details obtained from June 6, 2024 USGS-UMWSC tape-down; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.79 ft; land surface datum is a bolt in the well casing

^[3] Well details obtained from the USGS

Documentation for this well is included in appendix 3.



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(see figure on previous page) **Figure 13.** Panel A, location of well LA-1498 (larger red marker) in Langlade County, Wisc. LA-1498 replaced LA-537 (smaller red marker), which is approximately 2 miles east of LA-1498. Panel B, LA-1498 (red marker) is located at Moccasin Lake Cross Country Ski and Snowshoe Trails, approximately 2.2 miles west of Elcho, Wisc.

Initial work plan

LA-1498 was originally proposed under objective 5 for well drilling. Work planned to include drilling the well to replace LA-537, constructing the well as similarly as possible to LA-537 in the same aquifer. The plan of work for this site also included a slug test to evaluate the well-aquifer connection. Borehole cuttings were planned to be collected, processed, used to generate a lithologic log, and archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. Concurrent operation of LA-537 and its replacement was also planned to establish an overlapping water-level record.

Description of work completed

In 2022, the WGNHS worked closely with the Langlade County Forest Administrator to identify potential well drilling sites. In March 2023, the WGNHS obtained permission to drill the replacement well on Langlade County property at Moccasin Lake Cross Country Ski and Snowshoe Trails and obtained a land-access agreement.

Drilling of replacement well LA-1498 was completed on November 30, 2023, by Drews Well Drilling Inc. in compliance with Wisconsin Administrative Code NR812 (fig. 14). Using dual rotary, a 6-in.-diameter borehole was drilled to a total depth of approximately 139 ft blsd. A 6-in.-diameter steel casing was installed to a reported depth of 136 ft blsd, below which 3 ft of 5-in.-diameter slotted steel was installed to 139 ft blsd with a rubber seal between the screen and casing.

Drill cuttings were collected every 5 ft and used to generate a lithologic description of the well borehole (see soil boring log 4400-122 completed by WGNHS). Cuttings were archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. Most of the borehole consists of sand and gravel, with clay and fine sand in the lower 20 ft.

LA-1498 was developed by the well driller after the well was completed on November 30, 2023, using a test pump method (see WCR form 3300-077A completed by the well driller). To fulfill reporting requirements the WCR was submitted to WDNR by the well driller.

The well was fixed with a locking, protective, steel wellhead, and two protective bollards were installed around it (fig. 14b).

No geophysical logs were collected for well LA-1498 due to its construction into unconsolidated glacial material.

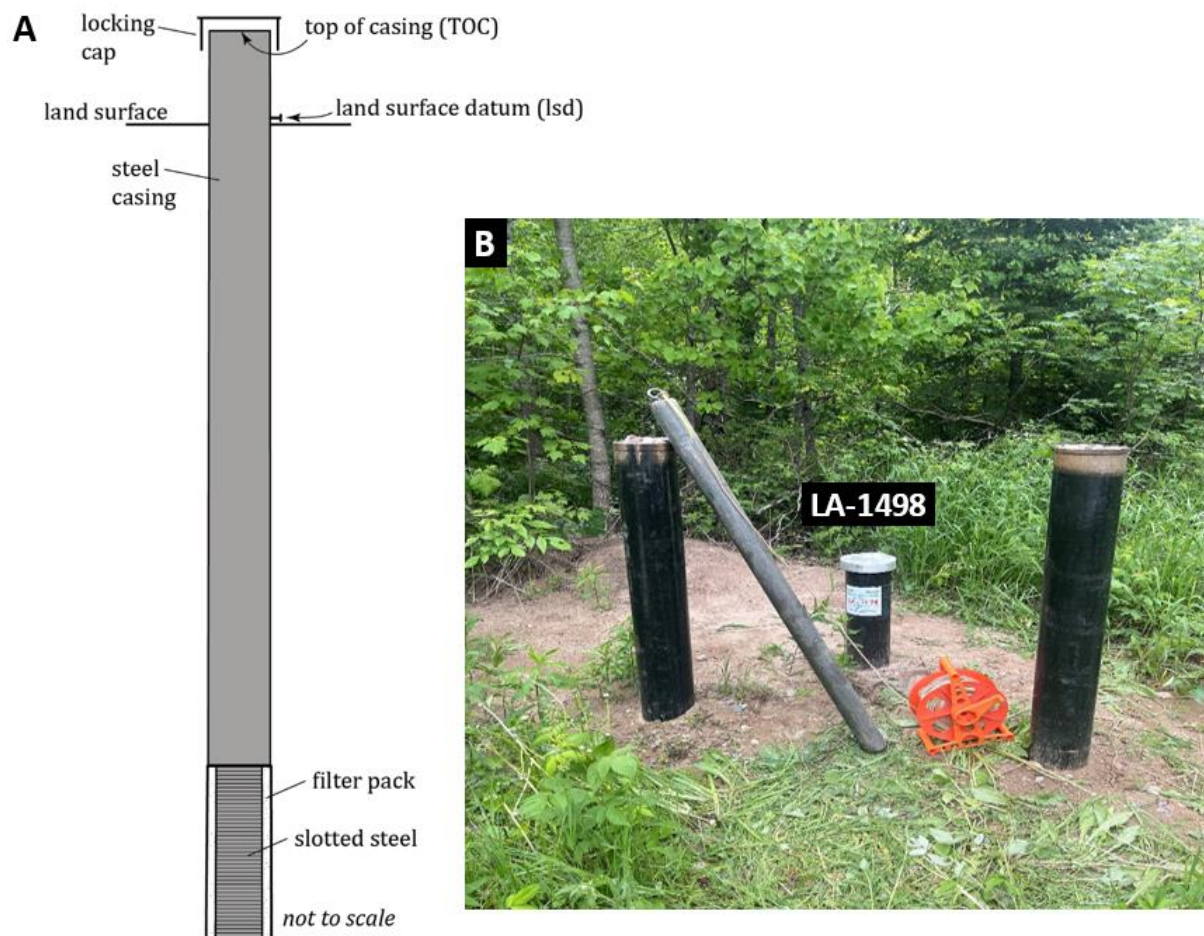


Figure 14. Panel A, simplified well construction diagram for LA-1498. The diagram is not to scale. Panel B, newly completed well LA-1498 with locking wellhead protector and two protective bollards. Orange reel and attached slug shown in the foreground. Photo courtesy of USGS-UMWSC.

June 6, 2024, the USGS-UMWSC surveyed the well using RTN-GPS, completed a slug test to test the well-aquifer connection, and installed a pressure transducer to begin recording continuous water-level data. The slug test was performed using a 3-in.-diameter, 5-ft-long solid PVC slug. The slug was inserted and removed several times, and the water level responded quickly every time (fig. 15), indicating a good connection to the unconsolidated aquifer.

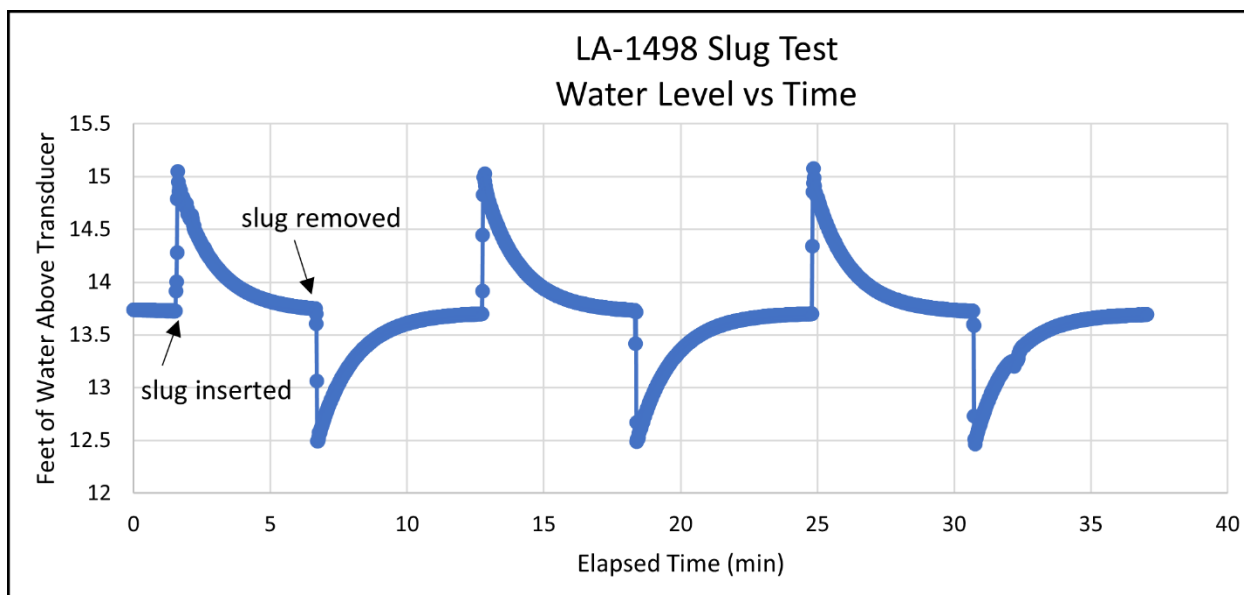


Figure 15. Slug test performed on well LA-1498 by the USGS-UMWSC on June 6, 2024. The rapid response of the water level indicates a good connection to the aquifer. Data courtesy of the U.S. Geological Survey.

Monitoring for LA-1498 began June 6, 2024. Concurrent water-level data with LA-537 were not collected, as LA-537 was dropped from the NGWMN/WGLMN in July of 2022.

WGNHS and WDNR plan to install an educational sign at this site, similar to at well PT-1821; see work completed section for well PT-1821.

Suggestions for future work

LA-1498 successfully replaced LA-537. No future work is anticipated for this well except for routine monitoring and maintenance by the USGS-UMWSC.

MT-07 (Marinette County, Wisc.) – replaced by MT-488

USGS Site Number: 453816087590101

USGS Site Name: MT-37/20E/34-0007

WGNHS Well ID: 38000007

WDNR Well Number: unknown

Well information

MT-07 was drilled by an unknown driller in November 1938 on private property in Pembine, Wisc. ^[1]. No well construction reports have been found for this well and very little is known about the construction. Based on historical USGS records and a well evaluation study by the WGNHS and USGS in the mid-1990s ^[1,2], described in a 1996 report (Dunning and others, 1996), the well likely was completed with an 8-in.-diameter casing with an open end that extended to 33 feet below land surface (ft bls). The 1996 report (Dunning and others, 1996) determined that MT-07 was poorly connected to the surrounding aquifer based on slug testing. Based on this evaluation, the WGNHS obtained funding to install a replacement well, which was drilled in June 2000 on the same private land within 5 ft of the original well (fig. 16). A basic diagram of the replacement well (including mention of geology encountered) is also included in the report by Batten and others (2000). This new well was assigned the same well name (MT-07) and completed to a reported total depth of 33 feet below land surface datum (ft blsd) ^[3]. A 4-in.-diameter PVC casing was set to a reported depth of 28 ft blsd with a screened interval from 28 to 33 ft blsd, open to the local sand and gravel aquifer. Including both wells, water-level monitoring has occurred at this site since March 1939 ^[1], representing one of the longest records in the WGLMN. Monitoring ended in May 2021 due to loss of access to the well and deterioration of the wellhead ^[4]. MT-07 was successfully replaced by MT-488 in November 2023. Historical water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=453816087590101

Latitude, longitude: 45°38'14.62", -87°59'01.21" (NAD83) ^[4]

Current land surface datum: 969.3 feet above mean sea level (NAVD88) ^[4]

Hydrologic Unit (USGS Watershed Code): 04030108 ^[4]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110SANDP (Sand (Holocene and/or Pleistocene)) ^[3,4]

Last known well depth (2020): 36.8 ft-BTOC (33.95 ft blsd) ^[4]

Current depth of screened interval: unknown, well is inaccessible, originally 28 to 33 ft blsd ^[3, 4]

^[1] Well details obtained from historical scanned documents; no WCR was found for MT-07

^[2] Well details obtained from historical geophysical logs published in Dunning and others (1996)

^[3] Well details obtained from well construction diagram published in Batten and others (2000)

^[4] Well details obtained from the USGS; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; stick up of redrilled MT-07 was 2.8 ft; land surface datum was a 1" capped pipe driven into ground at base of well

Documentation for this well is included in appendix 4.

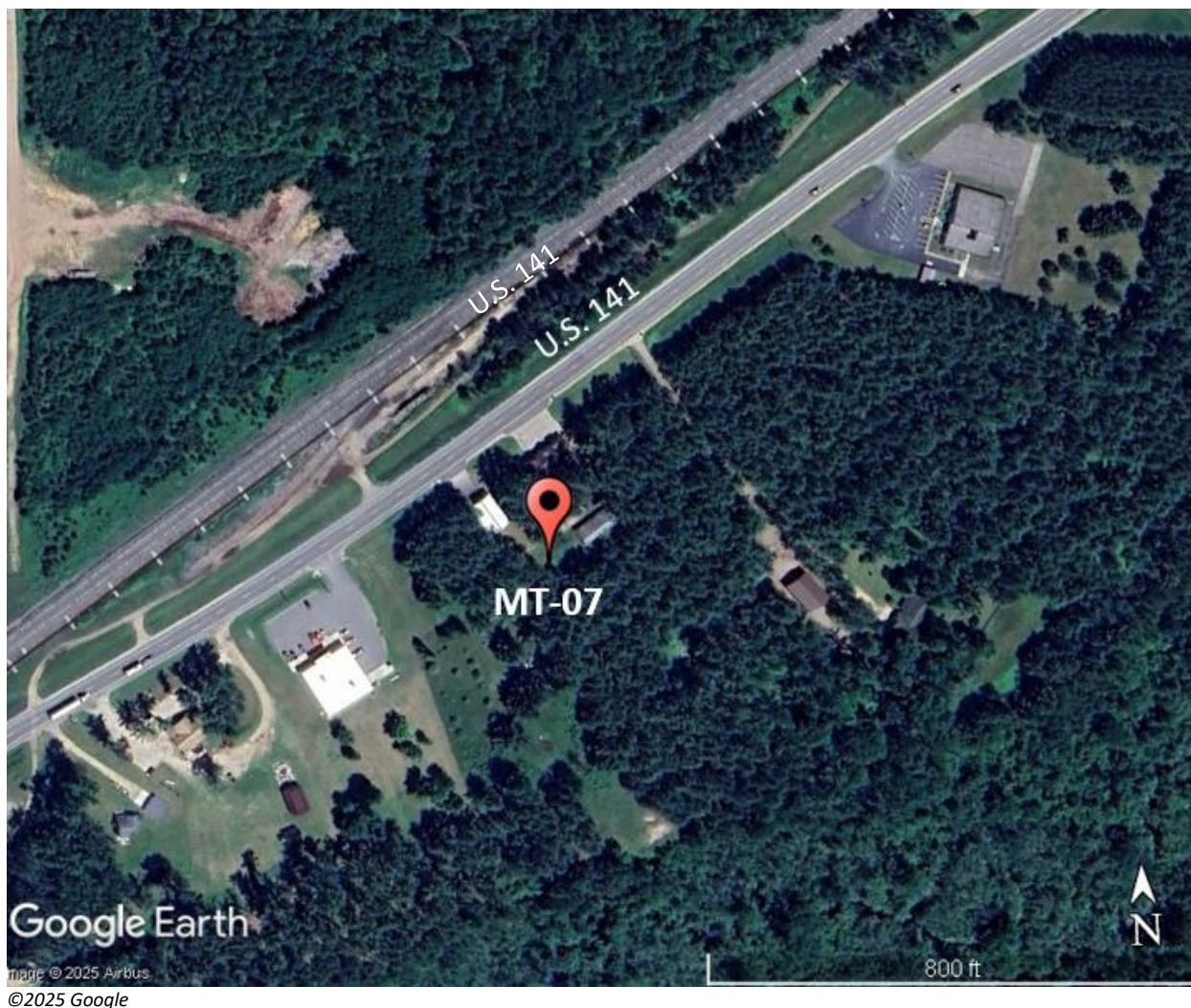


Figure 16. Location of well MT-07 (red marker) in Marinette County, Wisc. Site is located on private property along U.S. Highway 141 in Pembine, Wisc., approximately 0.25 miles west of County Road R.

Initial work plan

MT-07 was initially proposed under objective 5 for well replacement. Due to wellhead deterioration, inaccessibility, and concern for the future sustainability of this site, WGNHS planned to drill a replacement well nearby in the same aquifer to ensure a continued monitoring record for this important site. Prior to the abandonment of MT-07, concurrent operation of MT-07 and its replacement was also planned.

Description of work completed

WGNHS obtained approval to drill a replacement well for MT-07. No work could be completed on MT-07 due to the well no longer being accessible. Monitoring ended on May 7, 2021. This loss of access prevented concurrent monitoring and abandonment of MT-07. A replacement well (MT-488) was drilled on November 13, 2023. Details of the replacement well are presented below.

Suggestions for future work

MT-07 was dropped from the NGWMN network in Wisconsin in May of 2021; it is no longer accessible. No future work remains.

MT-488 (Marinette County, Wisc.) – replaces MT-07

USGS Site Number: 453657087594101

USGS Site Name: MT-36/20E/03-0488

WGNHS Well ID: 38000488

WDNR Well Number: WB812

Well information

MT-488 was drilled as a replacement well for MT-07 on November 13, 2023, by ECS Midwest, LLC ^[1]. The well is located on property owned by the WDNR in Pembine, Wisc. (fig. 17). The 2-in.-diameter PVC casing has a 15-ft screened interval open to the local unconsolidated sand and gravel aquifer ^[1]. Monitoring began on June 6, 2024 ^[2] and the well is currently in good condition. Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=453657087594101

Latitude, longitude: 45°36'57.05", –87°59'40.51" (NAD83) ^[2]

Land surface datum: 974.01 feet above mean sea level (NAVD88) ^[2]

Hydrologic Unit (USGS Watershed Code): 040301080606 ^[2]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110SANDP (Sand (Holocene and/or Pleistocene)) ^[2]

Current well depth: 39 ft-BTOC (36 ft blsd) ^[1,3]

Current depth of screened interval: 24 to 39 ft-BTOC (21 to 36 ft blsd) ^[1,3]

^[1] Well details obtained from 2023 well construction report completed by WGNHS (form 4400-113A)

^[2] Well details obtained from the USGS

^[3] Well details obtained from June 6, 2024 USGS-UMWSC tape-down; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 2.83 ft; land surface datum is a rebar at base of well

Documentation for this well is included in appendix 4.

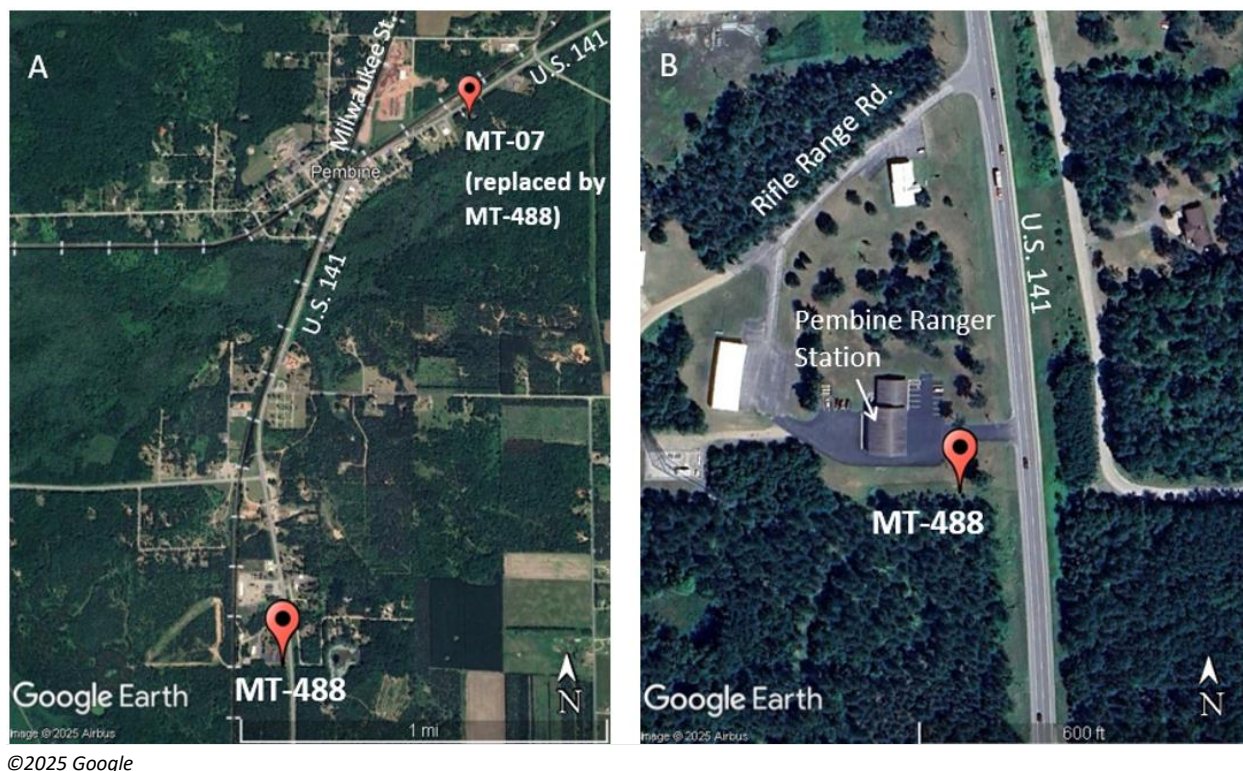


Figure 17. Panel A, location of well MT-488 (larger red marker) in Marinette County, Wisc. MT-488 replaced MT-07 (smaller red marker), which is approximately 1.6 miles northeast of MT-488. Panel B, MT-488 (red marker) is located near the Pembine Ranger Station on property owned by the WDNR in the Town of Pembine, Wisc.

Initial work plan

This well was initially proposed under objective 5 for well drilling. Work planned to include drilling a replacement well for MT-07, constructed as similarly as possible to MT-07 into the same aquifer system. The plan of work for this site also included characterization of the replacement well with a slug test to evaluate the well-aquifer connection. Borehole cuttings were planned to be collected, processed, used to generate a lithologic log, and archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. Concurrent operation of MT-07 and its replacement was also planned to establish an overlapping water-level record.

Description of work completed

WGNHS worked with WDNR and USGS to find a suitable location to drill a replacement well for MT-07. In early 2023, a draft land access agreement was established to drill a new well at the WDNR Pembine Ranger Station. On November 13, 2023, ECS Midwest LLC completed the drilling of MT-488 in compliance with Wisconsin Administrative Code NR141. Using a hollow stem auger, an 8.4-in.-diameter borehole was drilled to a total depth of 36 ft blsd. Drill cuttings were collected every 5 ft using a split spoon method and used to generate a lithologic description of the well borehole (see soil boring log 4400-122 completed by WGNHS). Cuttings

were archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. The entire borehole primarily consists of glacial outwash material. The glacial outwash material is composed of fine to coarse, poorly sorted sand with trace gravel to cobbles.

A 2-in.-diameter PVC casing was subsequently installed to a total depth of 21 ft blsd, below which a 15-ft-long schedule 40 PVC screen was installed from 21 to 36 ft blsd, open to the local unconsolidated glacial sand and gravel aquifer. The screened interval was filter-packed with #40 red flint and #15 red flint, then sealed with bentonite and finished with a locking protective well cover (fig. 18).

MT-488 was developed on November 13, 2023, using a surge block with bailer, and pumped for 90 minutes, after which the water ran clear. To fulfill reporting requirements with the WDNR, a well construction form 4400-113A, soil boring log 4400-122, and monitoring well development form 4400-113B were completed by the WGNHS and submitted to the WDNR.

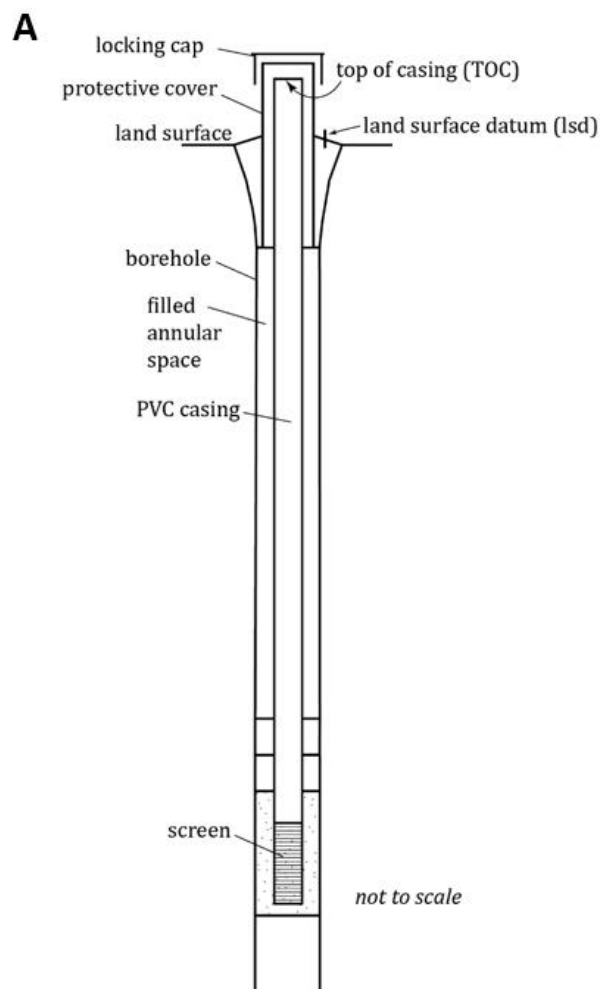


Figure 18. Panel A, simplified well construction diagram for MT-488. The diagram is not to scale. Panel B, newly completed well MT-488 with locking wellhead protector. Photo courtesy of USGS-UMWSC.

The WGNHS did not collect geophysical logs or an optical borehole image because MT-488 was completed with a 2-in.-diameter PVC casing and bentonite seal.

On June 6, 2024, the USGS-UMWSC surveyed MT-488 using RTN-GPS, completed a slug test to test the well-aquifer connection, and installed a pressure transducer to begin recording continuous water-level data.

The slug test was completed using a 1 and 3/8-in.-diameter, 5-ft-long solid cylindrical PVC slug. The slug was inserted and removed three times and each time, the water column was quickly displaced by approximately 1 ft and recovered quickly (fig. 19). These results indicate a good connection to the local unconsolidated aquifer.

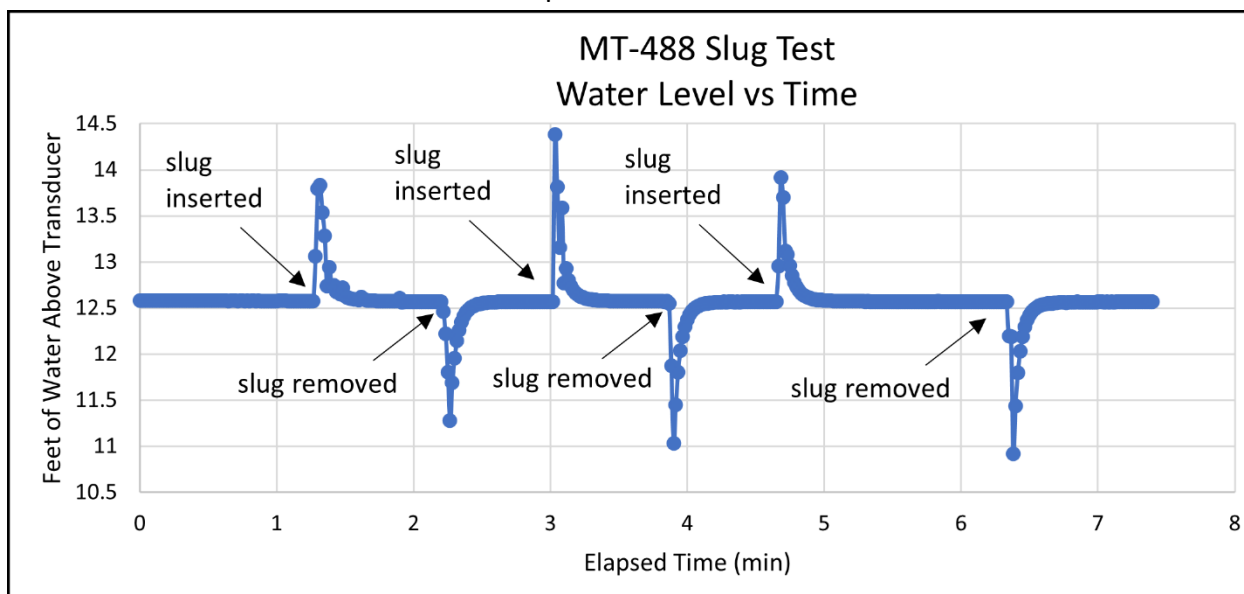


Figure 19. Slug test performed on well MT-488 by the USGS-UMWSC on June 6, 2024. The rapid response of the water level indicates a good connection to the aquifer. Data courtesy of the U.S. Geological Survey.

Monitoring of MT-488 began June 6, 2024. Concurrent monitoring of MT-488 and MT-07 could not be completed due to MT-07 no longer being accessible, and monitoring on MT-07 ended May 7, 2021.

Suggestions for future work

MT-488 successfully replaced MT-07. No future work is anticipated for this well except for routine monitoring and maintenance by the USGS-UMWSC.

MO-17 (Monroe County, Wisc.) – replaced by MO-334

USGS Site Number: 440026090390101

USGS Site Name: MO-18/02W/29-0017

WGNHS Well ID: 42000017

WDNR Well Number: None

Well information

MO-17 well was drilled in a wooded area on U.S. Army property (fig. 20) by M. F. Baley in 1940^[1] to a reported total depth of 192 feet below land surface (ft bls) to supply water for Fort McCoy^[2]. The 1940 lithologic log reports the well depth to be 190 ft bls; however, USGS measurements and work done for the most recent well evaluation indicate the well was drilled to 192 ft bls. A 10-in.-diameter steel casing was installed in the 10-in.-diameter borehole to a reported total depth of 109 ft bls^[1]. Some older records report a 9-in.-diameter casing; however, this is incorrect. Below the casing, the borehole was left open to the sandstone bedrock aquifer. As part of USGS-NGWMN Award #G18AC00069, WGNHS evaluated this well, found MO-17 to have a poor aquifer connection, and ultimately ended up recommending the well be replaced (Bremmer and others, 2022). Since then, the USGS-UMWSC has reported unexplained jumps in the water levels, providing further evidence of poor aquifer response^[3]. Monitoring began in 1950^[3] and ended March 13, 2025. MO-17 was successfully replaced by MO-334 in July 2024. Historical water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=440026090390101

Latitude, longitude: 44°00′25.40″, –90°39′01.81″ (NAD83)^[2]

Current land surface datum: 905.5 feet above mean sea level (NAVD88)^[2]

Hydrologic Unit (USGS Watershed Code): 07040006^[2]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 300SNDISA (Sandstone Aquifer)^[2]

Last known well depth: 191.5 ft-BTOC (191 ft blsd)^[4]

Last known casing depth: 109 ft-BTOC (108.5 ft blsd)^[4]

^[1] Well details obtained from 1940 lithologic log; no WCR was found for MO-17

^[2] Well details obtained from 1949 USGS well schedule

^[3] Well details obtained from USGS

^[4] Well details obtained from Bremmer and others (2022); ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 0.52 ft; land surface datum is 1.5-inch pipe in ground, 1 inch north of well

Documentation for this well is included in appendix 5. Historical records for this well can be found in appendix 14 of Bremmer and others (2022).



Figure 20. Location of well MO-17 (red marker). The site is located on Fort McCoy U.S. Army property approximately 135 ft south of State Highway 21 and 540 ft east of X Rd between Tomah and Fort McCoy, Wisc.

Initial work plan

This well was initially proposed under objective 5 for well replacement. A previous evaluation by the WGNHS in 2019–2020, as part of USGS-NGWMN Award # G18AC00069, determined that the well is severely compromised and inaccessible for redevelopment or service due to the encroachment of trees and should be replaced (Bremmer and others, 2022). While the well depth is reportedly 191 ft blsd, the borehole video camera entered soft muck (most likely accumulated biofoul sediment) at a depth of 108 ft blsd and was obstructed at 124 ft blsd.

The USGS-UMWSC has recently reported unexplained jumps in the water levels, providing further evidence of poor aquifer response and a need for well replacement. Due to the overall deterioration of the well, inability to access for redevelopment, and inconsistent water-level measurements, work planned to include drilling a replacement well nearby in the same aquifer. Prior to abandonment of MO-17, concurrent operation of MO-17 and its replacement was also planned to establish an overlapping water-level record.

Description of work completed

WGNHS obtained approval to drill a replacement well for MO-17 and continue monitoring at this site until appropriate concurrent water level data were collected. The replacement well (MO-334) was drilled in July 2024. Details of the replacement well are presented below. Continuous monitoring of MO-17 ended on March 13, 2025. MO-17 was filled, sealed, and abandoned in early July 2025 by Nelson Plumbing and Electric Inc. using 97 bags of bentonite

chips. The steel casing could not be cut off below grade due to a buried culvert that surrounds the well, it was cut off at land surface and filled with concrete. A fill and seal report (form 3300-005) was completed by Nelson Plumbing and Electric Inc., modified by the WGNHS, and sent to the WDNR.

Suggestions for future work

MO-17 was replaced in July 2024 and dropped from the NGWMN network in Wisconsin in March 2025 and abandoned in July 2025. No future work remains at this site.

MO-334 (Monroe County, Wisc.) – replaces MO-17

USGS Site Number: 440434090365701

USGS Site Name: MO-19/02W/33-0334

WGNHS Well ID: 42000334

WDNR Well Number: ABW587

Well information

MO-334 was drilled as a replacement well for MO-17 on July 30, 2024, by Nelson’s Plumbing and Electric Inc. ^[1] The well is located on public property owned by the WDNR south of County Highway E in Grant, Wisc. (fig. 21). Below the 6-in.-diameter steel casing, the borehole is open to the local bedrock sandstone aquifer ^[1]. Monitoring began September 10, 2024, ^[2] and the well is currently in good condition. Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=440434090365701

Latitude, longitude: 44°04′33.84″, –90°36′56.96″ (NAD83) ^[2]

Current land surface datum: 1023.06 feet above mean sea level (NAVD88) ^[2]

Hydrologic Unit (USGS Watershed Code): 070400060202 ^[2]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 372EKMD (Elk Mound Group Aquifer) ^[2]

Current well depth: 208 ft-BTOC (205 ft blsd) ^[1,3]

Current casing depth: 61 ft-BTOC (58 ft blsd) ^[1,3]

^[1] Well details obtained from 2024 well construction report completed by the well driller (form 3300-077A)

^[2] Well details obtained from the USGS

^[3] Well details obtained from work completed for this funding opportunity. Casing interpreted from August 14, 2024, WGNHS geophysical logs; well depth interpreted from 8/17/24 WGNHS geophysical logs and September 10, 2024, USGS-UMWSC tape-down; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 3.13 ft; land surface datum is bolt inside of casing

Documentation for this well is included in appendix 5.

Geophysical logs collected on August 14, 2024, for this grant period can be viewed and downloaded from: <https://data.wgnhs.wisc.edu/data-viewer/view/42000334>



Figure 21. Location of well MO-334 (red marker). The site is located approximately 174 ft from County Highway E, 5 miles northeast of Fort McCoy, in Grant, Wisc.

Initial work plan

This well was originally proposed under objective 5 for well drilling. Work planned to include drilling the well to replace MO-17, constructing the well nearby, as similarly as possible to MO-17, and in the same aquifer. The plan of work for this site also included characterization of the replacement well with a borehole video, full suite of geophysical logs, and a slug test to evaluate the well-aquifer connection. Borehole cuttings were planned to be collected, processed, used to generate a lithologic log, and archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. Concurrent operation of MO-17 and its replacement was also planned to establish an overlapping water-level record.

Description of work completed

WGNHS worked with WDNR and USGS to find a suitable location to drill a replacement well for MO-17. In early 2023, a draft land access agreement was established to drill a new well on WDNR property near County Highway E in Grant, Wisc., approximately 5 miles NNE of MO-17. On November 30, 2024, Nelson’s Plumbing and Electric Inc. completed the drilling of MO-334 in compliance with Wisconsin Administrative Code NR182 (fig. 22).

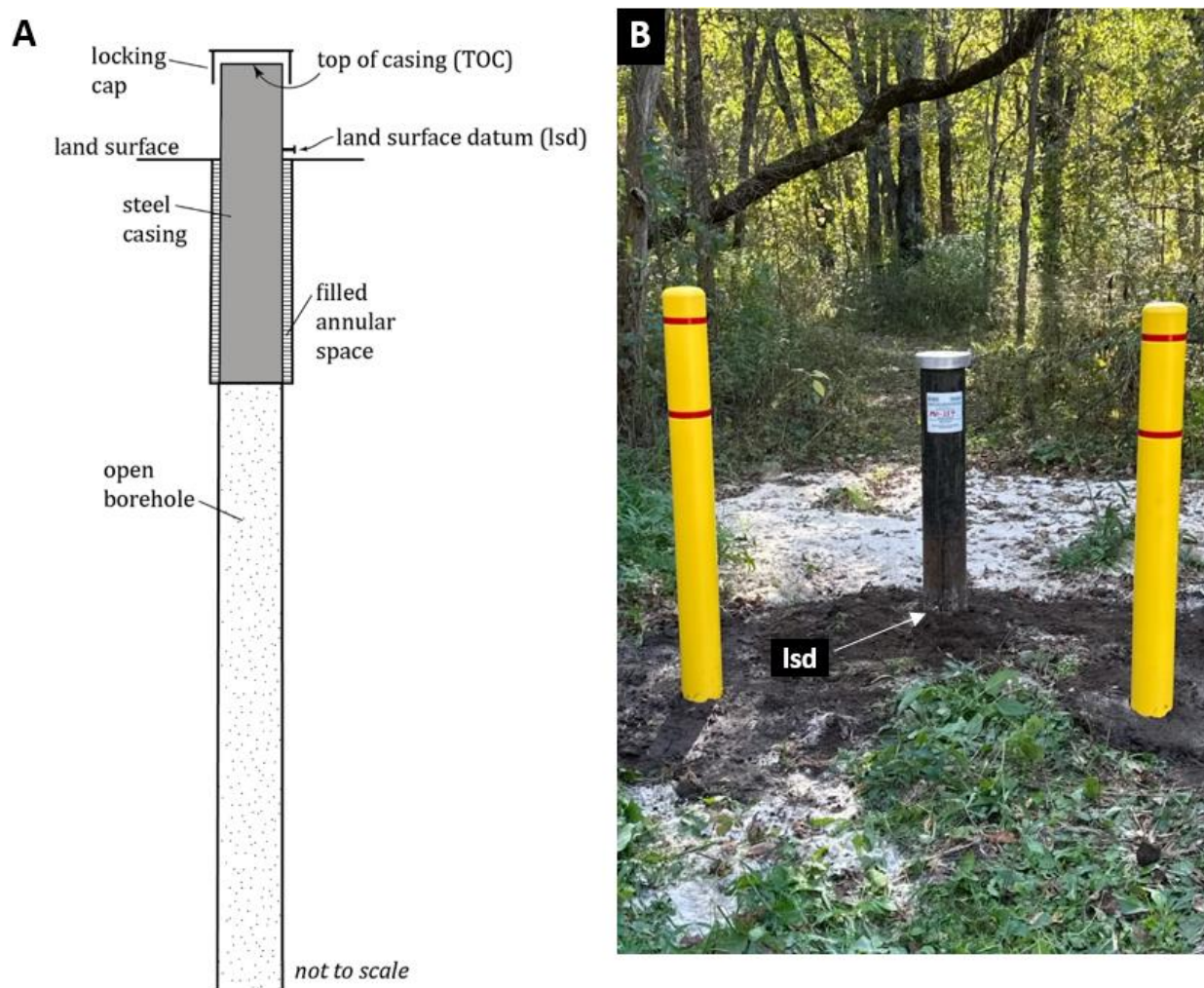


Figure 22. Panel A, simplified well construction diagram for MO-334. The diagram is not to scale. Panel B, newly completed well MO-334 with locking wellhead protector and two protective bollards.

Using mud rotary, a 10-in.-diameter borehole was drilled to a total depth of 58 feet below land surface datum (ft blsd), and a 6-in.-diameter steel casing was sealed into the borehole to a total depth of 58 ft blsd using neat cement. A 3.13 ft casing stick up was left above grade. A 6-in.-diameter borehole was subsequently drilled to a total depth of 205 ft blsd. Below the steel casing, the borehole is left open to the local sandstone bedrock aquifer.

Drill cuttings were collected every 5 ft and used to generate a lithologic description of the well borehole (see WCR from driller and soil boring from 4400-122 completed by WGNHS). Cuttings were archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. All bedrock cuttings collected were sandstone.

MO-334 was developed by the well driller after the well was completed on November 30, 2024, using an airlift method to pump the well for an hour (WCR form 3300-077A). The well was fixed

with a locking, protective, steel wellhead and two protective bollards were installed around the well. To fulfill reporting requirements, the WCR was submitted by the well driller to the WDNR.

On August 14, 2024, the WGNHS completed geophysical logging and collected an optical borehole image (OBI): <https://data.wgnhs.wisc.edu/data-viewer/view/42000334>. A borehole video was not collected due to technical issues with the borehole video logger at the time of geophysical logging. The OBI shows that the casing is in good condition and is well seated into bedrock. It also confirms a casing depth of 58 ft blsd (61 ft below top of casing). Both the geophysical logs and the OBI show sandstone bedrock and multiple horizontal and steeply west-dipping fractures throughout the entire open interval of the borehole. Preliminary analysis indicates that the sandstone aquifer is Cambrian in age and is part of the Elk Mound Group; further subdivision of the geologic units is beyond the scope of this work.

September 10, 2024, the USGS-UMWSC surveyed MO-334 using RTN-GPS, completed a slug test to test the well-aquifer connection, and installed a pressure transducer to begin recording continuous water-level data. The slug test was completed using a 3-in.-diameter, 5-ft-long solid cylindrical PVC slug. The slug was inserted and removed four times. Each time, the water column was quickly displaced by approximately 1 ft and recovered quickly (fig. 23). The oscillatory response of the water column is likely due to the rapidly responding well coupled to a very transmissive aquifer. These results indicate a good connection to the local unconsolidated aquifer.

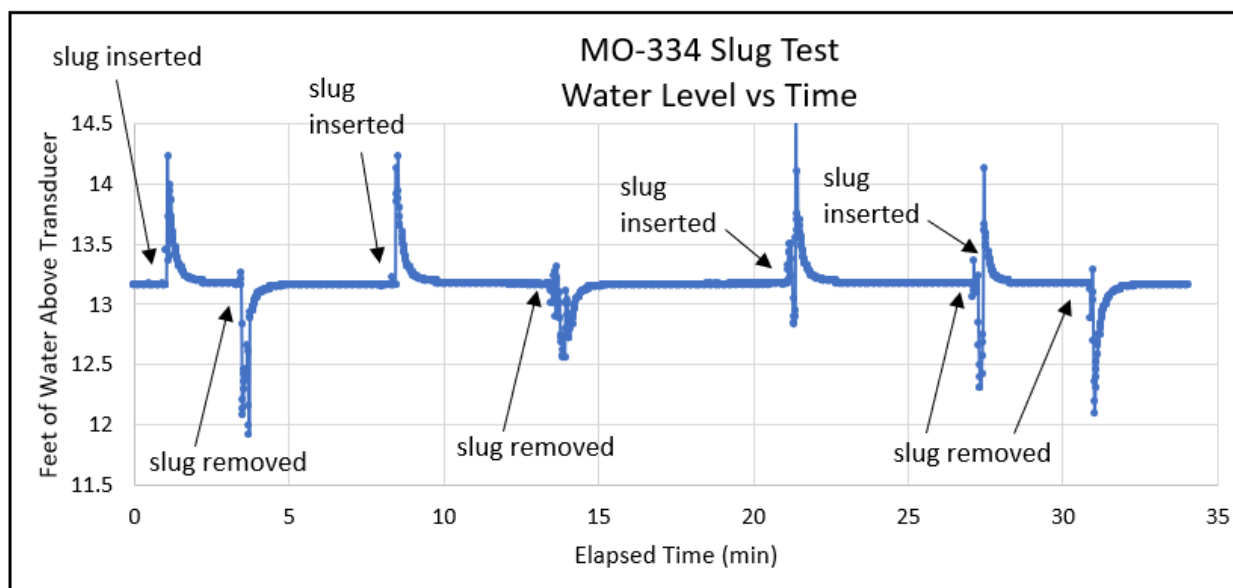


Figure 23. Slug test performed on well MO-334 by the USGS-UMWSC on September 10, 2024. The rapid response of the water level indicates a good connection to the aquifer. During the second slug removal and third insertion, the slug likely got hung up on the transducer, generating abnormal-appearing water level responses. Data courtesy of the U.S. Geological Survey.

Monitoring of MO-334 began September 10, 2024, and concurrent water-level data were collected with well MO-17 until March 13, 2025 (fig. 24).

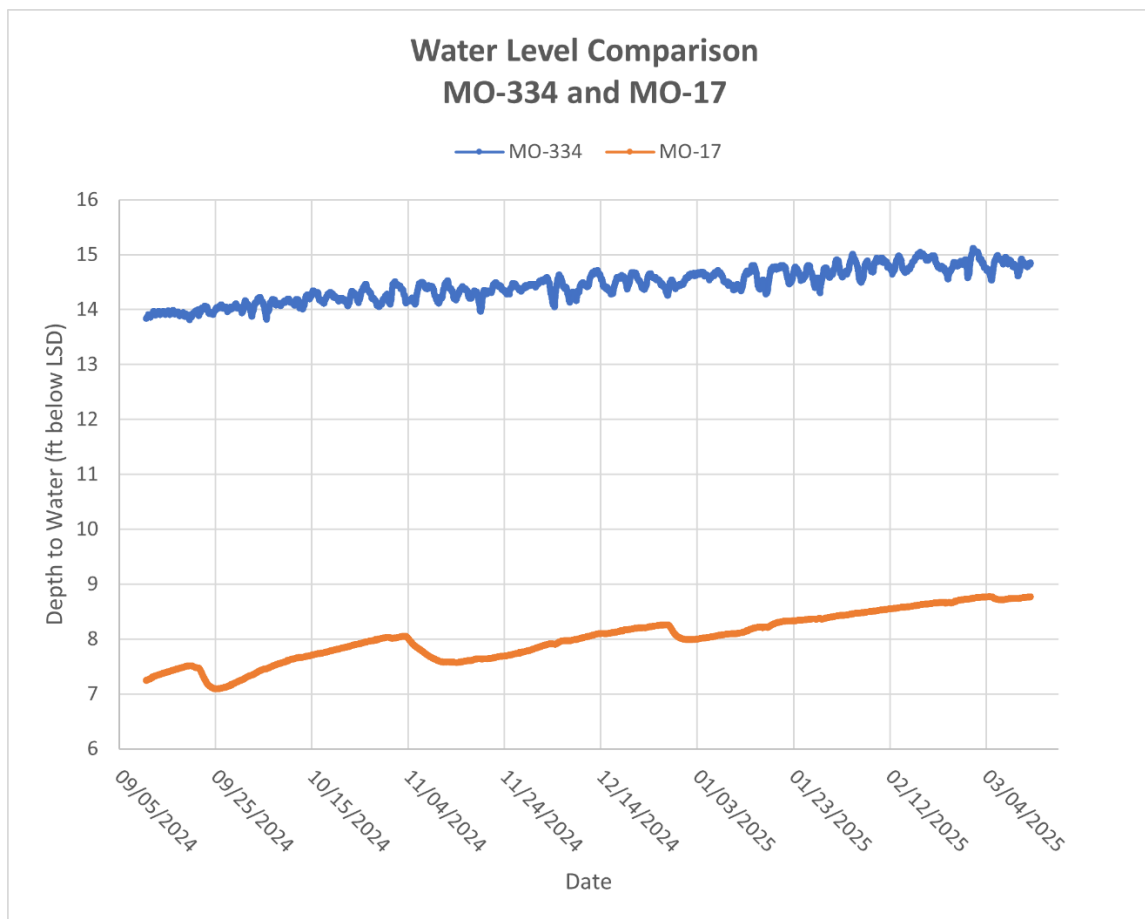


Figure 24. Concurrently recorded water levels for MO-17 and its replacement well, MO-334, between September 10, 2024, and March 13, 2025. Accounting for land surface datum of MO-17 (905.5 ft msl (mean sea level)) and MO-334 (1023.06 ft msl), the difference in water level elevation between the two wells averages 111.13 ft over this period. Note that MO-17 was compromised over the duration and not well-connected to the aquifer. Data courtesy of the U.S. Geological Survey.

Concurrent monitoring shows that the response trend for replacement well MO-334 closely resembles the general trend of well MO-17, despite MO-17 remaining compromised over the duration of the concurrent monitoring period. The average difference in water level elevations (after accounting for the difference in datum elevations of the wells) is 111.13 ft over the duration of concurrent monitoring. Based on these results, MO-334 provides excellent data continuity that can be combined with historical records for MO-17.

Suggestions for future work

No future work is anticipated for this well except for routine monitoring and maintenance by the USGS-UMWSC.

PT-276 (Portage County, Wisc.) – replaced by PT-1821

USGS Site Number: 442810089194501

USGS Site Name: PT-23/10E/18-0276

WGNHS Well ID: 50000276

WDNR Well Number: unknown

Well information

PT-276 was drilled in July 1958 in Lake Emily County Park on the north side of Lake Emily (fig. 25) by CF Berkstresse & Hanes ^[1]. The well was completed to a reported total depth of approximately 17.4 feet below land surface (ft bls). A 1.25-in.-diameter casing was installed to a reported depth of approximately 16 ft bls, below which a screen was installed connecting the well to the local sand and gravel aquifer. The screened interval was likely 1.5 ft in length ^[1]; however, historical documents that date after the 1967 USGS well schedule note a 1-ft screened interval ^[2]. Monitoring began in 1958 ^[1]. Since PT-276 was drilled, water levels have exceeded land surface and the well casing several times. Additionally, ice has heaved the ground surface, affecting the well elevation ^[2,3]. In 2021, a wellhead extension was temporarily installed ^[3]. Due to continued freezing of the well and rises in water level, PT-276 was successfully replaced by PT-1821 in June 2023 and monitoring ended April 12, 2024 ^[4].

Historical water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=442810089194501

Latitude, longitude: 44°28'15.07", -89°19'58.87" (NAD83) ^[3]

Current land surface datum: 1092.4 feet above mean sea level (NAVD88) ^[3]

Hydrologic Unit (USGS Watershed Code): 04030202 ^[3]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110SANDP (Sand (Holocene and/or Pleistocene)) ^[3]

Last measured well depth: 20.7 ft-BTOC (17.6 ft blsd) ^[3]

Last known screened interval depth: 19.05 to 20.55 ft-BTOC (16 to 17.5 ft blsd) ^[3]

^[1] Well details obtained from 1967 USGS well schedule; no WCR was found for PT-276

^[2] Well details obtained from historical scanned documents

^[3] Well details obtained from the USGS; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; original well casing stick up is 2.30 ft, casing stick up changed multiple times since originally constructed; last known measurement had a casing stick up of 3.05 ft and lsd was a 1.5" pipe pounded into ground 1 ft west of well

^[4] Well details obtained from work completed for this funding opportunity

Documentation for this well is included in appendix 6.



Figure 25. Location of well PT-276 (red marker). The site is located on a beach on the north side of Lake Emily in Lake Emily County Park, Portage County, Wisc., approximately 250 ft southwest of Park Dr.

Initial work plan

This well was initially proposed under objective 5 for well replacement. Due to continual disruption of the water level records from rising groundwater/lake levels above the well, and continual changes in the land's surface datum due to freeze-thaw ground heaving, work planned to include drilling a replacement well nearby in the same aquifer. Prior to the abandonment of PT-276, concurrent operation of PT-276 and its replacement was also planned to establish an overlapping water-level record.

Description of work completed

WGNHS obtained approval to drill a replacement well for PT-276 and to continue monitoring at this site until appropriate concurrent water level data are collected to establish an adequate replacement.

The replacement well PT-1821 was drilled in June 2023. Details of the replacement well are presented below. PT-276 and PT-1821 were monitored concurrently for approximately 9 months. Monitoring of PT-276 ended April 12, 2024, and the well was removed from the NGWMN. PT-276 was filled, sealed, and abandoned on April 17, 2025, by the USGS-UMWSC, using bentonite pellets. The steel casing was cut off 2 ft below land surface and the protective well casing cover was removed. A well fill and seal report (form 3300-005) was completed by the WGNHS and sent to the WDNR.

Suggestions for future work

PT-276 was replaced in June 2023, dropped from the NGWMN network in April 2024, and abandoned in April 2025. No future work remains.

PT-1821 (Portage County, Wisc.) – replaces PT-276

USGS Site Number: 442808089193501

USGS Site Name: PT-23/10E/18-1821

WGNHS Well ID: 50001821

WDNR Well Number: VQ859

Well information

PT-1821 was drilled as a replacement well for PT-276 on June 19, 2023, by On-site Environmental Services LLC ^[1]. The well is located in Lake Emily County Park on the east side of Lake Emily (fig. 26). A 2-in.-diameter, 15-ft-long, screened interval is open to the local unconsolidated sand and gravel aquifer. Monitoring began July 21, 2023, ^[2] and the well is currently in good condition. Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=442808089193501

Latitude, longitude: 44°28′07.89″, –89°19′34.99″ (NAD83) ^[2]

Current land surface datum: 1098.82 feet above mean sea level (NAVD88) ^[2]

Hydrologic Unit (USGS Watershed Code): 040302021802 ^[2]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 100SDGV (Sand and Gravel Aquifer) ^[2]

Current well depth: 27.7 ft-BTOC (25.5 ft blsd) ^[3]

Current depth of screened interval: 12.2 to 27.2 ft-BTOC (10 to 25 ft blsd) ^[2]

^[1] Well details obtained from 2023 well construction report completed by WGNHS (form 4400-113A)

^[2] Well details obtained from the USGS

^[3] Well details obtained from July 21, 2023, USGS-UMWSC tape-down; ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 2.16 ft; land surface datum is a rebar at base of well

Documentation for this well is included in appendix 6.



Figure 26. Location of well PT-1821 (larger red marker) in Portage County, Wisc. PT-1821 replaced PT-276 (smaller red marker), which is approximately 0.35 miles northwest of PT-1821. The site is located near a boat ramp on the east side of Lake Emily in Lake Emily County Park, Portage County, Wisc., approximately 90 ft west of Lake Dr.

Initial work plan

PT-1821 was originally proposed under objective 5 for well drilling. Work planned to include drilling the well to replace PT-276, constructing the well nearby, as similarly as possible to PT-276, and in the same aquifer. The plan of work for this site also included characterization of the replacement well with a slug test to evaluate the well-aquifer connection. Borehole cuttings were planned to be collected, processed, used to generate a lithologic log (soil boring form 4400-122), and archived at the WGNHS Research Collections and Education Center (Core Repository) in Mount Horeb, Wisc. Concurrent operation of PT-276 and its replacement was also planned to establish an overlapping water-level record.

Description of work completed

WGNHS worked with WDNR and USGS to find a suitable location to drill a replacement well for PT-276. In early 2023, a land access agreement was established to drill a new well at Lake Emily in Lake Emily County Park. On June 19, 2023, On-site Environmental Services LLC completed the drilling of PT-1821 in compliance with Wisconsin Administrative Code NR141. Using a hollow stem auger, an 8.3-in.-diameter borehole was drilled to a total depth of 25.5 ft bld. Drill cuttings were collected every 5 ft and used to generate a lithologic description of the well borehole (see WCR form 4400-113A and soil boring form 4400-122 completed by WGNHS). Cuttings were archived at the WGNHS Research Collections and Education Center (Core

Repository) in Mount Horeb, Wisc. The entire borehole consists primarily of sand and silt with minor clay laminations in the lower 5 ft.

A 2-in.-diameter PVC casing was subsequently installed to a total depth of 10 ft blsd, below which a 15-ft-long schedule 40 PVC screen was installed from 10 to 25 ft blsd, open to the local unconsolidated glacial aquifer. The screened interval was filter-packed with #40 red flint and #15 red flint, then sealed with bentonite and finished with a locking protective well cover (fig. 27).

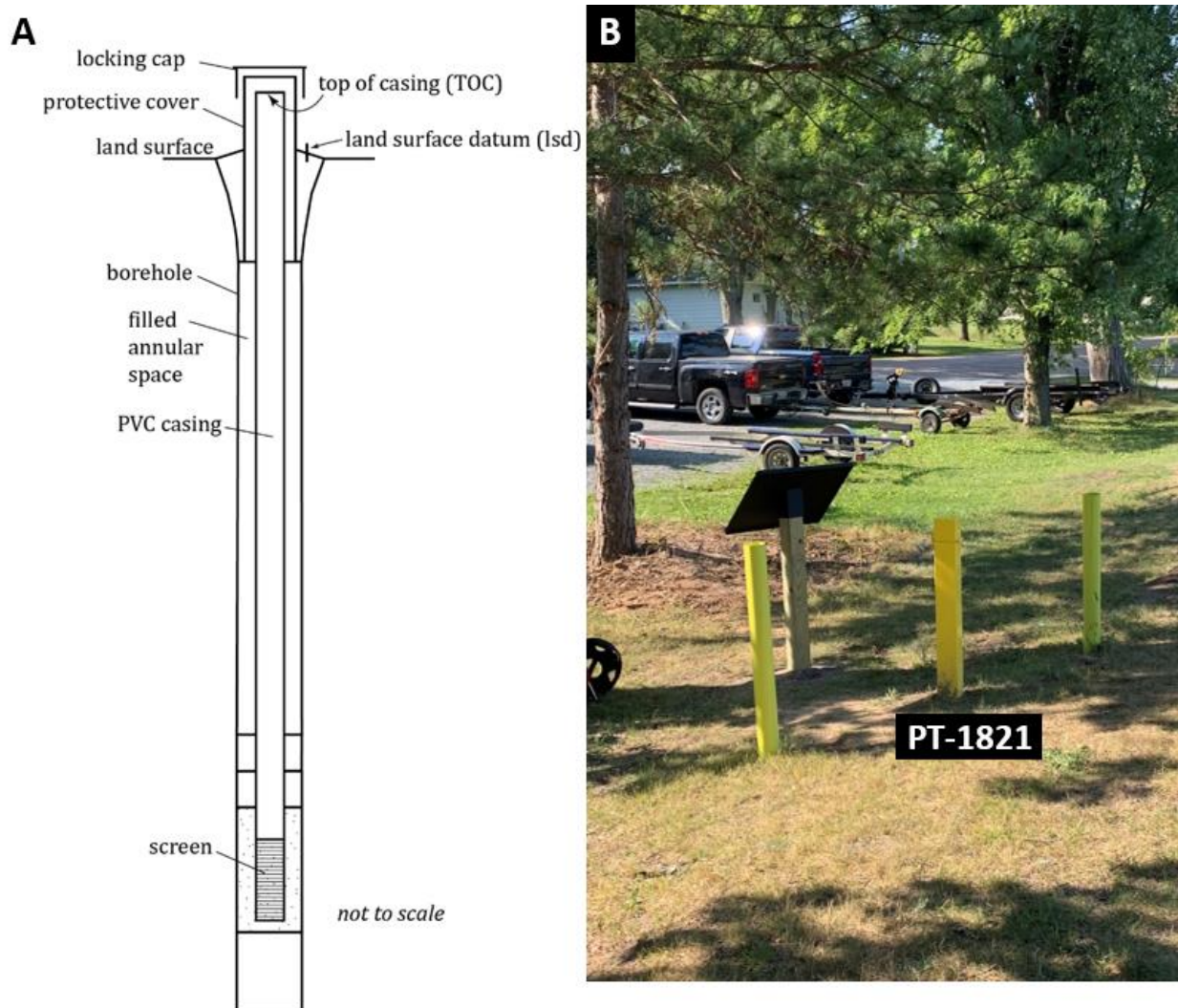


Figure 27. Panel A, simplified well construction diagram for PT-1821. The diagram is not to scale. Panel B, newly completed well PT-1821 with locking wellhead protector and two protective bollards. Photo courtesy of USGS-UMWSC.

PT-1821 was developed on June 19, 2023, using a surge block with bailer, and pumped for 120 minutes, after which the water ran clear. To fulfill reporting requirements with the WDNR, a

well construction form 4400-113A, soil boring log 4400-122, and monitoring well development form 4400-113B were completed by the WGNHS and submitted to the WDNR.

The WGNHS did not collect geophysical logs or an optical borehole image because PT-1821 was completed with a 2-in.-diameter PVC casing and bentonite seal.

On July 21, 2023, the USGS-UMWSC surveyed PT-1821 using RTN-GPS and completed a slug test and installed a pressure transducer to begin recording continuous water-level data.

The slug test was completed using a 1 and 3/8-in.-diameter, 5-ft-long solid cylindrical PVC slug. The slug was inserted and removed three times. Each time, the water column was quickly displaced by approximately 2 ft and recovered quickly (fig. 28). These results indicate a good connection to the local unconsolidated aquifer. Monitoring of PT-1821 began July 21, 2023.

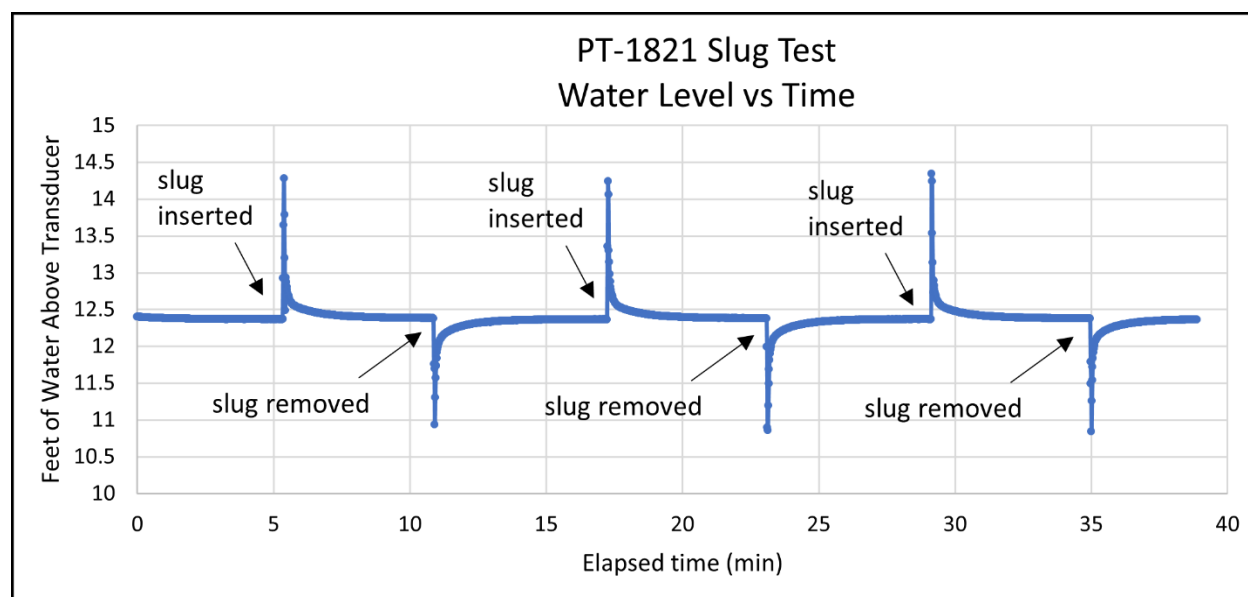


Figure 28. Slug test performed on well PT-1821 by the USGS-UMWSC on July 21, 2023. The rapid response of the water level indicates a good connection to the aquifer. Data courtesy of the U.S. Geological Survey.

In 2024, the USGS and WDNR constructed and installed an educational sign next to the wellhead (fig. 29).

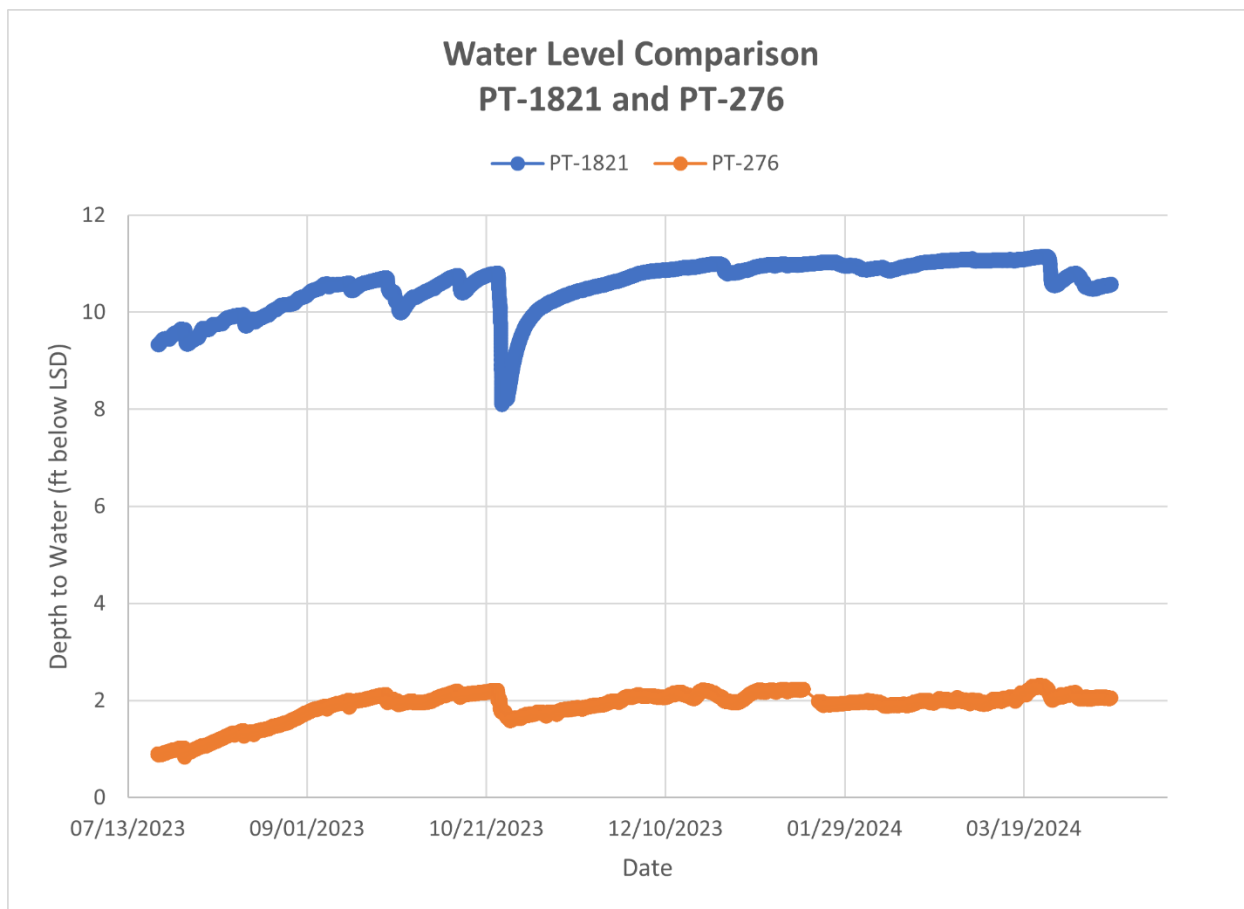


Figure 30. Concurrently recorded water levels for PT-276 and its replacement well, PT-1821, between July 21, 2023, and April 12, 2024. Accounting for land surface datum of PT-276 (1092.4 ft msl) and PT-1821 (1098.82 ft msl), the difference in water level elevation between the two wells averages 2.26 ft over this period. Data courtesy of the U.S. Geological Survey.

Concurrent monitoring shows that the response trend for replacement well PT-1821 closely resembles the general trend of well PT-276. The average difference in water level elevations (after accounting for the difference in datum elevations of the wells) is 2.26 ft over the duration of concurrent monitoring. The data show that PT-1821 responds quicker than PT-276 to changes in water level and suggests that PT-276 may have been slightly compromised due to blockage(s). Based on these results, PT-1821 provides excellent data continuity that can be combined with historical records for PT-276.

Suggestions for future work

No future work is anticipated for this well except for routine monitoring and maintenance by the USGS-UMWSC.

Objective 6 wells

Initial work plan

For objective 6 (purchase equipment to support continuous water-level data collection), the work plan was to purchase vented transducers and associated cables for 16 monitoring wells. These equipment purchases were planned in order to either replace older transducers that are more than 5 years old at continuous monitoring sites, or upgrade discrete manual-measurement tape-down sites to continuous monitoring sites. Additionally, we plan to purchase one telemetry system to be installed at site PT-1464, effectively converting the site from discrete to real-time monitoring. This site is of particular importance because septic tank installers routinely use water levels from this well as a benchmark for determining baseline water levels for septic tank installations across the state.

AS-380

USGS Site Number: 463635090481101

USGS Site Name: AS-48/04W/25-0380

WGNHS Well ID: 2000380

WDNR Well Number: None

Latitude, longitude: 46°36′34.55″, –90°48′42.12″ (NAD83) ^[1]

Current land surface datum: 644.4 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 04010301 ^[1]

Well completed in: USGS national aquifer N9999OTHER (Other aquifers) and local aquifer 420BFLD (Bayfield Group – Precambrian sandstone) ^[1]

Current well depth: 219 ft-BTOC (217.4 ft blsd) ^[1]

Current depth of casing: 113 ft-BTOC (111.4 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2022);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.66 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=463635090481101

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on May 8, 2023, replacing the levellogger and barologger that were more than 5 years old.

BN-435

USGS Site Number: 442859088025801

USGS Site Name: BN-23/20E/10-0435

WGNHS Well ID: 5000435

WDNR Well Number: CB010

Latitude, longitude: 44°28'58.60", -88°02'58.73" (NAD83) ^[1]
Current land surface datum: 591.6 feet above mean sea level (NAVD88) ^[1]
Hydrologic Unit (USGS Watershed Code): 04030204 ^[1]
Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 365GAPV (Galena-Platteville) ^[1]
Current well depth: 281.93 ft-BTOC (280 ft blsd) ^[1]
Current depth of casing: 41.93 ft-BTOC (40 ft blsd) ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.93 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=442859088025801

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on January 22, 2023, replacing the levellogger and barologger that were more than 5 years old.

CH-142

USGS Site Number: 445544091155701
USGS Site Name: CH-28/07W/17-0142
WGNHS Well ID: 9000142
WDNR Well Number: None

Latitude, longitude: 44°54'38.68", -91°15'57.24" (NAD83) ^[1]
Current land surface datum: 965.8 feet above mean sea level (NAVD88) ^[1]
Hydrologic Unit (USGS Watershed Code): 07050005 ^[1]
Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 372MNSN (Mount Simon Sandstone) ^[1]
Current well depth: 62 ft-BTOC (60.3 ft blsd) ^[1]
Current depth of casing: 38 ft-BTOC (36 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2022);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.76 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=445544091155701

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on June 6, 2023, replacing the levellogger and barologger that were more than 5 years old.

DN-1440

USGS Site Number: 430718089291501

USGS Site Name: DN-08/08E/36-1440

WGNHS Well ID: 13001440

WDNR Well Number: OQ253

Latitude, longitude: 43°07'17.60", -89°29'15.13" (NAD83) ^[1]

Current land surface datum: 885.1 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 0790002 ^[1]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 300SNDSA (Sandstone Aquifer) ^[1]

Current well depth: 286.79 ft-BTOC (285 ft blsd) ^[1]

Current depth of casing: 81.79 ft-BTOC (80 ft blsd) ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.79 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=430718089291501

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on April 7, 2023, replacing the levellogger and barologger that were more than 5 years old.

DN-6212

USGS Site Number: 430409089234601

USGS Site Name: DN-07/09E/23-6212

WGNHS Well ID: 13006212

WDNR Well Number: PX587

Latitude, longitude: 43°04'08.57", -89°23'45.79" (NAD83) ^[1]

Current land surface datum: 858.8 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07090002 ^[1]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 300SNDSA (Sandstone Aquifer) ^[1]

Current well depth: 97.1 ft-BTOC (94.8 ft blsd) ^[1]

Current depth of screened interval: 92.1 to 97.1 ft-BTOC (89.8 to 94.8 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2024);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 2.27 ft; land surface datum is a bolt in the steel wellhead cover

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=430409089234601

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on April 7, 2023, replacing the levellogger and barologger that were more than 5 years old.

FR-87

USGS Site Number: 455620088593901

USGS Site Name: FR-40/12E/21-0087

WGNHS Well ID: 21000087

WDNR Well Number: None

Latitude, longitude: 45°55′58.6″, –88°59′27.9″ (NAD83) ^[1]

Current land surface datum: 1750 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 04030108 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110QRNR (Quaternary System) ^[1]

Current well depth: 101.52 ft-BTOC (101.5 ft blsd) ^[1]

Current depth of screened interval: 96.5 to 101.5 ft-BTOC (95.5 to 101.5 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2022);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 0.02 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=455620088593901

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on April 20, 2023, replacing the levellogger and barologger that were more than 5 years old.

LF-57

USGS Site Number: 423114090161101

USGS Site Name: LF-01/02E/33-0057

WGNHS Well ID: 33000057

WDNR Well Number: None

Latitude, longitude: 42°31′12.13″, –90°16′11.39″ (NAD83) ^[1]

Current land surface datum: 999.5 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07060005 ^[1]

Well completed in: USGS national aquifer N400SLRDVN (Silurian-Devonian aquifers) and local aquifer 365GLPV (Galena-Platteville) ^[1]

Current well depth: 267.51 ft-BTOC (265 ft blsd) ^[1]

Current depth of casing: 18.51 ft-BTOC (16 ft blsd) ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 2.51 ft; land surface datum is a piece of rebar in ground about 1 ft west of well

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=423114090161101

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on March 29, 2023, replacing the Sutron Shaft encoder that was more than 5 years old.

PT-1464

USGS Site Number: 442622089302901

USGS Site Name: PT-23/08E/26-1464

WGNHS Well ID: 50001464

WDNR Well Number: PP829

Latitude, longitude: 44°26'22.49", -89°30'29.63" (NAD83) ^[1]

Current land surface datum: 1093.5 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07070003 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110SDGVP (Sand and Gravel (Holocene and/or Pleistocene)) ^[1]

Current well depth: 22.35 ft-BTOC (19 ft blsd) ^[1]

Current depth of screened interval: from 12.35 to 22.35 ft-BTOC (9 to 19 ft blsd) ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 3.35 ft; land surface datum is rebar at base of well

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=442622089302901

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer, datalogger, and cellular modem on June 16, 2023, converting the site from discrete to real-time monitoring.

RA-62

USGS Site Number: 424119088081801

USGS Site Name: RA-03/20E/28-0062

WGNHS Well ID: 52000062

WDNR Well Number: EZ880

Latitude, longitude: 42°41'19.28", -88°08'18.87" (NAD83) ^[1]

Current land surface datum: 794.0 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07120006 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110QRNR (Quaternary System) ^[1]

Current well depth: 105.4 ft-BTOC (104 ft blsd) ^[1]

Current depth of casing: 105.4 ft-BTOC (104 ft blsd), open-ended well ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.40 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=424119088081801

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on May 24, 2023, converting the monitoring at this site from discrete to continuous.

SK-03

USGS Site Number: 432100089440001

USGS Site Name: SK-10/06E/02-0003

WGNHS Well ID: 57000003

WDNR Well Number: FD146

Latitude, longitude: 43°22'42.56", -89°45'19.14" (NAD83) ^[1]

Current land surface datum: 885.8 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07070005 ^[1]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 372EKMD (Elk Mound Group) ^[1]

Current well depth: 452.88 ft-BTOC (451 ft blsd) ^[1]

Current depth of casing: 161.88 ft-BTOC (160 ft blsd) ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.88 ft; land surface datum is top of concrete anchor bolt on southwest corner of concrete pad, painted red

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=432100089440001

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on May 2, 2023, replacing the levellogger and barologger that were more than 5 years old.

TA-01

USGS Site Number: 450947090483902

USGS Site Name: TA-31/04W/13-0001

WGNHS Well ID: 61000001

WDNR Well Number: None

Latitude, longitude: 45°09'47.20", -90°48'40.84" (NAD83) ^[1]

Current land surface datum: 1209.0 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07050005 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110QRNR (Quaternary System) ^[1]

Current well depth: 26.5 ft-BTOC (24.4 ft blsd) ^[1]

Current depth of screened interval: between 15.05 to 20.05 (between 13 and 18 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2022);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 2.05 ft; land surface datum is a bolt level with bottom of well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=450947090483902

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on May 1, 2023, replacing the levellogger and barologger that were more than 5 years old.

In January 2025, TA-01 was replaced by an existing well, TA-217, in the NGWMN at the request of the WDNR. TA-01 appeared to be in poor connection with the surrounding aquifer and was responding to surface water flow in a nearby stream. TA-217 is approximately 14.5 miles northeast of TA-01 and is well connected to the local sand and gravel aquifer, continuing to record groundwater levels.

TR-71

USGS Site Number: 441743091153101

USGS Site Name: TR-21/07W/17-0071

WGNHS Well ID: 62000071

WDNR Well Number: None

Latitude, longitude: 44°17'43.66", -91°15'31.18" (NAD83) ^[1]

Current land surface datum: 885.7 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07040003 ^[1]

Well completed in: USGS national aquifer S300CAMORD (Cambrian-Ordovician aquifer system) and local aquifer 370CMBR (Cambrian system) ^[1]

Current well depth: 80.1 ft-BTOC (78.5 ft blsd) ^[1]

Current depth of casing: 42 ft-BTOC (40.4 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2022);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.65 ft; land surface datum is a chiseled mark in concrete at base of well

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=441743091153101

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on September 12, 2023, replacing the levellogger and barologger that were more than 5 years old.

WW-09

USGS Site Number: 424004088440601

USGS Site Name: WW-03/15E/33-0009

WGNHS Well ID: 65000009

WDNR Well Number: None

Latitude, longitude: 42°40′04.10″, –88°44′04.56″ (NAD83) ^[1]

Current land surface datum: 967.5 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07090001 ^[1]

Well completed in: USGS national aquifer N400SLRDVN (Silurian-Devonian aquifer system) and local aquifer 365SNNP (Sinnipee Group Aquifer) ^[1]

Current well depth: 258 ft-BTOC (258 ft blsd) ^[1]

Current depth of casing: 199.7 ft-BTOC (199.7 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2024);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 0.01 ft; land surface datum is 1.5″ pipe sticking up from ground at base of well; pipe has external threading

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=424004088440601

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on May 24, 2023, converting the monitoring at this site from discrete to continuous.

WB-48

USGS Site Number: 460039091500101

USGS Site Name: WB-41/12W/26-0048

WGNHS Well ID: 66000048

WDNR Well Number: None

Latitude, longitude: 46°00′37.70″, –91°50′03.13″ (NAD83) ^[1]

Current land surface datum: 1091.6 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07030002 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110QRNR (Quaternary System) ^[1]

Current well depth: 91.55 ft-BTOC (87 ft blsd) ^[1]

Current depth of screened interval: from 88.55 to 91.55 ft-BTOC (84 to 87 ft blsd) ^[1]

Principal Aquifer: N100GLCIAL

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 4.55 ft; land surface datum is lip at base of casing about level with ground surface

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=460039091500101

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on July 25, 2023, replacing the levellogger and barologger that were more than 5 years old.

WK-31

USGS Site Number: 425535088131701

USGS Site Name: WK-05/19E/02-0031

WGNHS Well ID: 68000031

WDNR Well Number: None

Latitude, longitude: 42°55′35.76″, –88°13′18.33″ (NAD83) ^[1]

Current land surface datum: 975.3 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07120006 ^[1]

Well completed in: USGS national aquifer N400SLRDVN (Silurian-Devonian aquifers) and local aquifer 355NGRN (Niagaran Series) ^[1]

Current well depth: 499 ft-BTOC (498 ft blsd) ^[1]

Current depth of casing: 429 ft-BTOC (426.5 ft blsd) ^[1]

^[1] Details obtained from Bremmer and others (2022);

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 2.55 ft; land surface datum is a bolt in the well casing

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=425535088131701

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on July 11, 2023, replacing the levellogger and barologger that were more than 5 years old.

WK-4454

USGS Site Number: 430416088144301

USGS Site Name: WK-07/19E/15-4454

WGNHS Well ID: 68004454

WDNR Well Number: VQ804

Latitude, longitude: 43°04'15.91", -88°14'42.73" (NAD83) ^[1]

Current land surface datum: 849.9 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 07120006 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 100SDGV (Sand and Gravel Aquifer) ^[1]

Current well depth: 16.1 ft-BTOC (14.71 ft blsd) ^[1]

Current depth of screened interval: from 6.1 to 16.1 ft-BTOC (4.71 to 14.71 ft blsd) ^[1]

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 1.39 ft; land surface datum is rebar driven into ground northeast of well

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=430416088144301

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on May 11, 2023, replacing the levellogger and barologger that were more than 5 years old.

WP-13

USGS Site Number: 442353088443801

USGS Site Name: WP-22/14E/12-0013

WGNHS Well ID: 69000013

WDNR Well Number: None

Latitude, longitude: 44°23'52.35", -88°44'38.58" (NAD83) ^[1]

Current land surface datum: 764.7 feet above mean sea level (NAVD88) ^[1]

Hydrologic Unit (USGS Watershed Code): 04030202 ^[1]

Well completed in: USGS national aquifer N100GLCIAL (Sand and gravel aquifers (glaciated regions)) and local aquifer 110SDGV (Sand and Gravel (Holocene and/or Pleistocene)) ^[1]

Current well depth: 203.56 ft-BTOC (203 ft blsd) ^[1]

Current depth of screened interval: from 188.56 to 203.56 ft-BTOC (188 to 203 ft blsd) ^[1]

Principal Aquifer: N100GLCIAL

^[1] Details obtained from USGS;

ft-BTOC = feet below top of casing; ft blsd = feet below land surface datum; well casing stick up is 0.56 ft; land surface datum is an "X" mark on the concrete at the base of the well

Water-level data can be viewed at:

https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=442353088443801

Description of work completed

The USGS-UMWSC successfully installed a new vented transducer on April 19, 2023, replacing the levellogger and barologger that were more than 5 years old.

Acknowledgments

We are indebted to many individuals and agencies for their cooperation, technical assistance, and input in helping guide this multi-year project to completion. The authors would particularly like to thank the U.S. Geological Survey's National Groundwater Monitoring Network (USGS-NGWMN) program for funding this project, and Jason Fine, Daryll Pope, and Sara Roser for remaining steadfast partners. In executing the well evaluations, repairs, replacements, and new well drilling, the authors would also like to acknowledge the contributions of several staff at the USGS Upper Midwest Water Science Center (USGS-UMWSC): Lucas Stevens, who provided support at multiple monitoring well sites; Rob Waschbusch, who aided in planning and site-access arrangements; and especially Jason Smith, who coordinated and performed myriad fieldwork activities and ensured the authors had access to USGS documentation and historical records for each monitoring station. In providing feedback on well repair and drilling priorities along with site access support, the authors would like to recognize the efforts of multiple Wisconsin Department of Natural Resources (WDNR) staff. Adam Freihofer, Aaron Pruitt, and Joe Rosenow gave input regarding repair and well drilling priorities, while Renee Kerska led the effort to establish easements for multiple WDNR properties.

A big thank you to all the landowners and property managers throughout the state that graciously provided site access to their properties. Specifically, we would like to thank the following: Eau Claire County Parks and Administrative staff, Langlade County Conservation staff, the staff at UW–Platteville Pioneer Farms, the Wisconsin Department of Transportation (WisDOT), Portage County Parks staff and WDNR staff in Marinette and Monroe Counties. Lastly, well owners in Ashland, Brown, Chippewa, Forest, Lafayette, Portage, Racine, Taylor, Trempealeau, Walworth, Washburn, Waukesha, and Waupaca Counties helped make this project a success by hosting wells on their properties that are now equipped with continuous data recorders.

The authors would like to acknowledge the following Wisconsin-based contractors for their efforts to drill, repair, and build wells as part of this project: Midwest Drilling and Hydrofracking of Cornell, Drews and Koeppel Drilling of Ringle, On-Site Environmental Services Inc. of Sun Prairie, Nelson's Plumbing and Well Drilling of Tomah, Subsurface Exploration Service of Suamico, and Water Wells Inc. of Windsor.

Eleanor Wu and the staff at the Division of Business Services at UW–Madison lent their expertise to facilitate the development and signing of easements and access agreements for multiple monitoring wells. Marlene Flannery, Brad Gottschalk, Sushmita Lotlikar, Pete Schoephoester, and Sue Swanson of the WGNHS contributed to project design, data management, contractor bidding, and grant administration. Amber Boudreau and especially Irene Lippelt facilitated project completion through their mastery of geophysical log production and tireless sleuthing of archival documents and well records. Matt Waldren (UW–Madison Division of Extension) and Liz Ceperley (WGNHS) served as editors, and Jason Smith (USGS) made important contributions to the manuscript review.

Special thank you to Amelia Burgess, WGNHS student employee, for an incredible amount of work proofreading text, formatting figures, assembling the appendices for this report, and completing a laundry list of other items with enthusiasm and impressive efficiency.

Thank you to all the others that helped along the way and are not specifically listed. There were too many to comprehensively list, and we are more than appreciative for your efforts and hard work.

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Wisconsin Geological
and Natural History Survey
DIVISION OF EXTENSION
UNIVERSITY OF WISCONSIN-MADISON

Appendix 1: Well EC-909 documents

Documentation of work done for this report

EC-909 Land use agreement, 2022

Property access agreement, 4 pages

EC-909 WDNR well construction report, 2023

Form 3300-077A, 2 pages

EC-909 WDNR soil boring form, 2023

Form 4400-122, 1 page

EC-909 Land use agreement, 2022

Property access agreement, page 1 of 4

LAND USE AND ACCESS AGREEMENT FOR GROUNDWATER MONITORING

This agreement is between the Wisconsin Geological and Natural History Survey (WGNHS), part of the Natural Resources Institute (Division of Extension, UW- Madison), and Eau Claire County, Wisconsin, a quasi-municipal corporation, represented by its Parks and Forest Director.

The WGNHS partners with the U.S. Geological Survey's Upper Midwest Water Science Center (USGS) to operate, maintain, and manage the Wisconsin Groundwater-Level Monitoring Network (WGLMN). The WGNHS also closely coordinates with the Wisconsin Department of Natural Resources (WDNR) regarding the WGLMN.

The purpose of this agreement is to allow WGNHS the ability to install and maintain a well for monitoring groundwater levels on property owned by Eau Claire County. Eau Claire County grants WGNHS access and use in common with Eau Claire County and with such other parties authorized by Eau Claire County to Tax Parcel #18026-2-270520-310-0001, located at NE-SW, Sect. 20, T27N, R5W, in the Town of Wilson. The approximate location of the proposed well is shown on Exhibit A.

Parties agree that the following terms govern this Land use agreement:

1. The effective date of the land access will be upon mutual agreement and execution of this agreement by the WGNHS and Eau Claire County.
2. Eau Claire County is not responsible for the cost to install, maintain, repair, or monitor the during any period of the Land Use Agreement.
3. Prior to the installation and/or removal of any well or structure WGNHS will obtain written consent from the Parks and Forest Director.
4. WGNHS will mitigate damages caused to the Premises and surrounding areas and consult with the Parks and Forest Director regarding specific well location and any damages or expected damages to Eau Claire County Property.
5. WGNHS shall at its own expense and cost maintain and keep the premises in good repair and condition.
6. WGNHS shall not discharge waste or other hazardous material in such a manner to contaminate the well or other bodies of water or otherwise become a public nuisance.
7. WGNHS shall help to protect the environment and natural resources, and where damage nonetheless occurs, WGNHS will be held liable for its actions and/or activities in order to restore the damages resources.
8. WGNHS must obtain written approval from the Parks and Forest Director for prior to the use of any herbicide or pesticide.
9. WGNHS does not have the authority and shall not transfer nor assign said land use agreement without prior written approval from the Parks and Forest Director.

EC-909 Land use agreement, 2022

Property access agreement, page 2 of 4

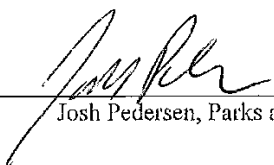
10. WGNHS shall be mindful of the Eau Claire County employees working in the vicinity of the monitoring well.
11. WGNHS commits to maintaining the premises in a decent, sanitary, and safe condition and will at no time allow its work to cause a hazard or unsafe conditions.
12. WGNHS commits to locking or securing the monitoring well to ensure that the installation is only accessible by approved personnel.
13. Well drilling, well construction, major repairs, and well decommissioning and abandonment (as needed) will be covered under a temporary construction easement for the time period the contractor will be on site.
14. Upon final decommissioning of this monitoring station (not anticipated), this Agreement shall terminate.
15. Should the WGNHS discontinue use of this monitoring station, all equipment will be removed from this location and the site restored at the sole expense of WGNHS. Eau Claire County agrees to provide assistance in identifying an alternative location for a monitoring well if this Agreement continues and is not terminated.
16. The use of the monitoring station shall continue unless terminated by either party upon 180 days written notice.
17. Well evaluations may consist of borehole geophysical logging, the establishment of elevation datum benchmarks, packer testing, or other hydrogeological well evaluations. WGNHS staff may perform this work in coordination with the USGS or delegate these activities to the USGS who serves as a partner in operating, maintaining, and managing the WGLMN.
18. Monitoring and maintenance consist of the deployment of water-level monitoring equipment inside the well, visits by WGNHS and/or USGS personnel to perform water-level measurements and retrieve water-level data. These visits may also include the performance of small repairs to the well such as replacing padlocks, repainting the exterior of the monitoring well, or replacing/repairing in-well monitoring equipment. WGNHS staff may perform this work in coordination with the USGS or delegate these activities to the USGS serves as a partner in operating, maintaining, and managing the WGLMN.
19. Notices required or deemed advisable under this Agreement shall be placed in writing and delivered personally or by registered or certified mail:
 - If to Eau Claire County, upon Eau Claire County Administrator, 721 Oxford Ave, Suite 3520, Eau Claire, WI 54703.
 - If to WGNHS, upon the State Geologist, 3817 Mineral Point Road, Madison, WI 53705, with copy to the Real Estate Specialist, Facilities Planning and Management, 21 N. Park Street 6th floor, Madison, WI 53715.
20. The laws of the State of Wisconsin shall govern this Agreement and executed amendments thereto. Venue for all legal proceedings arising out of this Agreement, or breach thereof, shall be exclusively in Eau Claire County Circuit Court, Eau Claire, WI.
21. Insurance: Each party agrees to maintain property, liability and workers compensation insurance for their employees and property in the manner provided by law.

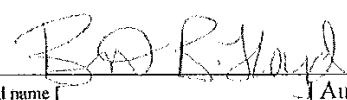
EC-909 Land use agreement, 2022

Property access agreement, page 3 of 4

22. Liability: It is mutually agreed by Eau Claire County and WGNHS that, as related to this Agreement, any loss or expense or resultant legal liability, involving personal injury or property damage, will be the responsibility of the party whose officer, employee or agent may have caused the loss or expense by his or her respective actions, acts, activities, or omissions which occurred or may occur in connection with this agreement.
23. Non-discrimination: No otherwise qualified person shall be excluded from employment, be denied the benefits of employment or otherwise be subject to discrimination in employment in any manner or term of employment on the basis of age, race, creed, color, sex, national origin, or ancestry, disability as defined in Section 504 and the Americans with Disabilities Act (ADA), arrest or conviction record (consistent with s. 111.32 s. HSS 83.12(3), and s. HSS 83.13(6), sexual orientation, political affiliation, marital status, or military participation. All employees are expected to support goals and programmatic activities relating to non-discrimination in employment. This clause applies to Lessee membership.
24. Americans with Disabilities Act Compliance: In connection with the performance of work under this Agreement, WGNHS agrees that no qualified individual with a disability, as defined by the Americans with Disabilities Act, shall by reason of such disability, be excluded from participation and the benefits of services, programs, or activities, including employment, or be subjected to discrimination. WGNHS is specifically notified that it is subject to all employment requirements listed under Title I of the Americans with Disabilities Act by virtue of its Agreement with the, a public entity. The Lessee is specifically notified that it is subject to federal requirements to assure participation and access to public facilities, programs, and activities under Title II of the Americans with Disabilities Act by virtue of its Agreement with, a public entity. These requirements mandate separate or special programs or reasonable modification of existing programs, services, and activities without surcharge to disabled individuals as long as safety is not compromised. WGNHS shall provide a similar notice to all its subcontractors.
25. By signing below, the parties affirm and acknowledge that they have read and understand this Agreement and its attachments, if any, consisting of four (4) typewritten pages; they have authority to enter into this Agreement on behalf of the entity, corporation, or County they are signing for; they are knowingly, freely, and voluntarily entering into this Agreement; and that they accept and agree to be bound by the terms and conditions of this Agreement and its attachments, if any, as outlined in this Agreement.

EAU CLAIRE COUNTY BY:

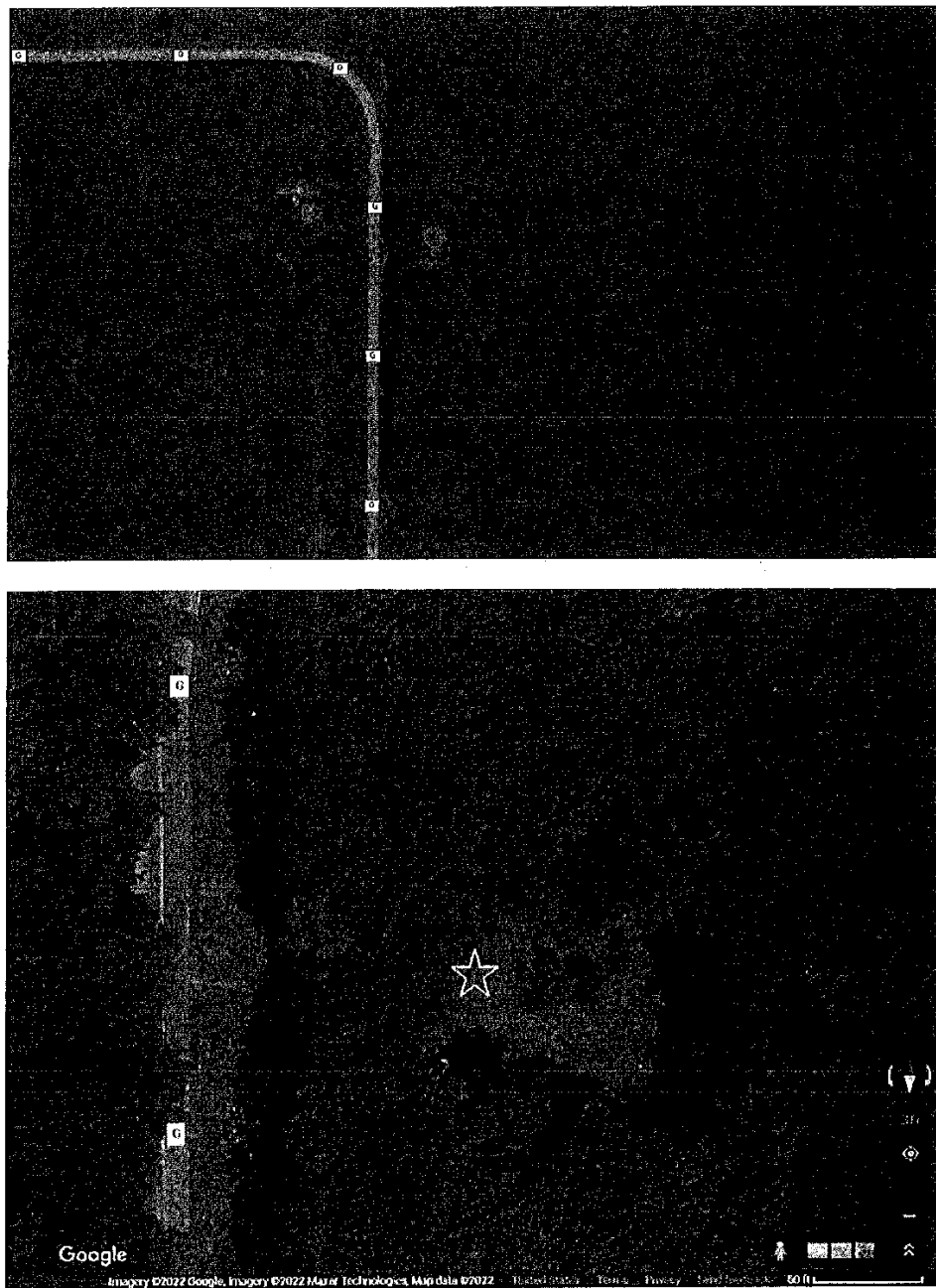
signature  12-15-2022 (Date)
Josh Pedersen, Parks and Forest Director

signature  11-22-2022 (Date)
Printed name [] Authorized Representative of WGNHS

EC-909 Land use agreement, 2022

Property access agreement, page 4 of 4

Exhibit A



EC-909 WDNR well construction report, 2023

Form 3300-077A, page 1 of 2

Well Construction Report WISCONSIN UNIQUE WELL NUMBER				ABB776		Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707				Form 3300-077A	
Property Owner US GEOLOGICAL SURVEY				Phone #		1. Well Location				Fire # (if avail.)	
Mailing Address 8551 RESEARCH WAY						Town of WILSON					
City MIDDLETON				State WI Zip Code 53562		Street Address or Road Name and Number					
County Eau Claire				Co. Permit # 34831		COUNTY HWY G					
Notification # 9209998801				Completed 07-21-2023		Subdivision Name				Lot # Block #	
Well Constructor (Business Name) MIDWEST WELL DRILLING & HYDROFRACKING LLC				Lic. # 6799		Latitude / Longitude in Decimal Degree (DD) 44.8057 °N -91.0172 °W				Method Code GPS008	
Address 31569 150TH AV CORNELL WI 54732-6100				Well Plan Approval #		NE SW Section Township Range or Govt Lot # 20 27 N 5 W					
Approval Date (mm-dd-yyyy)						2. Well Type New Well					
Hicap Permanent Well # Common Well # Specific Capacity 0						of previous unique well # constructed in					
Reason for replaced or reconstructed well ?											
3. Well serves 1 # of MONITOR WELL				Hicap Well ? No		Construction Type Drilled					
Private, potable				Hicap Property ? No							
Heat Exchange ___ # of drillholes				Hicap Potable ? No							
4. Potential Contamination Sources - ON REVERSE SIDE											
5. Drillhole Dimensions and Construction Method						8. Geology					
Dia. (in.)	From (ft.)	To (ft.)	Upper Enlarged Drillhole		Lower Open Bedrock	Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc...		From (ft.)	To (ft.)	
10	Surface	40	No	Rotary - Mud Circulation	No	T V C	T-TAN/BROWN V-NON-CAVING C-CLAY		Surface	1	
6	40	80	Yes	Rotary - Air	No	Y M N M	Y-YELLOW M-MEDIUM N-SANDSTONE M-SILTY		1	35	
			No	Rotary - Air & Foam	No	R M N	R-RED M-MEDIUM N-SANDSTONE		35	38	
			No	Drill-Through Casing Hammer		I H N	I-WHITE H-HARD/FIRM N-SANDSTONE		38	70	
			No	Reverse Rotary		R M Q	R-RED M-MEDIUM Q-GRANITE		70	80	
			No	Cable-tool Bit ___ in. dia...	No						
			No	Dual Rotary	No						
			No	Temp. Outer Casing 6in. dia							
			Yes	Removed? 3depth ft. (If NO explain on back side)							
6. Casing, Liner, Screen						9. Static Water Level			11. Well Is		
Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly			From (ft.)	To (ft.)	37 ft. below ground surface			24 in. above grade		
6	NEW STEEL, 18.97#/FT A53B WHEATLAND P.E. WELDED			Surface	40	10. Pump Test			Developed ? Yes		
Dia. (in.)	Screen type, material & slot size			From (ft.)	To (ft.)	Pumping level 45 ft. below surface			Disinfected ? Yes		
						Pumping at 12 GP M for 5 Hrs.			Capped ? Yes		
						Pumping Method ? Test Pump					
7. Grout or Other Sealing Material						12. Notified Owner of need to fill & seal ? Yes					
Method PRESSURE GROUT											
Kind of Sealing Material		From (ft.)	To (ft.)	# Sacks Cement		Filled & Sealed Well(s) as needed? Yes					
NEAT CEMENT GROUT		Surface	40	12 S							
13. Constructor / Supervisory Driller						Lic #		Date Signed			
MSP						8236		08-02-2023			
Drill Rig Operator						Lic or Reg #		Date Signed			
MSP											

WISCONSIN UNIQUE WELL NUMBER ABB776

EC-909 WDNR well construction report, 2023

Form 3300-077A, page 2 of 2

4a. Potential Contamination Sources

Is the well located in floodplain ? No

Comment:

11/10/23 PER JASON J SMITH, USGS: THAT WELL APPEARS TO BE A WATER LEVEL MONITORING WELL THAT WISCONSIN GEOLOGICAL AND NATURAL HISTORY INSTALLED FOR THE USGS CLIMATE RESPONSE NETWORK.

Created On: 07-19-2023

Created by: HMPHELPS1969

Updated On: 11-10-2023

Updated by: lyonsd

WISCONSIN UNIQUE WELL NUMBER **ABB776**

EC-909 WDNR soil boring form, 2023

Form 4400-122, page 1 of 1

State of Wisconsin Department of Natural Resources				SOIL BORING LOG INFORMATION Form 4400-122 Rev. 7-98																																																																																																																								
Route To: ☐ Watershed/Wastewater ☐ Waste Management ☐ ☐ Remediation/Revelopment ☐ Other ☐				Page <u>1</u> of <u>1</u>																																																																																																																								
Facility/Project Name Statewide Monitoring Network		License/Permit/Monitoring Number		Boring Number WID 18000909 aka EC-909																																																																																																																								
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Last Name: Phelps		Date Drilling Started 07 / 21 / 2023 m m d d y y y y		Date Drilling Completed 07 / 21 / 2023 m m d d y y y y																																																																																																																								
Firm: Matt Midwest Drilling and Hydrofracking		Drilling Method 10" Mud rotary to 40' 6" Air rotary to TD																																																																																																																										
WI Unique Well No. ABB776	DNR Well ID No.	Well Name	Final Static Water Level 35.55 Feet MSL	Surface Elevation 1068.94 Feet MSL	Borehole Diameter 10/6 inches																																																																																																																							
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane N , E		Lat 44.805559 Long -91.017294		Local Grid Location ☐ N ☐ E ☐ S ☐ W																																																																																																																								
NE 1/4 of SW 1/4 of Section 20 , T 27 N, R 5W		County Eau Claire		County Code Wilson																																																																																																																								
Facility ID		Civil Town/City/ or Village																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th rowspan="2">Sample Number and Type</th><th rowspan="2">Length Att. & Recovered (in)</th><th rowspan="2">Blow Counts</th><th rowspan="2">Depth in Feet (below ground surface)</th><th rowspan="2">Soil/Rock Description And Geologic Origin For Each Major Unit</th><th rowspan="2">USCS</th><th rowspan="2">Graphic Log</th><th rowspan="2">Well Diagram</th><th rowspan="2">PID/FID</th><th colspan="5">Soil Properties</th><th rowspan="2">RQD/ Comments</th></tr><tr><th>Compressive Strength</th><th>Moisture Content</th><th>Liquid Limit</th><th>Plasticity Index</th><th>P 200</th></tr></thead><tbody><tr><td rowspan="6">Grab Each 5ft- 16 samples total</td><td></td><td></td><td>0- 0.5</td><td>Dark brown Loamy organic topsoil</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>0.5- 2.8</td><td>SILTY SAND, 70% fine sand 30% silt, yellow brown, moist</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>2.8- 10</td><td>SANDSTONE, soft, non caving, f-c, well rounded mostly quartz sand, yellow to reddish yellow</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>10- 15</td><td>SHALE red to brown, soft</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>15- 70</td><td>SANDSTONE, w/shale layers, soft, non caving, f-c well rounded quartz sand, yellow to red brown Shaley 39-41 (red) and 68-70 (gray)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>70- 80</td><td>GRANITE red-brown, fine -med texture hard</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td colspan="3">EOB 80 feet 6" casing to 40 feet Static water level 37.1 feet Unless otherwise noted, all depths reported as feet below top of casing. Top of casing is 1.93 ft above land surface datum.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>						Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	Grab Each 5ft- 16 samples total			0- 0.5	Dark brown Loamy organic topsoil													0.5- 2.8	SILTY SAND, 70% fine sand 30% silt, yellow brown, moist													2.8- 10	SANDSTONE, soft, non caving, f-c, well rounded mostly quartz sand, yellow to reddish yellow													10- 15	SHALE red to brown, soft													15- 70	SANDSTONE, w/shale layers, soft, non caving, f-c well rounded quartz sand, yellow to red brown Shaley 39-41 (red) and 68-70 (gray)													70- 80	GRANITE red-brown, fine -med texture hard														EOB 80 feet 6" casing to 40 feet Static water level 37.1 feet Unless otherwise noted, all depths reported as feet below top of casing. Top of casing is 1.93 ft above land surface datum.										
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I hereby certify that the information on this form is true and correct to the best of my knowledge.																																																																																																																												
Signature Peter M. Chase P.G.			Firm Wisconsin Geological and Natrual History Survey																																																																																																																									
This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.																																																																																																																												

Appendix 2: Wells LF-493, LF-535, and LF-536 documents

Wells LF-535 and LF-536 were installed into well LF-493

Historical documents: LF-493

LF-493 WDNR well construction report, 2021

Form 3300-077A, 2 pages

Documentation of work done for this report:

LF-493, 535, and 536 Well owner document, 2025

Property access agreement, 2 pages

Documentation of work done for this report: LF-535

LF-535 WDNR monitoring well construction form, 2024

Form 4400-113A, 1 page

Documentation of work done for this report: LF-536

LF-536 WDNR monitoring well construction form, 2024

Form 4400-113A, 1 page

LF-493 WDNR well construction report, 2021

Form 3300-077A, page 1 of 2

33000493 (aka LF-493) was retrofitted with two new wells (33000535 and 33000536) constructed inside the open borehole

Well Construction Report WISCONSIN UNIQUE WELL NUMBER				AAI372		Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707				Form 3300-077A		
Property Owner WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY				Phone # (608)265-8181		1. Well Location				Fire # (if avail.)		
Mailing Address 3817 MINERAL POINT ROAD						Town of ELK GROVE				29200		
City MADISON				State WI		Street Address or Road Name and Number 29200 COLLEGE FARM ROAD						
County Lafayette		Co. Permit #		Notification #		Completed		Subdivision Name		Lot # Block #		
				8361668701		04-12-2021						
Well Constructor (Business Name) FAHERTY, JEFFERY A				Lic. # 6819		Latitude / Longitude in Decimal Degree (DD)				Method Code		
						42.7168 °N -90.3853 °W				SCR002		
Address FAHERTY & SON WELL DRLG LLC PO BOX 247 PLATTEVILLE WI 53818				Well Plan Approval #		NW SW Section Township Range		or Govt Lot #		21 3 N 1 E		
				Approval Date (mm-dd-yyyy)		2. Well Type New Well				of previous unique well # constructed in		
Hicap Permanent Well #				Common Well #		Reason for replaced or reconstructed well ?						
				Specific Capacity 0.3								
3. Well serves 1 # of 1 MONITORING WELL				Hicap Well ? No								
Drillhole				Hicap Property ? Yes								
Heat Exchange ___ # of drillholes				Hicap Potable ? No		Construction Type Drilled						
4. Potential Contamination Sources - ON REVERSE SIDE												
5. Drillhole Dimensions and Construction Method												
Dia. (in.)	From (ft.)	To (ft.)	Upper Enlarged Drillhole		Lower Open Bedrock		Geology Codes		8. Geology Type, Caving/Noncaving, Color, Hardness, etc...		From (ft.)	To (ft.)
11	Surface	7	No		Rotary - Mud Circulation		No		T-TAN/BROWN C-CLAY		Surface	6
10	7	40	No		Rotary - Air		Yes		T-TAN/BROWN L-LIMESTONE/DOLOMITE		6	189
6	40	304	Yes		Rotary - Air & Foam		No		G-GRAY L-LIMESTONE/DOLOMITE		189	280
			No		Drill-Through Casing Hammer				U-BLUE H-SHALE		280	281
			No		Reverse Rotary				N-SANDSTONE		281	304
			No		Cable-tool Bit ___ in. dia...		No					
			No		Dual Rotary		No					
			Yes		Temp. Outer Casing 10in. dia							
			Yes		Removed? 8depth ft. (If NO explain on back side)							
6. Casing, Liner, Screen												
Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly			From (ft.)	To (ft.)	9. Static Water Level			11. Well Is			
6	WHEATLAND A53 STEEL 6.625 .280 PLAIN END WELDED			Surface	40	72 ft. below ground surface			24 in. above grade			
Dia. (in.)	Screen type, material & slot size			From (ft.)	To (ft.)	10. Pump Test			Developed ? Yes			
						Pumping level 215 ft. below surface			Disinfected ? Yes			
						Pumping at 40 GP M for 1 Hrs.			Capped ? Yes			
						Pumping Method ? Airlift						
7. Grout or Other Sealing Material												
Method TREMIE PIPE - PUMPED												
Kind of Sealing Material		From (ft.)	To (ft.)	# Sacks Cement	12. Notified Owner of need to fill & seal ? No							
NEAT CEMENT GROUT		Surface	40	22 S	Filled & Sealed Well(s) as needed? No							
13. Constructor / Supervisory Driller												
JF				Lic # 6819		Date Signed 04-12-2021						
Drill Rig Operator				Lic or Reg #		Date Signed						

WISCONSIN UNIQUE WELL NUMBER AAI372

LF-493, 535, and 536 Well owner document, 2025

Property access agreement, page 1 of 2



DIVISION OF EXTENSION

May 27, 2025

Wisconsin Groundwater-Level Monitoring Network – Well Owner Document
33000493 (LF-493) borehole, 33000535 (LF-535) shallow, and 33000536 (LF-536) deep

Re: Landowner Property Access

Dear Director of UW-Platteville Pioneer Farm,

As part of the Wisconsin Groundwater-Level Monitoring Network (WGLMN), the Wisconsin Geological and Natural History Survey (WGNHS) looks forward to working with you to collect geological and groundwater data on your property. Collaboration by property owners such as yourself is essential to maintaining and strengthening the WGLMN for generations to come and we greatly appreciate your willingness to participate as a partner.

The WGLMN is collaboratively operated, maintained, and managed by the WGNHS, Wisconsin Department of Natural Resources (WDNR), and U.S. Geological Survey Upper Midwest Water Science Center (USGS). The WGLMN dates back to 1946 when the Wisconsin State Legislature formally established a groundwater-monitoring network. Water levels collected from the network help scientists and managers evaluate effects of well pumping, the response of groundwater levels to drought or increased precipitation, and effects of land-use change on groundwater resources. These data are also routinely used in the development of regional groundwater flow models, because long-term water-level measurements serve as reliable model calibration targets. More information about the WGLMN, including a link to an interactive map of network wells can be found here: <https://wgnhs.wisc.edu/water-environment/groundwater-monitoring-network/>

This document seeks to establish clear lines of communication between you and the WGNHS (as well as our partners at the WDNR and USGS) and clarify the mutual responsibilities and expectations for well installation and data collection on your property. While not every situation can be anticipated, the following section provides an outline of joint responsibility and mutual expectation.

Wisconsin Geological and Natural History Survey
3817 Mineral Point Road Madison, WI 53705 608-262-1705 WGNHS.org
Susan K. Swanson, Director and State Geologist

LF-493, 535, and 536 Well owner document, 2025

Property access agreement, page 2 of 2

The WGNHS acknowledges that we (in coordination with the USGS) will:

- Inform you of site visits and serve as a point of contact regarding on-site activities and ongoing monitoring.
- Strive to clearly communicate the status of on-site activities and ongoing monitoring.
 - On-site activities may include basic reconnaissance, well installation, well maintenance, and data collection.
 - Routine visits will be performed on an as-needed basis but typically not more than monthly.
 - The most intensive activity occurs during the initial phase when the well is reconstructed, and the monitoring well and water level monitoring equipment is installed.
- Ensure ongoing operation and maintenance of the new monitoring well in coordination with the USGS.

As hosting property owner, you acknowledge that you:

- Have received information about the WGLMN and wish to volunteer your well for the collection of geologic and hydrogeologic data.
- Are the owner / operator of the property and, as such, have the authority to allow for the described activities on your land.
- Will not tamper with the well and any of the equipment installed as part of ongoing monitoring efforts.
- Will not be responsible for any costs associated with well installation or ongoing operation and maintenance of the well, nor removal from service (including filling and sealing).
- Will facilitate on-site activities to the best of your ability and communicate any specific requests or concerns directly to WGNHS and USGS staff.

If you have any questions or concerns, feel free to contact us directly by email or phone.

Sincerely,

Peter M Chase

Pete Chase

Geotechnician

3817 Mineral Point Rd

Madison, WI 53705

pete.chase@wisc.edu

(608) 265-6003

P.s. Contact information for our partners at WDNR and USGS is as follows:

Rob Waschbusch

USGS

Hydrologist

1 Gifford Pinchot Drive

Madison, WI 53726

rjwaschb@usgs.gov

608-821-3868

Joseph Rosnow

WDNR

Water Quantity Reporting and Inventory Coordinator

101 S. Webster Street, PO Box 7921

Madison, WI 53707

Joseph.Rosnow@wisconsin.gov

(608) 220-1226



DIVISION OF EXTENSION

LF-535 WDNR monitoring well construction form, 2024

Form 4400-113A, page 1 of 1

33000535 aka LF-535, new well (shallow well constructed, along with LF-536, inside LF-493)

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 7-98

Facility/Project Name: Statewide Groundwater Monitoring Network
Facility License, Permit or Monitoring No.:
Facility ID: Pioneer Farm, UW-Platteville

Local Grid Location of Well: ft. ☐ N. ☐ E. ☐ S. ☐ W.
Local Grid Origin ☐ (estimated: ☐) or Well Location ☒
Lat. 42 ° 43 ' 03.59 N " Long. 90 ° 23 ' 07.15 W " or

Well Name: 33000535 aka LF-535
Wis. Unique Well No. WA238 DNR Well ID No.
Date Well Installed: 10/01/2024
Well Installed By: Name (first, last) and Firm: Michael Berkholz, Water Wells, Inc.

Type of Well: Well Code 11 / mw
Section Location of Waste/Source: NW 1/4 of SW 1/4 of Sec. 21, T. 3 N, R. 1 E W
Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known
Distance from Waste/Source: ft. Apply ☐ Gov. Lot Number

A. Protective pipe, top elevation: 1,114 ft. MSL
B. Well casing, top elevation: 1,113.56 ft. MSL
C. Land surface elevation: 1,111 ft. MSL
D. Surface seal, bottom: 1110 ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒ Dolomite (Galena Fm.)

13. Sieve analysis performed? ☐ Yes ☒ No
14. Drilling method used: Rotary ☒ 5 0
Hollow Stem Auger ☐ 4 1
Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☒ 0 1
Drilling Mud ☐ 0 3 None ☐ 9 9
16. Drilling additives used? ☒ Yes ☐ No
Describe: foam

17. Source of water (attach analysis, if required):
Platteville POTW

E. Bentonite seal, top: 1110 ft. MSL or 1 ft.
F. Fine sand, top: 1059 ft. MSL or 52 ft.
G. Filter pack, top: 1059 ft. MSL or 52 ft.
H. Screen joint, top: 1052 ft. MSL or 59 ft.
I. Well bottom: 1037 ft. MSL or 74 ft.
J. Filter pack, bottom: 1036 ft. MSL or 75 ft.
K. Borehole, bottom: 810 ft. MSL or 301 ft. See NOTE below
L. Borehole, diameter: 6.0 in.
M. O.D. well casing: 2.5 in.
N. I.D. well casing: 2.1 in.

NOTE: Borehole (LF-493) Drilled in April 2021 by Faherty Well Drilling WCR #AAJ372. Two monitoring wells are constructed in this boring, this one (LF-535), and a deep piezometer (WUWV WA239) screened from 295-300 ft. w/ a bentonite seal from 290-78 ft. All depths are in feet below land surface datum.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 40.0 ft.
c. Material: Steel ☒ 0 4
Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe:
3. Surface seal: Bentonite ☐ 3 0
Concrete ☒ 0 1
Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ 3 0
Other ☐
5. Annular space seal: a. Granular/Chipped Bentonite ☒ 3 3
b. Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
c. Lbs/gal mud weight Bentonite slurry ☐ 3 1
d. % Bentonite Bentonite-cement grout ☐ 5 0
e. 550 # ☒ volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 3 2
c. Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. Unimin #15
b. Volume added ft³
8. Filter pack material: Manufacturer, product name & mesh size
a. Unimin #15
b. Volume added ft³
9. Well casing: Flush threaded PVC schedule 40 ☐ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
Sch 80 PVC w/ glued couplers every 20 feet Other ☒
10. Screen material: Sch 80 PVC
a. Screen type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer: Monoflex
c. Slot size: 0.010 in.
d. Slotted length: 15 ft.
11. Backfill material (below filter pack): None ☐ 1 4
Unimin #15 Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Peter M. Chase Firm: Wisconsin Geological and Natural History Survey

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

LF-536 WDNR monitoring well construction form, 2024

Form 4400-113A, page 1 of 1

33000536 aka LF-536, new well (deep well constructed, along with LF-535, inside LF-493)

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 7-98

Facility/Project Name: Statewide Groundwater Monitoring Network
Facility License, Permit or Monitoring No.:
Facility ID: Pioneer Farm, UW-Platteville
Type of Well: Well Code 12 / pz
Distance from Waste/Source: ft. Enfl. Stds. Apply ☐
Local Grid Location of Well: Local Grid Origin (estimated: ☐) or Well Location ☒
Lat. 42 ° 43 ' 03.59 N " Long. 90 ° 23 ' 07.15 W " or 42.7168, -90.3853
Section Location of Waste/Source: NW 1/4 of SW 1/4 of Sec. 21, T. 3, N. R. 1 ☒ E. W
Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known
Gov. Lot Number:
Well Name: 33000536 aka LF-536
Wis. Unique Well No.: WA239 DNR Well ID No.:
Date Well Installed: 10 / 01 / 2024
Well Installed By: Name (first, last) and Firm: Michael Berkholz
Water Wells, Inc.

A. Protective pipe, top elevation: 1,114 ft. MSL
B. Well casing, top elevation: 1113.46 ft. MSL
C. Land surface elevation: 1,111 ft. MSL
D. Surface seal, bottom: 1110 ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒ Sandstone (St. Peter Fm.)
13. Sieve analysis performed? ☐ Yes ☒ No
14. Drilling method used: Rotary ☒ 5 0
Hollow Stem Auger ☐ 4 1
Other ☐
15. Drilling fluid used: Water ☐ 0 2 Air ☒ 0 1
Drilling Mud ☐ 0 3 None ☐ 9 9
16. Drilling additives used? ☒ Yes ☐ No
Describe: Foam
17. Source of water (attach analysis, if required):
Platteville POTW

E. Bentonite seal, top: 1037 ft. MSL or 74 ft.
F. Fine sand, top: 824 ft. MSL or 287 ft.
G. Filter pack, top: 824 ft. MSL or 287 ft.
H. Screen joint, top: 816 ft. MSL or 295 ft.
I. Well bottom: 811 ft. MSL or 300 ft.
J. Filter pack, bottom: 810 ft. MSL or 301 ft.
K. Borehole, bottom: 810 ft. MSL or 301 ft.
L. Borehole, diameter: 6.0 in.
M. O.D. well casing: 2.5 in.
N. I.D. well casing: 2.1 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 40 ft.
c. Material: Steel ☒ 0 4
Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe:
3. Surface seal: Bentonite ☐ 3 0
Concrete ☒ 0 1
Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ 3 0
Other ☐
5. Annular space seal: a. Granular/Chipped Bentonite ☒ 3 3
b. Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
c. Lbs/gal mud weight Bentonite slurry ☐ 3 1
d. % Bentonite Bentonite-cement grout ☐ 5 0
e. 2250 # volume added for any of the above
f. How installed: Tremie ☒ 0 1
Tremie pumped ☐ 0 2
Gravity ☐ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. 1/4 in. 3/8 in. 1/2 in. Bentonite chips ☒ 3 2
c. 3/8" coated bentonite pellets to 240" 3/8" chips to 78" Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. Unimin #15
b. Volume added ft³
8. Filter pack material: Manufacturer, product name & mesh size
a. Unimin #15
b. Volume added 250 # ☒
9. Well casing: Flush threaded PVC schedule 40 ☐ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
Sch 80 PVC w/ glued couplers every 20 feet Other ☒
10. Screen material: Sch 80 PVC
a. Screen type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer Monoflex
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☐ 1 4
Unimin #15 Other ☒

NOTE: NOTE: Borehole (LF-493) Drilled in April 2021 by Faherty Well Drilling WCR #AAB72 Two monitoring wells are constructed in this boring, this one (LF-536), and a shallow water table well (VUUVN WA238) screened from 59-74 ft. w/ a bentonite seal from 1-52 ft. All depths are in feet below land surface datum

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Peter M. Chase Firm: Wisconsin Geological and Natural History Survey

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

Appendix 3: Wells LA-537 and LA-1498 documents

Well LA-1498 replaced well LA-537

Historical Documents: LF-537

LA-537 Well location maps, date unknown

Historic well information compiled by WGNHS, 2 pages

LA-537 WDNR well construction report, 1981

1 page

LA-537 Site schedule, 1983

Historic well information compiled by WGNHS, 2 pages

LA-537 Basic well information, 1987

Historic well information compiled by WGNHS, 1 page

LA-537 Well evaluation, 1987

Historic well information compiled by WGNHS, 1 page

LA-537 Historic water level data, 1981–1990

Historic well information compiled by WGNHS, 2 pages

Documentation of work done for this report: LA-1498

LA-1498 Land use and access agreement, 2023

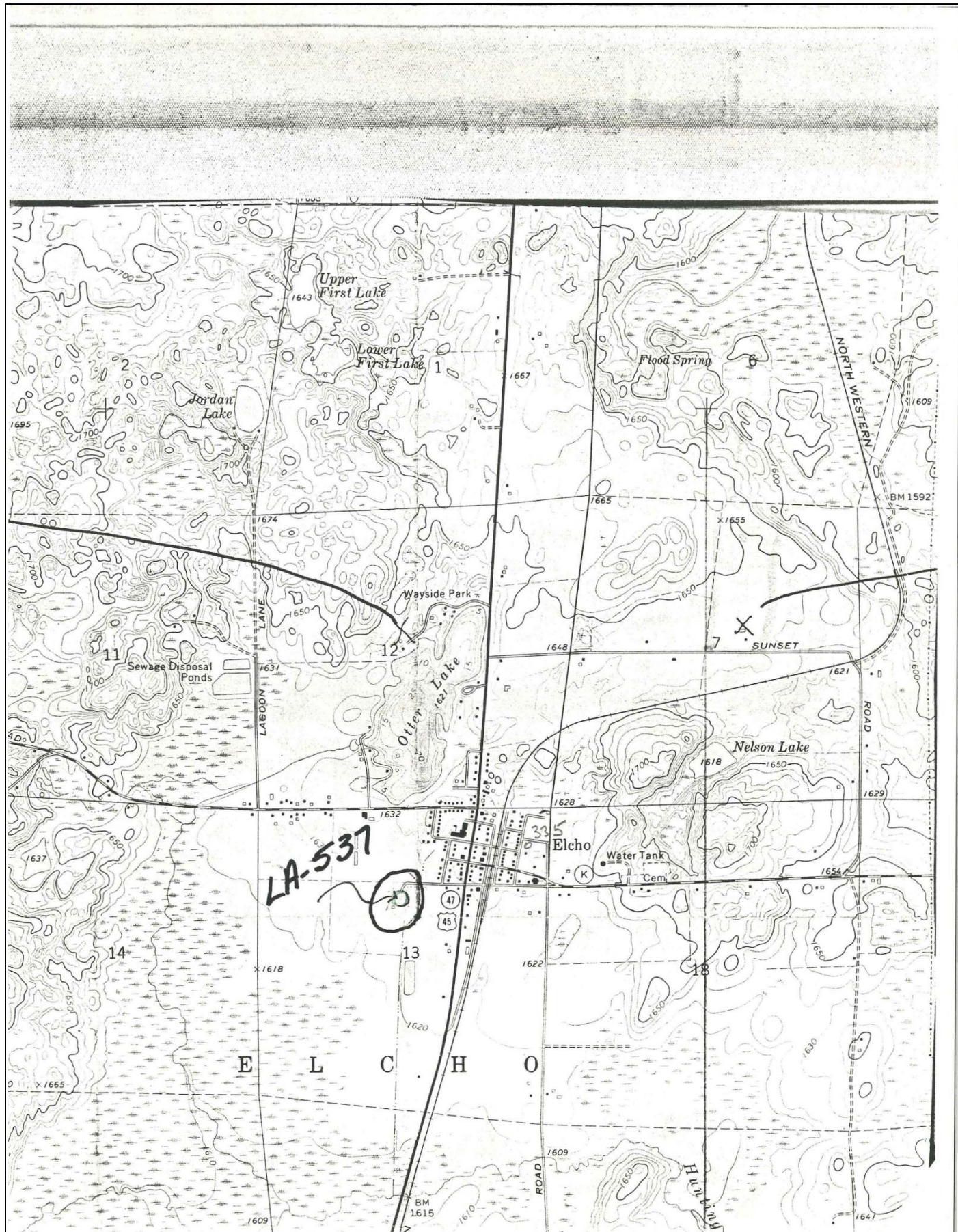
Property access agreement, 4 pages

LA-1498 WDNR well construction report, 2023

Form 3300-077A, 2 pages

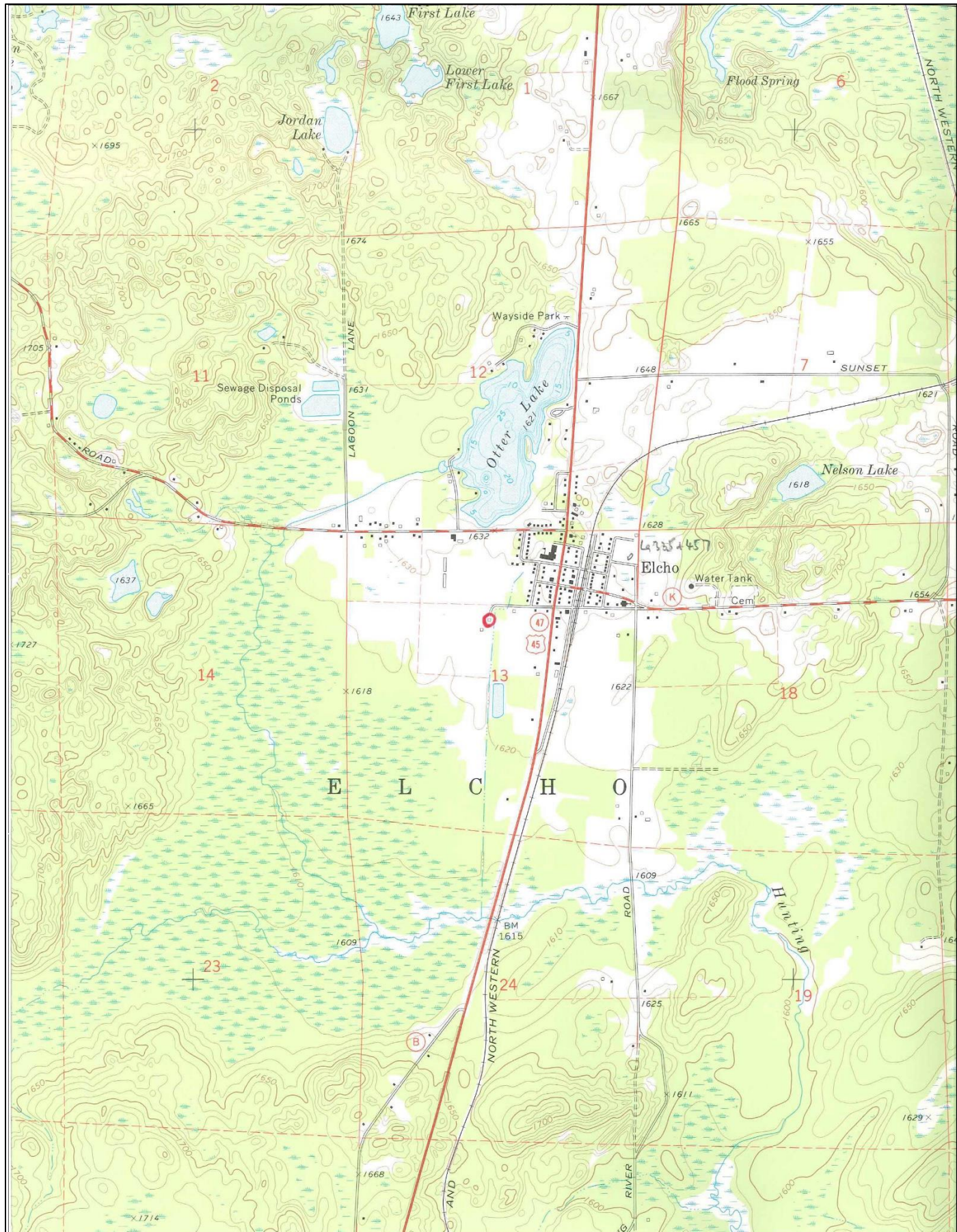
LA-537 Well location maps, date unknown

Historic well information compiled by WGNHS, page 1 of 2



LA-537 Well location maps, date unknown

Historic well information compiled by WGNHS, page 2 of 2



LA-537 WDNR well construction report, 1981

Page 1 of 1

LA-537

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy - Division's Copy
Green Copy - Driller's Copy
Yellow Copy - Owner's Copy

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79

1. COUNTY HANGHADE CHECK (✓) ONE: ☒ Town ☐ Village ☐ City Name ECHO OCT 2 1981

2. LOCATION SE 1/4 NW 1/4 13 34N 10E 3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
OR - Grid or Street No. Street or Road Name ADDRESS BOX 133
AND - If available subdivision name, lot & block No. POST OFFICE ECHO, WIS. 54428 ZIP CODE 54428

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain	Sanitary Bldg. Sewer	Floor Drain Connected To:	Storm Bldg. Drain	Storm Bldg. Sewer
8'	C.I. Other	C.I. Other	C.I. Sewer Other Sewer	C.I. Other	C.I. Other

Street Sewer Other Sewers Foundation Drain Connected to Sewage Sump Clearwater Sump Septic Tank Holding Tank Sewage Absorption Unit Manure Hopper or Retention or Pneumatic Tank

San. Storm C.I. Other Sewer Sewage Sump Clearwater Sump Septic Tank Holding Tank Sewage Absorption Unit Manure Hopper or Retention or Pneumatic Tank

Privy Pet Waste Pit Pit: Nonconforming Existing Subsurface Pumproom Barn Gutter Animal Barn Pen Animal Yard Silo With Pit Glass Lined Storage Facility Silo w/o Pit Earthen Silage Storage Trench Earthen Manure Basin

Temporary Manure Stack or Platform Watertight Liquid Manure Tank or Basin Manure Pressure Pipe Subsurface Gasoline or Oil Tank Waste Pond or Land Disposal Unit (Specify Type) Manure Storage Basin Concrete Floor Only Concrete Floor and Partial Concrete Walls Other (Describe)

5. Well is intended to supply water for: HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
5	Surface	0	97			GRAVEL & SAND	Surface	42
						CLAY	42	97
						SAND & GRAVEL	93	97

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Mfg. & Method of Assembly	From (ft.)	To (ft.)
5	NEW BLK. STEEL	Surface	94
15	1/2" 258" THREAD & CONCA (RECESS.)		
	A-53 SUMO TOMO METALS		
	5 STAINLESS SCREEN 94 97		

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
	Surface	

10. TYPE OF DRILLING MACHINE USED

☒ Cable Tool	☐ Rotary-hammer w/drilling mud & air	☐ Jetting with
☐ Rotary-air w/drilling mud	☐ Rotary-hammer & air	☐ Air
☐ Rotary-w/drilling mud	☐ Reverse Rotary	☐ Water

Well construction completed on SEPT. 21 1981

11. MISCELLANEOUS DATA

Yield Test: 1 HRL. AT 15 GPM

Well is terminated 8 inches ☒ above ☐ below final grade

Depth from surface to normal water level 18 Ft.

Well disinfected upon completion ☒ Yes ☐ No

Depth of water level when pumping 42 Ft. Stabilized ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to MADISON laboratory on SEPT. 22 1981

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seal, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature Oscar Koepfel Registered Well Driller Business Name and Complete Mailing Address Box 11 Thlox, Wis. 5446

LA-537 Site schedule, 1983

Historic well information compiled by WGNHS, page 1 of 2

SITE NO. LA-34/DE/13-0537

Recorded by B.R. ELLEFSON U.S. DEPT. OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
SITE SCHEDULE

Date 9-7-83

Check One ☒ English ☐ Metric Units

GENERAL SITE DATA (1)

Site Ident No 458603089111601 RG Number R-8 Transaction T-ADMV

Site Type 2-CDEHIMSPSTW Data 3-CULM Reliability add, delete, modify, verified

Project No. 5-4552202 District 6-55 State 7-ES County LANGLADE Reporting Agency 4-USGS

Latitude 9-45° 6' 03" Longitude 10-08° 11' 16" Lat-Long Accuracy 11-15 F T M

Land Number 12-LA-34/DE/13- Land Not Loc. 13-WEISENWEIS 13 T 34N R 10E 04

Location Map 14-ELCHO Scale 15-24000

Altitude 16-1625 Method of Measurement 17-AL Accuracy 18-5

Tape Setting 19-ABCDEFGHIJKLMNPSSTUVW Hydrologic Unit (HUC) 20-

Use of Site 23-ABCDEFGHIJKLMNPSSTUVWXZ Secondary Site Use 301- Tertiary Site Use 302-

Use of Water 24-ABCDEFGHIJKLMNPSSTUVXYZ

Secondary Water Use 25- Tertiary Use of Water 26- Depth of Hole 27-9.7 Depth of Well 28-9.7 Source of Depth Data 29-D

Water Level 30-18 Date Measured 31-09/21/1981 Source 33-D

Method of Measurement 34-ABCDEFGHIJKLMNPSSTUVZ

Site Status 37-DEF Source of Geohydrologic Data 38-D Pump Used 35- Date of First Construction Completion 21-09/21/1981

OWNER IDENTIFICATION (1)

R-158 T-ADMV Date of Ownership 159-09/21/1981

Name: Last 161-WESE First 162-MABEL Middle Initial 163-

Held 12.00
cut 1.11
10.59
mp 15+ .50 ft
8-17-83
Well next to
house. along
next to Elec.
wire.

Diagram showing well location relative to house, barn, and roads (CTH A, CTH K, STH 4745). Includes a grid with the number 13.

Observer
Gene West (village
water & sewer worker)
Box 133
ELCHO WI.
54428
715-275-3734

LA-537 Site schedule, 1983

Historic well information compiled by WGNHS, page 2 of 2

OTHER SITE IDENTIFICATION NUMBERS (1)

R-189 * T- A D M * add, delete, modify
New Card Same R & T

Ident 190 # LA-0537 * Assigner 191- KSGS *
Ident 190 # * Assigner 191- *

SITE VISIT DATA (1)

R-188 * T- A D M * add, delete, modify
Date of Visit 187 # 08/17/1983 * Name of Person 188- ELLEFSON, B. R. *

LIFT DATA (1)

R-42 * T- A D M * Type of Lift 43 # A B C J P R S T U Z * Entry No 254 # *
add, delete, modify
su, bucket, centrifugal, jet, piston, rotary, submersible, turbine, unknown, other

Pump Intake Setting 44- * Type of Power 45- D E G H L N W Z *
diesel, electric, gasoline, hand, LP gas, natural, windmill, other
Date 38- / / * Horsepower 46- *

MAJOR PUMP DATA (2)

R-47 * T- A D M * Type of Lift 43 # * Lift Entry No 254 # * Manufacturer of Pump 48- *
add, delete, modify
Serial No of Pump 49- * Name of Power Company 50- *
Power Company Account No 51- * Power Meter No 52- * Pump Rating 53- *
Person or Company Who Maintains the Pump 54- * Additional Lift 255- * Rated Pump Capacity 256- *

STANDBY POWER DATA (2) (See LIFT DATA for codes of fields 43 and 56 below)

R-55 * T- A D M * Type of Lift 43 # * Type of Power 56- * Horsepower 57- * Lift Entry No 254 # *
add, delete, modify

WATER LEVEL DATA COLLECTION (1)

R-121 * T- A D M * Begin Year 122 # * End Year 123- * Source Agency 124 # *
add, delete, modify
Frequency of Collection 7 125- * 8 Network Site 258 # *

MEASURING POINT

R-320 * T- A D M * add, delete, modify
Begin Date 321 # 08/17/1983 * End Date 322- / / * Height 323- .50 *
Remark 324- MP IS TOP OF CASING *

WATER LEVEL DATA

R-234 * T- A * DATE WATER LEVEL (BELOW LSD) 9 STATUS 10 METHOD
add, delete, modify

235 #	DATE	237 =	9	10
08/17/1983	10.09	R	J	
/ /				
/ /				
/ /				

HOLD	CUT	DEPTH BELOW MP	REMARKS	DATE PUNCHED	DATE ENTERED
12.00	1.41	10.59			

WATER QUALITY DATA COLLECTION (1)

R-114 * T- A D M * Begin Year 115 # * End Year 116- * Source Agency 117 # *
add, delete, modify
Frequency of Collection 7 118- * 8 Network Site 257 # * 11 Type of Analysis 120- * Analyzing Agency 307- *

FIELD WATER QUALITY MEASUREMENTS (1)

R-192 * T- A D M * Date 193 # / / * Geo/hydro-logic Unit 195 # *
add, delete, modify
New Card Same R thru 195

Temperature 196 # 0.0, 0.1, 0 * Degrees C 197- *
Conductance 198 # 0.0, 0.5 * p/miles 197- *
Other (STORET) Parameter 199 # * Value 197- *
Other (STORET) Parameter 199 # * Value 197- *

LA-537 Basic well information, 1987

Historic well information compiled by WGNHS, page 1 of 1

BASIC DATA ON WATER-LEVEL OBSERVATION WELL	
Well number LA-537 Owner MABEL WEST Location (Co., T/R.sec) Sec. 13 - T 34N / R 10E NE SE NW Land surface altitude 1025' Drainage basin HUNTING RIVER - 75' Wolf River Basin distance to the nearest perennial stream:	Well name Topographic setting
WELL DATA	
Depth 97' Casing depth 94' Screened interval 94'-97' Diameter 5" Aquifers open to well Sand & GRAVEL Geologic log available? NO Construction report available? YES Use of well DOMESTIC - HOME Access to measure well Other logs or data available	Date drilled Sept. 21, 1981
NEAREST SUPPLEMENTAL DATA POINTS	
Precipitation stations SUMMIT LAKE RANGER STATION - 3 miles South of WELL S. Pelican - 8 mi N N. Pelican - 16 mi N Streamgaging stations 05394500, PRAIRIE RIVER NEAR MERRILL WI 25 miles SW of WELL Observation wells ON 24 10 mi NW of WELL; LA 6 - 17 mi S of WELL; LA 118 - 18 mi S of WELL; LA-27 19 mi SSE of WELL Other	
EXISTING RECORD	
Measuring point (description) TOP OF CASING, 0.5 FT. ABOVE LSD: 1,625 Elev.: LSD Measuring equipment STEEL TAPE Frequency of measurement Period of record -- Started (date) 8-17-1983 1st measurement: 10.09 ft LSD Ended (date) Volume of missing record	
Recorded by <u>Jay Peterson</u> on <u>4/87</u>	

LA-537 Well evaluation, 1987

Historic well information compiled by WGNHS, page 1 of 1

July 1980
R. D. Cotter

CRITERIA FOR EVALUATION OF WATER-LEVEL OBSERVATION WELLS IN WISCONSIN

1. Areal spacing – distance from any observation well
 – distance from observation well in same aquifer
2. Ownership – private
 – public
3. Use of well domestic
4. Access – physical
 – owner's permission
5. Condition of well – casing
 – housing
6. Geologic log – yes
 – no
7. Construction report – yes
 – no
8. Diameter (4 inch minimum for recorder) 5 inches
9. Aquifer – single
 – multiple
10. Hydraulic connection with aquifer
11. Knowledge of pumping effects
12. Range and character of water level fluctuations
13. Length of record
14. Missing record
15. Adequacy of current measuring frequency
16. Probability of permanance

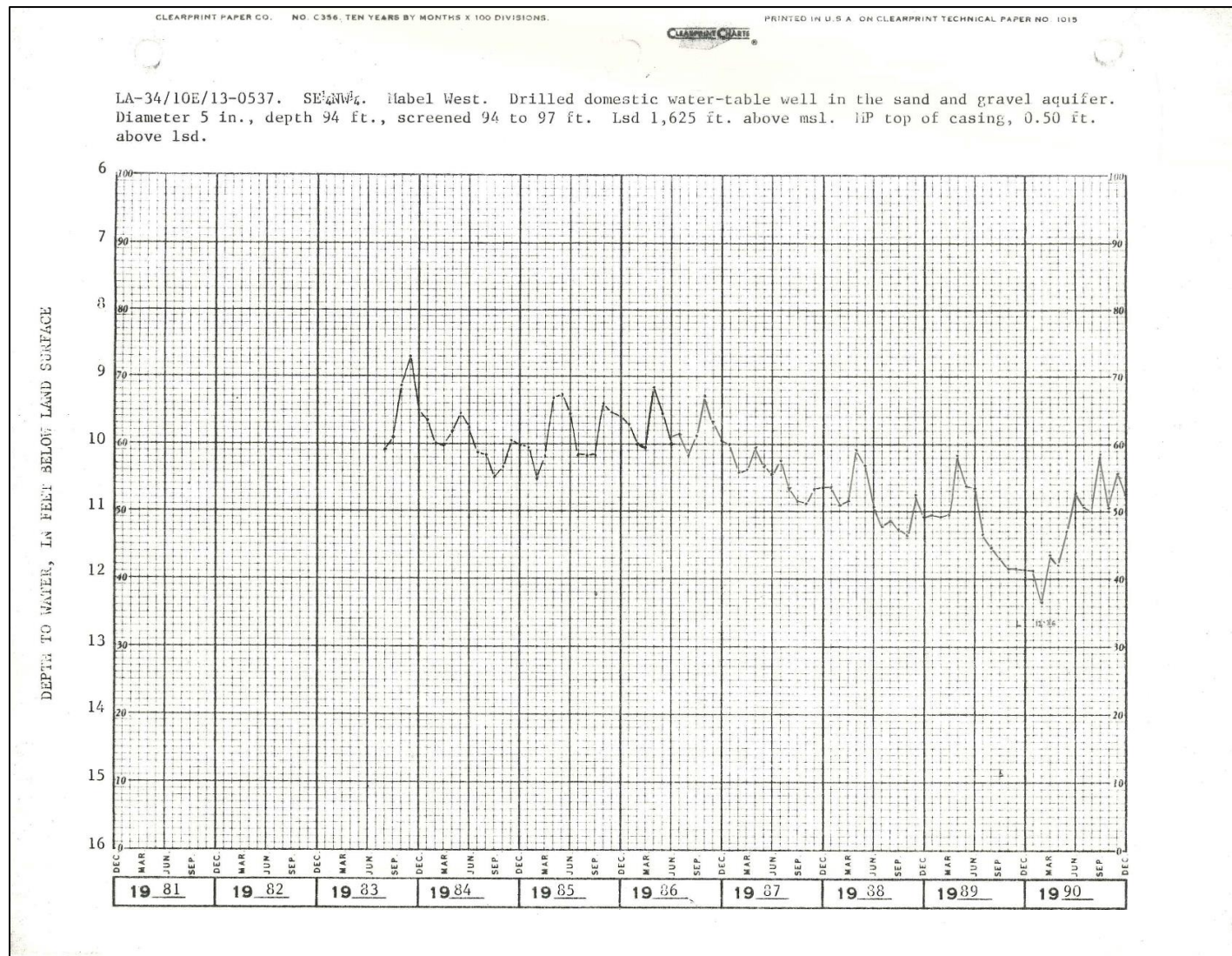
NOTES

Recommendations

na 7/17

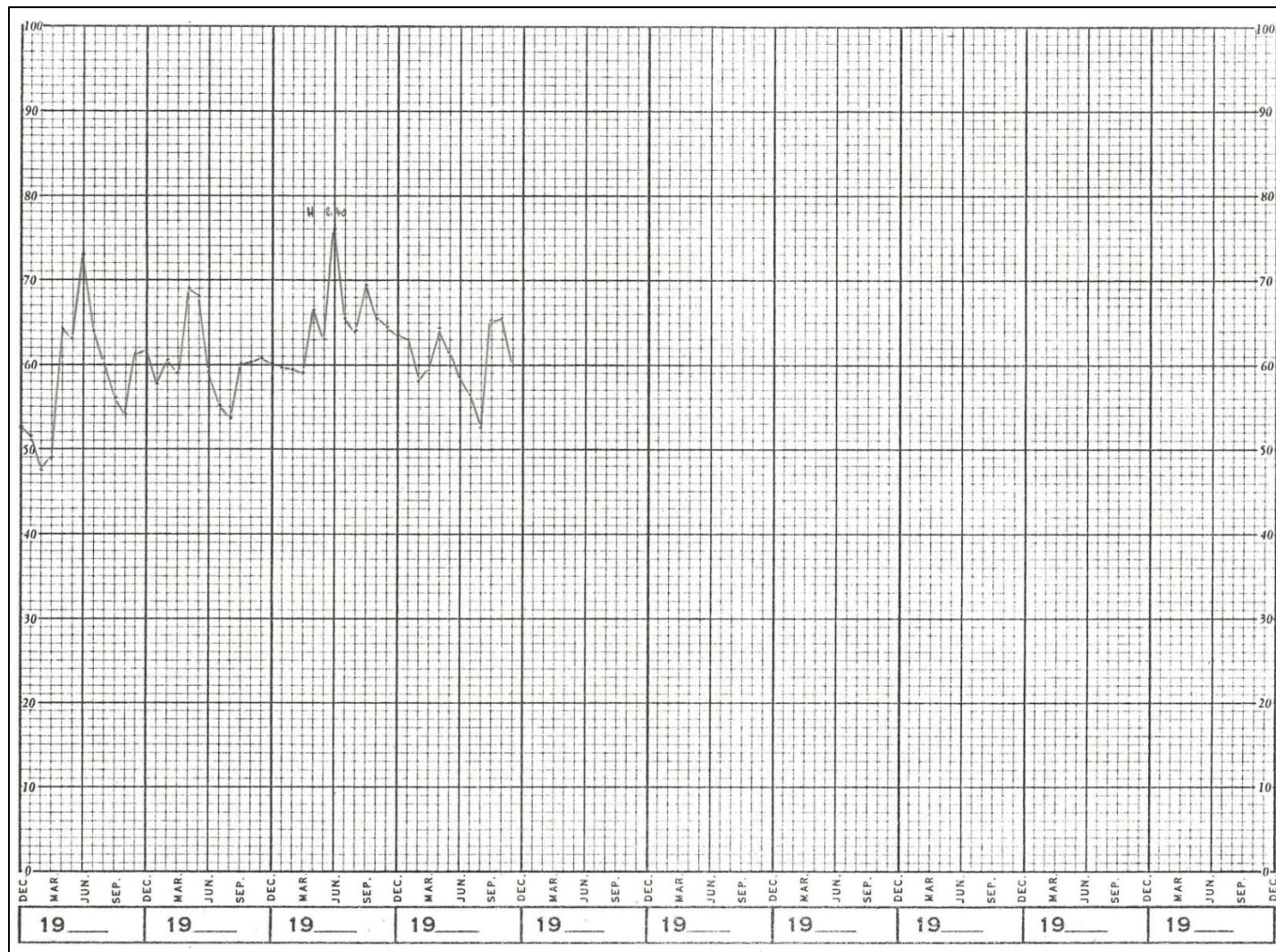
LA-537 Historic water level data, 1981–1990

Historic well information compiled by WGNHS, page 1 of 2



LA-537 Historic water level data, 1981–1990

Historic well information compiled by WGNHS, page 2 of 2



LA-1498 Land use and access agreement, 2023

Property access agreement, page 1 of 4

**LAND USE AND ACCESS AGREEMENT
FOR GROUNDWATER MONITORING**

This agreement is between the Wisconsin Geological and Natural History Survey (WGNHS), part of the Natural Resources Institute (Division of Extension, UW- Madison), and Langlade County, Wisconsin, a quasi-municipal corporation, represented by its Forest Administrator.

The WGNHS partners with the U.S. Geological Survey's Upper Midwest Water Science Center (USGS) to operate, maintain, and manage the Wisconsin Groundwater-Level Monitoring Network (WGLMN). The WGNHS also closely coordinates with the Wisconsin Department of Natural Resources (WDNR) regarding the WGLMN.

The purpose of this agreement is to allow WGNHS the ability to install and maintain a well for monitoring groundwater levels on property owned by Langlade County. Langlade County grants WGNHS access and use in common with Langlade County and with such other parties authorized by Langlade County to Tax Parcel #0080293, located at SW-NE, Sect. 15, T34N, R10E, in the Town of Elcho. The approximate location of the proposed well is shown on Exhibit A.

Parties agree that the following terms govern this Land use agreement:

1. The effective date of the land access will be upon mutual agreement and execution of this agreement by the WGNHS and Langlade County.
2. Langlade County is not responsible for the cost to install, maintain, repair, or monitor during any period of the Land Use Agreement.
3. Prior to the installation and/or removal of any well or structure WGNHS will obtain written consent from the Forest Administrator.
4. WGNHS will mitigate damages caused to the Premises and surrounding areas and consult with the Forest Administrator regarding specific well location and any damages or expected damages to Langlade County Property.
5. WGNHS shall at its own expense and cost maintain and keep the premises in good repair and condition.
6. WGNHS shall not discharge waste or other hazardous material in such a manner to contaminate the well or other bodies of water or otherwise become a public nuisance.
7. WGNHS shall help to protect the environment and natural resources, and where damage nonetheless occurs, WGNHS will be held liable for its actions and/or activities in order to restore the damages resources resulting from placement of the monitoring well including but not limited to direct contamination to aquifer from improper well maintenance or abandonment or damage to trees and timber value.
8. WGNHS must obtain written approval from the Forest Administrator prior to the use of any herbicide or pesticide.
9. WGNHS does not have the authority and shall not transfer nor assign said land use agreement without prior written approval from the Forest Administrator.

LA-1498 Land use and access agreement, 2023

Property access agreement, page 2 of 4

10. WGNHS shall be mindful of the Langlade County employees working in the vicinity of the monitoring well and shall not interfere with other activity or use on the site, including but not limited to forestry, timber harvesting, recreational trail development and trail maintenance.
11. WGNHS commits to maintaining the premises in a decent, sanitary, and safe condition and will at no time allow its work to cause a hazard or unsafe conditions.
12. WGNHS commits to locking or securing the monitoring well to ensure that the installation is only accessible by approved personnel.
13. Well drilling, well construction, major repairs, and well decommissioning and abandonment (as needed) will be covered under a temporary construction easement for the time period the contractor will be on site.
14. Upon final decommissioning of this monitoring station (not anticipated), this Agreement shall terminate.
15. Should the WGNHS discontinue use of this monitoring station, all equipment will be removed from this location and the site restored at the sole expense of WGNHS. Langlade County agrees to provide assistance in identifying an alternative location for a monitoring well if the parties continue this Agreement.
16. The use of the monitoring station shall continue unless terminated by either party upon 180 days written notice.
17. Well evaluations may consist of borehole geophysical logging, the establishment of elevation datum benchmarks, packer testing, or other hydrogeological well evaluations. WGNHS staff may perform this work in coordination with the USGS or delegate these activities to the USGS who serves as a partner in operating, maintaining, and managing the WGLMN.
18. Monitoring and maintenance consist of the deployment of water-level monitoring equipment inside the well, visits by WGNHS and/or USGS personnel to perform water-level measurements and retrieve water-level data. These visits may also include the performance of small repairs to the well such as replacing padlocks, repainting the exterior of the monitoring well, or replacing/repairing in-well monitoring equipment. WGNHS staff may perform this work in coordination with the USGS or delegate these activities to the USGS serves as a partner in operating, maintaining, and managing the WGLMN.
19. Notices required or deemed advisable under this Agreement shall be placed in writing and delivered personally or by registered or certified mail:
 - If to Langlade County, upon Langlade County Administrator
1633 Neva Road, Antigo, WI 54409.
 - If to WGNHS, upon the State Geologist, 3817 Mineral Point Road, Madison, WI 53705, with copy to the Real Estate Specialist, Facilities Planning and Management, 21 N. Park Street 6th floor, Madison, WI 53715.
20. The laws of the State of Wisconsin shall govern this Agreement and executed amendments thereto. Venue for all legal proceedings arising out of this Agreement, or breach thereof, shall be exclusively in Langlade Circuit Court, Antigo, WI.
21. Insurance: Each party agrees to maintain property, liability and workers compensation insurance for their employees and property in the manner provided by law.

LA-1498 Land use and access agreement, 2023

Property access agreement, page 3 of 4

22. Liability: It is mutually agreed by Langlade County and WGNHS that, as related to this Agreement, any loss or expense or resultant legal liability, involving personal injury or property damage, will be the responsibility of the party whose officer, employee or agent caused the loss or expense by his or her respective actions, acts, activities, or omissions which occurred in connection with this agreement.
23. Each party shall be responsible for the acts and omissions of itself and its employees, directors, officers, and agents. The Agreement shall not be construed to create a contractual obligation for either party to indemnify the other for loss or damage resulting from any act of omission of the other party or its employees, directors, officers, and agents. This Section shall not constitute a waiver by either party or any rights to indemnification, contribution or subrogation which the party may have by operation of law.
24. By signing below, the parties affirm and acknowledge that they have read and understand this Agreement and its attachments, if any, consisting of four (4) typewritten pages; they have authority to enter into this Agreement on behalf of the entity, corporation, or County they are signing for; they are knowingly, freely, and voluntarily entering into this Agreement; and that they accept and agree to be bound by the terms and conditions of this Agreement and its attachments, if any, as outlined in this Agreement.
25. Entire Agreement: This document represents the entire agreements between the parties and the agreements contained herein can only be modified upon subsequent written agreement signed by both parties.

APPROVALS:

LANGLADE COUNTY BY:

signature Al Murray 3/30/23
Al Murray, Forest Administrator (Date)

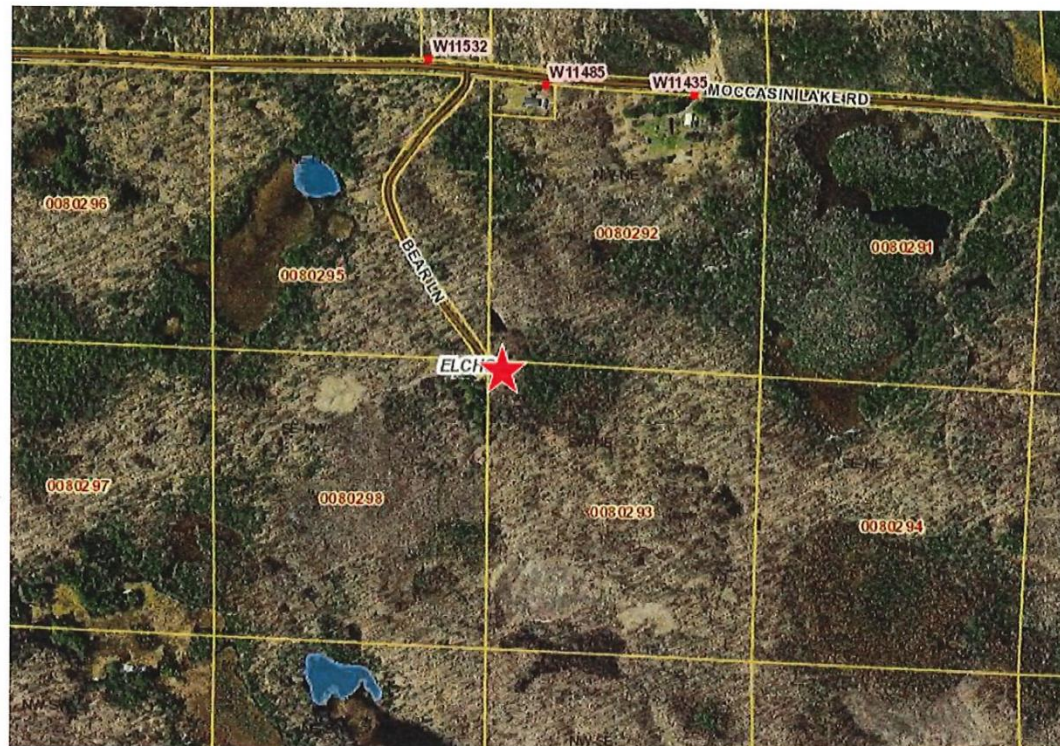
WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY BY:

signature Brent Lloyd 03/24/2023
Printed name | Brent Lloyd |, Authorized Representative of WGNHS (Date)

LA-1498 Land use and access agreement, 2023

Property access agreement, page 4 of 4

Exhibit A



LA-1498 WDNR well construction report, 2023

Form 3300-077A, page 1 of 2

34001498 (aka LA-1498), Statewide Monitoring Network, replaces LA-537

Well Construction Report WISCONSIN UNIQUE WELL NUMBER				ABQ837		Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707				Form 3300-077A	
Property Owner WI GEOLOGICAL SURVEY				Phone # (608)333-3785		1. Well Location				Fire # (if avail.)	
Mailing Address 3817 MINERAL POINT						Town of ELCHO					
City MADISON				State WI Zip Code 53705		Street Address or Road Name and Number					
County Langlade				Co. Permit #		Notification # 9346956001				Completed 11-30-2023	
Well Constructor (Business Name) DREWS WELL DRILLING INC				Lic. # 5900		Latitude / Longitude in Decimal Degree (DD) 45.436 °N -89.2281 °W				Method Code GPS008	
Address 170001 RINGLE AVE RINGLE WI 54471				Well Plan Approval #		SE NW Section Township Range				or Govt Lot # 15 34 N 10 E	
Hicap Permanent Well #				Common Well #		Specific Capacity 0				Reason for replaced or reconstructed well ?	
3. Well serves # of MONITOR WATER LEVEL				Hicap Well ? No		2. Well Type New Well				of previous unique well # constructed in	
Private, non-potable				Hicap Property ? No		Construction Type Drilled					
Heat Exchange ___ # of drillholes				Hicap Potable ? No							
4. Potential Contamination Sources - ON REVERSE SIDE											
5. Drillhole Dimensions and Construction Method						8. Geology					
Dia. (in.)	From (ft.)	To (ft.)	Upper Enlarged Drillhole		Lower Open Bedrock	Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc...		From (ft.)	To (ft.)	
6	Surface	141.5	No Rotary - Mud Circulation		No		Y	Y-SAND & GRAVEL	Surface	122	
			No Rotary - Air		No		C	C-CLAY	122	133	
			No Rotary - Air & Foam		No	N	S	N-FINE S-SAND	133	141.5	
			No Drill-Through Casing Hammer								
			No Reverse Rotary								
			No Cable-tool Bit ___ in. dia...		No						
			Yes Dual Rotary		No						
			No Temp. Outer Casing ___ in. dia								
			No Removed? ___ depth ft. (If NO explain on back side)								
6. Casing, Liner, Screen						9. Static Water Level			11. Well Is		
Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly			From (ft.)	To (ft.)	99 ft. below ground surface			24 in. above grade		
6	STEEL, 18.97 LBS/FT, A53B, MARIUCHI, WELDED			Surface	138.5	10. Pump Test			Developed ? Yes		
Dia. (in.)	Screen type, material & slot size			From (ft.)	To (ft.)	Pumping level 115 ft. below surface			Disinfected ? Yes		
5	STAINLESS STEEL 10 SLOT W/ KPAK			138.5	141.5	Pumping at 18 GP M for 2 Hrs.			Capped ? Yes		
7. Grout or Other Sealing Material						12. Notified Owner of need to fill & seal ? No					
Method MOUNDED						Filled & Sealed Well(s) as needed? No					
Kind of Sealing Material			From (ft.)	To (ft.)	# Sacks Cement	13. Constructor / Supervisory Driller			Lic #	Date Signed	
GRANULAR BENTONITE			Surface		1 S	EJD			5686	12-13-2023	
						Drill Rig Operator			Lic or Reg #	Date Signed	

WISCONSIN UNIQUE WELL NUMBER ABQ837

LA-1498 WDNR well construction report, 2023

Form 3300-077A, page 2 of 2

4a. Potential Contamination Sources		Is the well located in floodplain ? <u>No</u>	
Type	Qualifier	Distance	
Privy		86	

Comment:

Water Quality Text:

Water Quantity Text:

Difficulty Text:

Created On: 12-01-2023 Created by: DREWSWELL Updated On: 01-10-2024 Updated by: WELL PROCESS

WISCONSIN UNIQUE WELL NUMBER ABQ837

Appendix 4: Wells MT-07 and MT-488 documents

Well MT-488 replaced well MT-07

Historical Documents: MT-07

MT-07 Well evaluation, date unknown (original 1938 well)

Historic well information compiled by WGNHS, 1 page

MT-07 Well location maps, date unknown (original 1938 well)

Historic well information compiled by WGNHS, 2 pages

MT-07 Historic water-level data, 1936–1945 (original 1938 well)

Historic well information compiled by WGNHS, 1 page

MT-07 Basic well information, 1980 (original 1938 well)

Historic well information compiled by WGNHS, 1 page

MT-07 Historic water-level data, 1956–1985 (original 1938 well)

Historic well information compiled by WGNHS, 3 pages

MT-07 Historic water-level data, 1996–1999 (original 1938 well)

Historic well information compiled by WGNHS, 1 page

MT-07 Page 30 extracted from project 118 report, 1996 (original 1938 well); Dunning and others (1996)

Page 30 of report, 1 page

MT-07 Page 13 extracted from DNR-149 report, 2000 (second MT-07 well); Batten and others (2000)

Page 4 of Appendix A, 1 page

Documentation of work done for this report: MT-488

MT-488 WDNR groundwater monitoring station easement, 2021

Form 2200-296, 7 pages

MT-488 WDNR monitoring well construction form, 2023

Form 4400-113A, 1 page

MT-488 WDNR soil boring form, 2023

Form 4400-122, 2 pages

MT-488 WDNR monitoring well development form, 2023

Form 4400-113B, 1 page

MT-07 Well evaluation, date unknown (original 1938 well)

Historic well information compiled by WGNHS, page 1 of 1

Mt 7

(original 1938 well, MT-07)

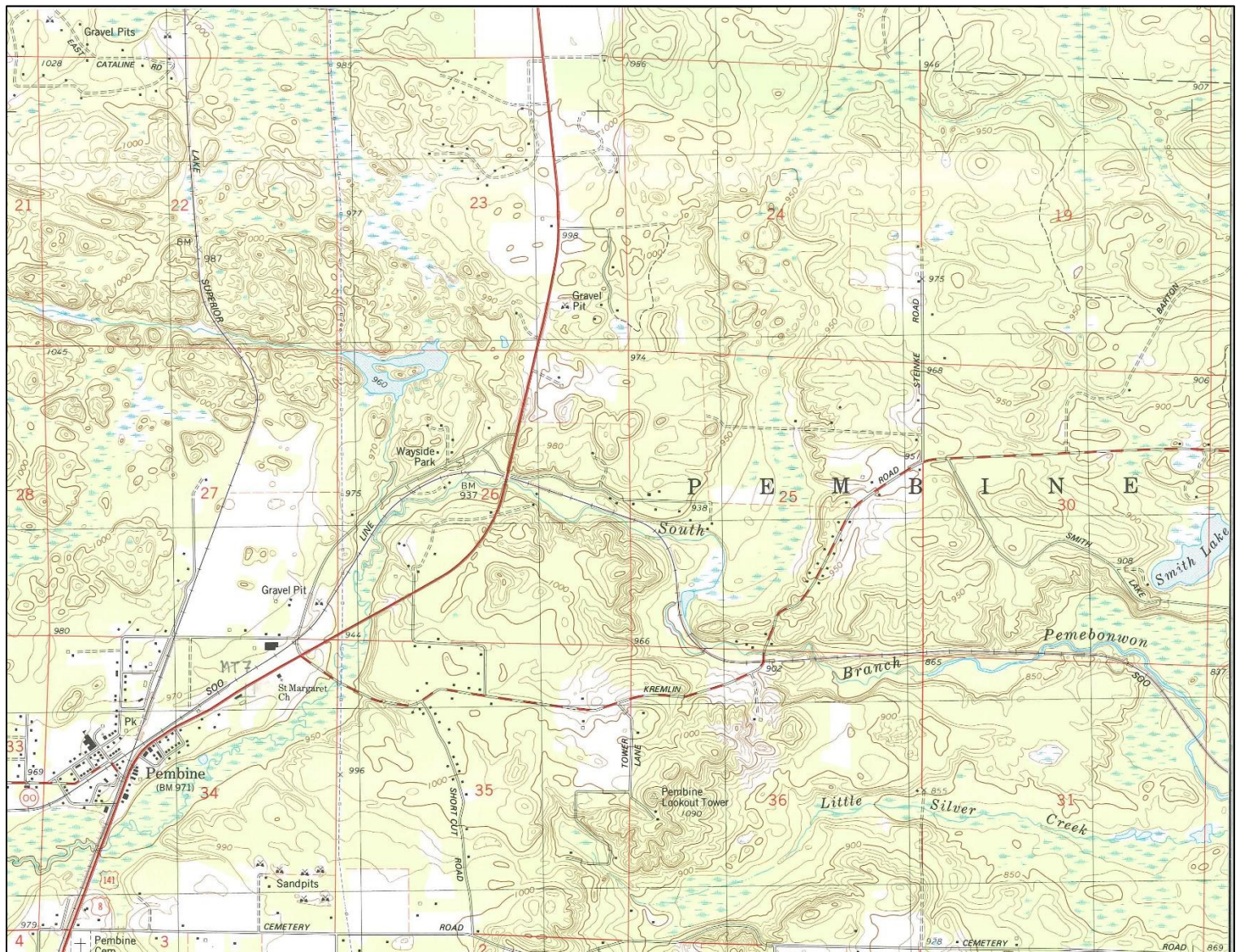
LIST OF CRITERIA FOR THE EVALUATION OF
EXISTING OBSERVATION WELLS IN WISCONSIN

1. Areal spacing -- distance from any observation well 13 mi
-- distance from observation well in same aquifer 13 mi
2. Ownership: private -- public
3. Use of well observation
4. Access -- physical
-- owner's permission
5. Condition of well -- casing
-- housing
6. Geologic log: yes -- no
7. Construction report: yes -- no
Well completion date: 1938
8. Diameter (4 in. minimum for recorder) 8"
9. Aquifer: single -- multiple
10. Good hydraulic connection with aquifer yes
11. Knowledge of pumping effect no
12. Range and character of w.l. fluctuations 4 ft (19-23); good normal fluct.,
very small long-term changes
13. Length of record 42 years
14. Missing record only 2.3% missing
15. Adequacy of current measuring frequency good
16. Probability of permanence good
17. Recommendations/Improvements
— keep as a key well

Evaluated by _____ on _____

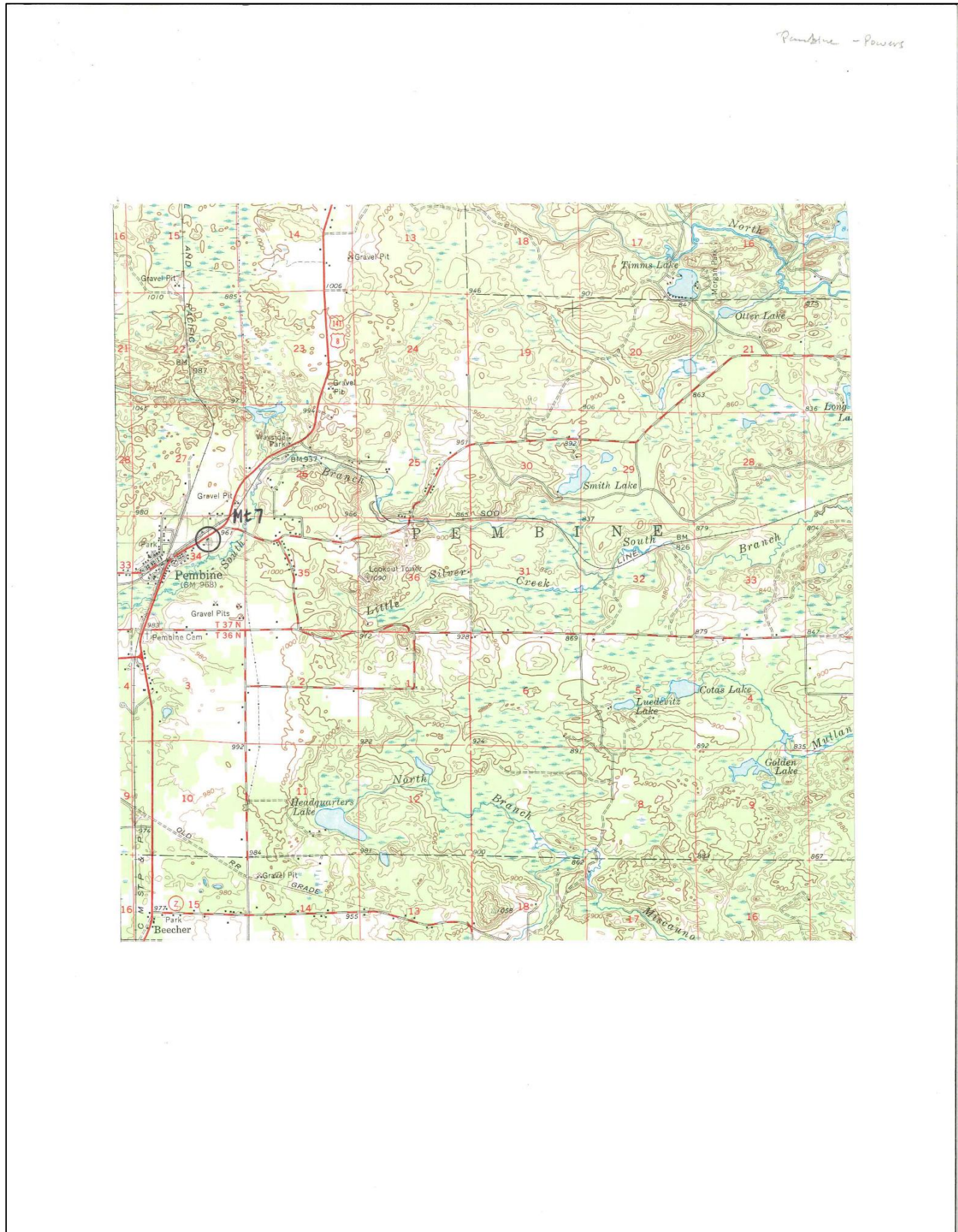
MT-07 Well location maps, date unknown (original 1938 well)

Historic well information compiled by WGNHS, page 1 of 2



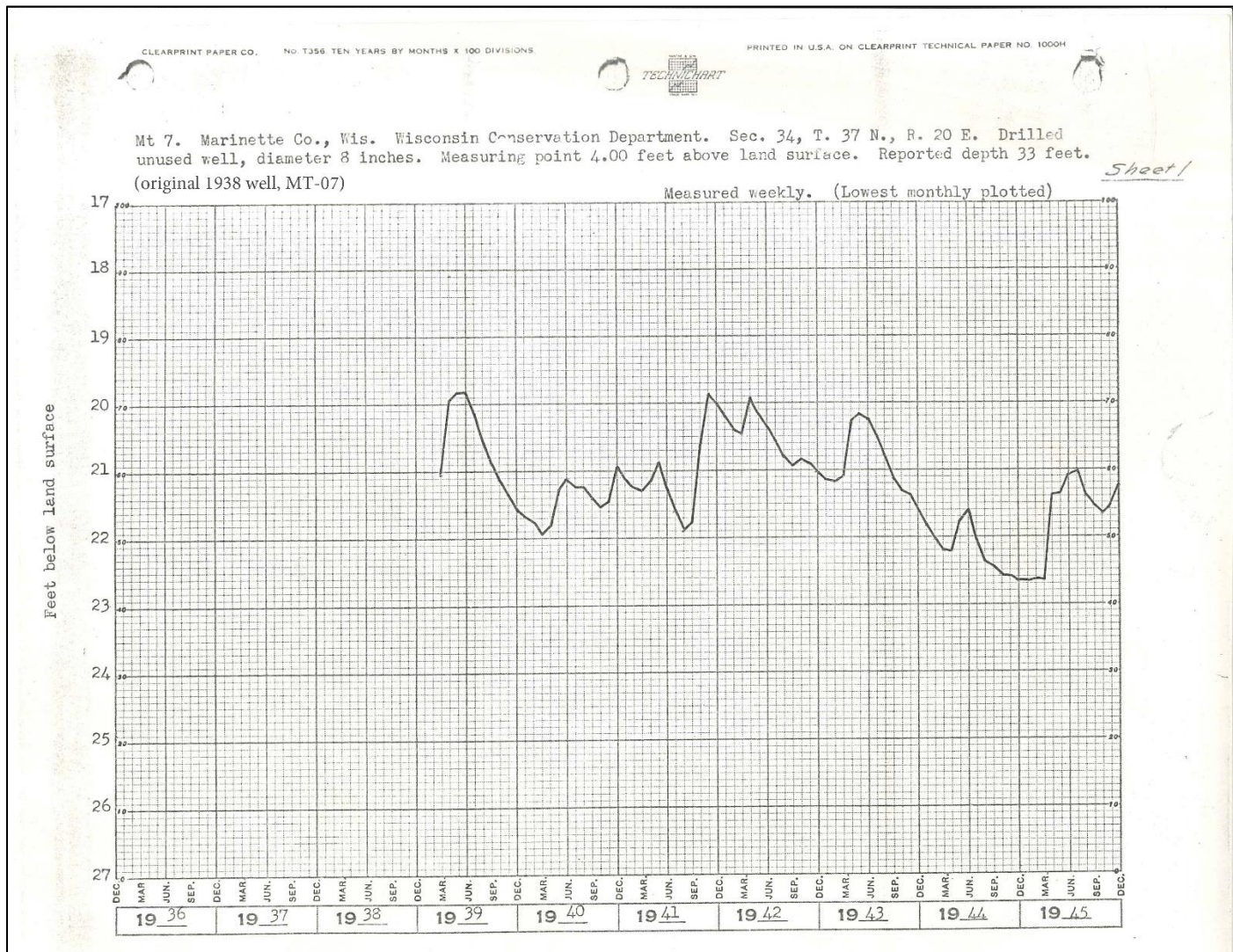
MT-07 Well location maps, date unknown (original 1938 well)

Historic well information compiled by WGNHS, page 2 of 2



MT-07 Historic water-level data, 1936–1945 (original 1938 well)

Historic well information compiled by WGNHS, page 1 of 1



MT-07 Basic well information, 1980 (original 1938 well)

Historic well information compiled by WGNHS, page 1 of 1

7/11/80

BASIC DATA ON WATER-LEVEL OBSERVATION WELL

Well number	ME 7 (original 1938 well, MT-07)		
Owner	Wis. DNR		
Location (Co., T/R.sec)	T37N, R20E, Sec. 34, SE1/NW1/NE1/4; at the Pembine Ranger Station		
Land surface altitude	965 ft		
Drainage basin	MENOMINEE R.; Pembina River (South Branch)		
Distance to the nearest perennial stream:	700 ft of the left bank		

WELL DATA

Depth	33 ft		
Casing depth	33 ft		
Screened interval	open end		
Diameter	8"		
Aquifers open to well	Quaternary - Pleistocene		
Geologic log available?	no		
Construction report available?	no		
Use of well	observation		
Access to measure well	good		

NEAREST SUPPLEMENTAL DATA POINTS

Precipitation stations	Iron Mountain, Mich. - 13 mi N. Wausaukee - 18 mi S Goodman - 18.2 mi W		
Streamgaging stations	04066000 Menominee R. nr. Pembine - 10 mi ESE		
Observation wells	ME 9 - 13 mi SE ME 27 - 23 mi S Fe 33 - 12 mi N Fe 9 - 29 mi W		
Other	-		

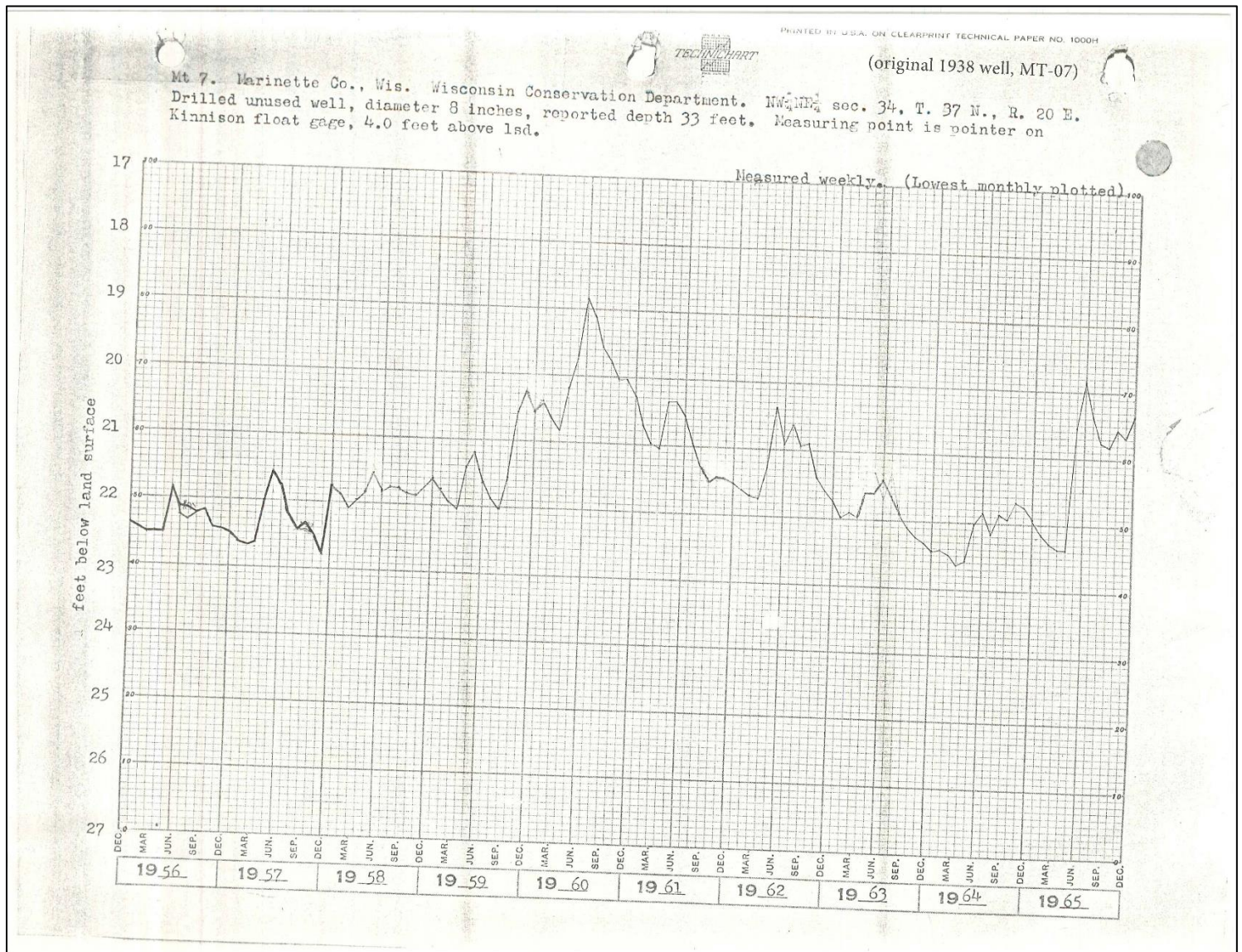
EXISTING RECORD

Measuring point	pointer on float gage, 4.00 ft above 1st		
Measuring equipment	Kinnison float gage		
Frequency of measurement	weekly (daily 03/05/39 - 02/08/45; monthly 12/15/51 - 10/28/52)		
Period of record --	1939 - present		
Started	03/05/39		
Ended			
Volume of missing record	very good record, only 2.3 % missing		

Recorded by A. Zepher on 9/24/80

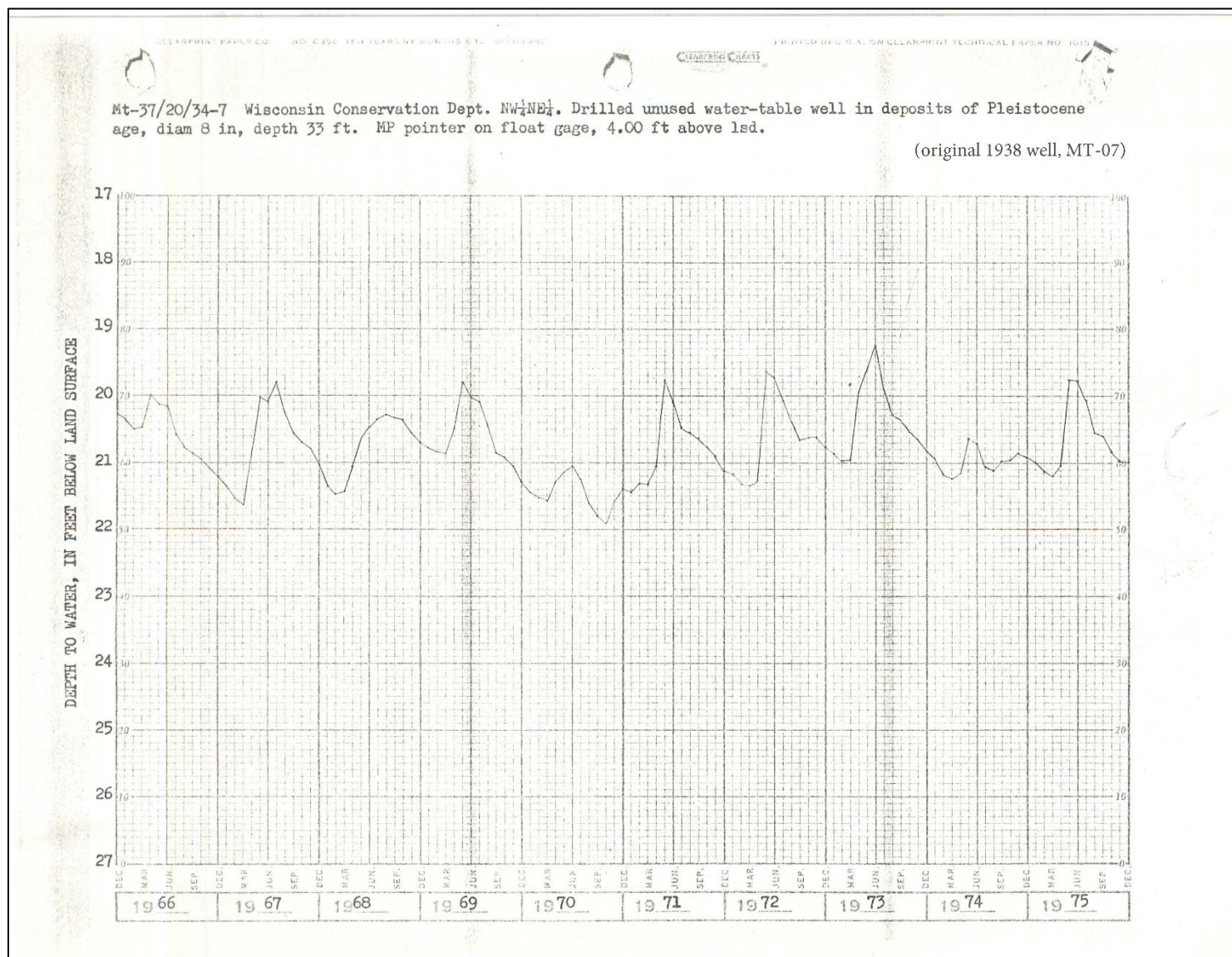
MT-07 Historic water-level data, 1956–1985 (original 1938 well)

Historic well information compiled by WGNHS, page 1 of 3



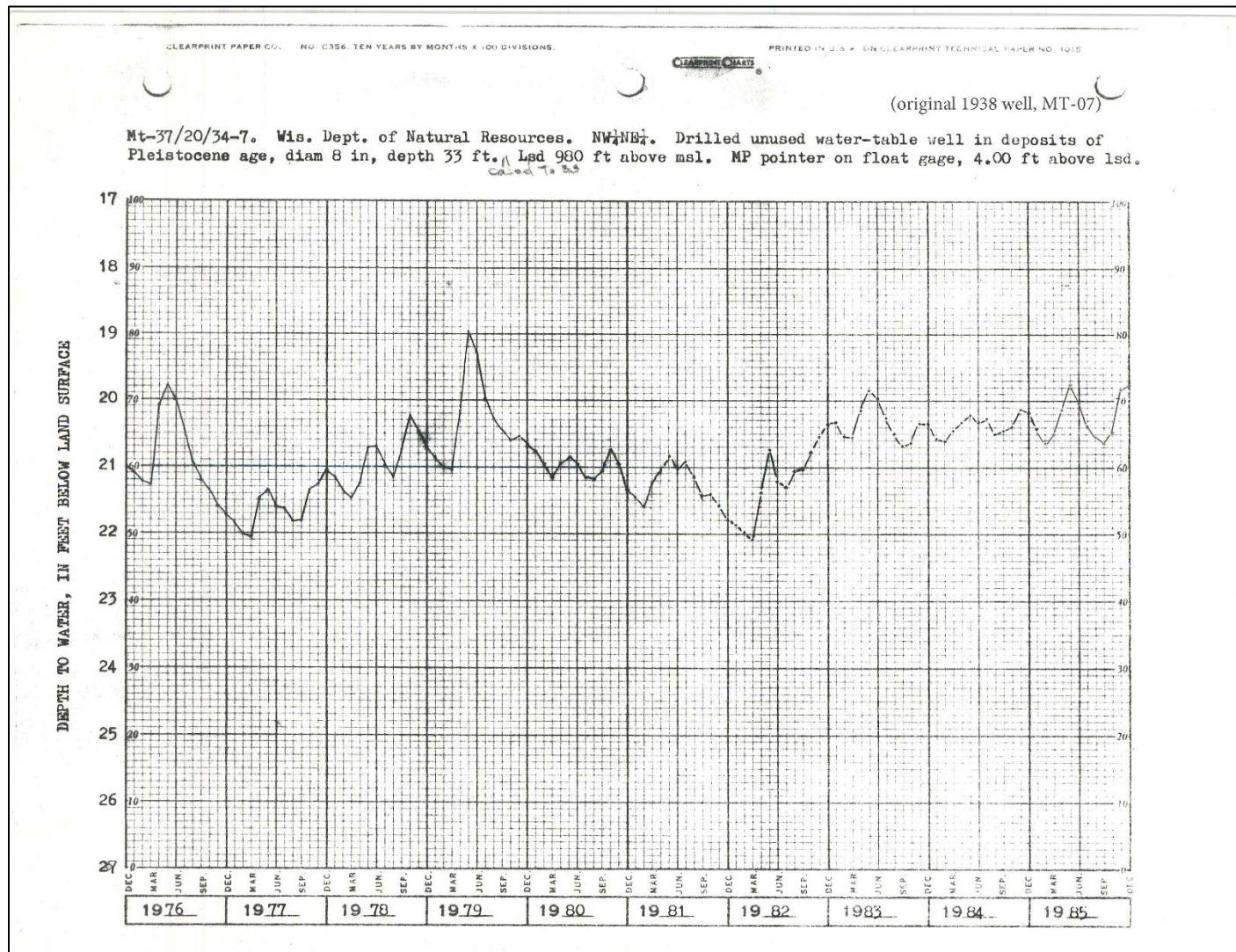
MT-07 Historic water-level data, 1956–1985 (original 1938 well)

Historic well information compiled by WGNHS, page 2 of 3



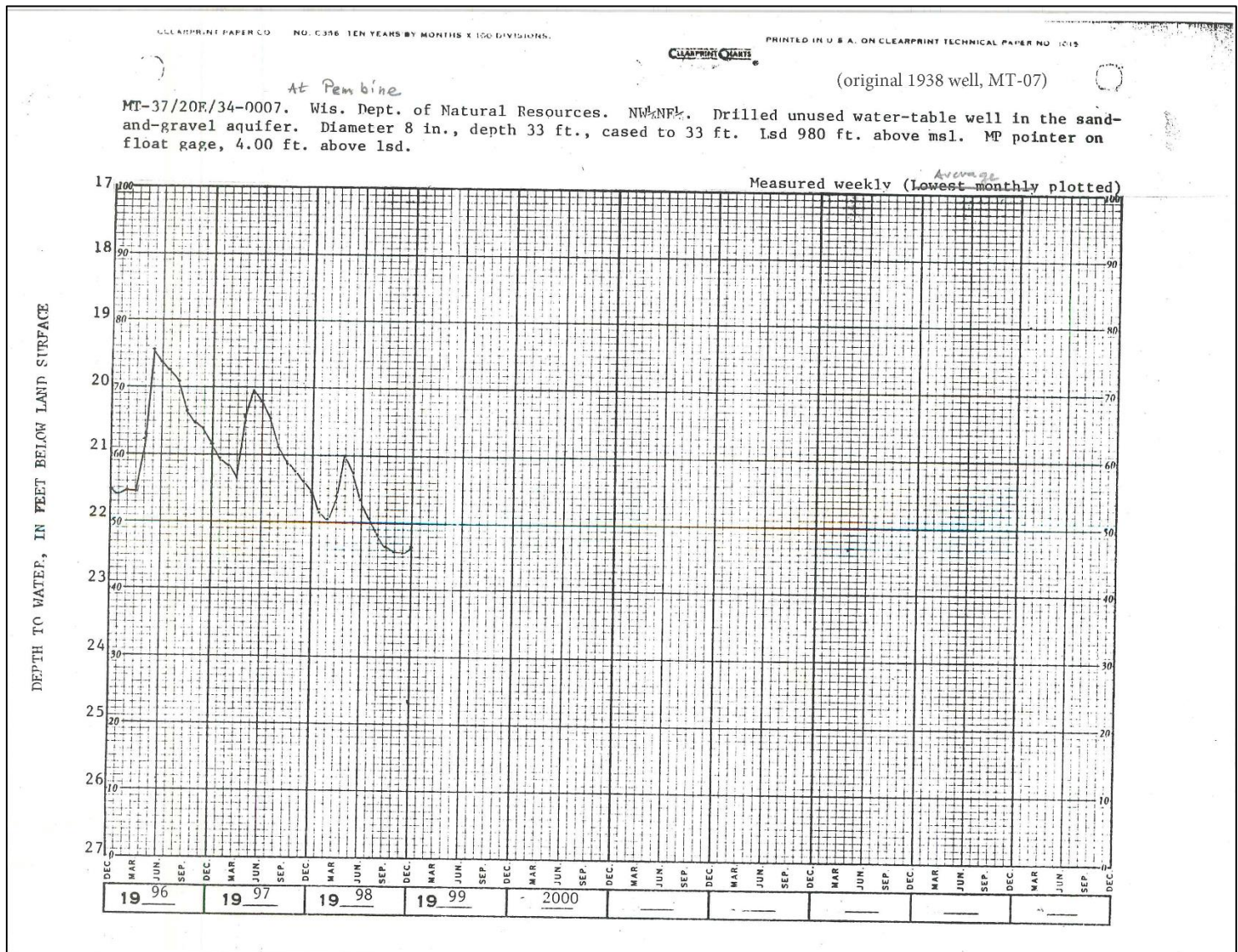
MT-07 Historic water-level data, 1956–1985 (original 1938 well)

Historic well information compiled by WGNHS, page 3 of 3

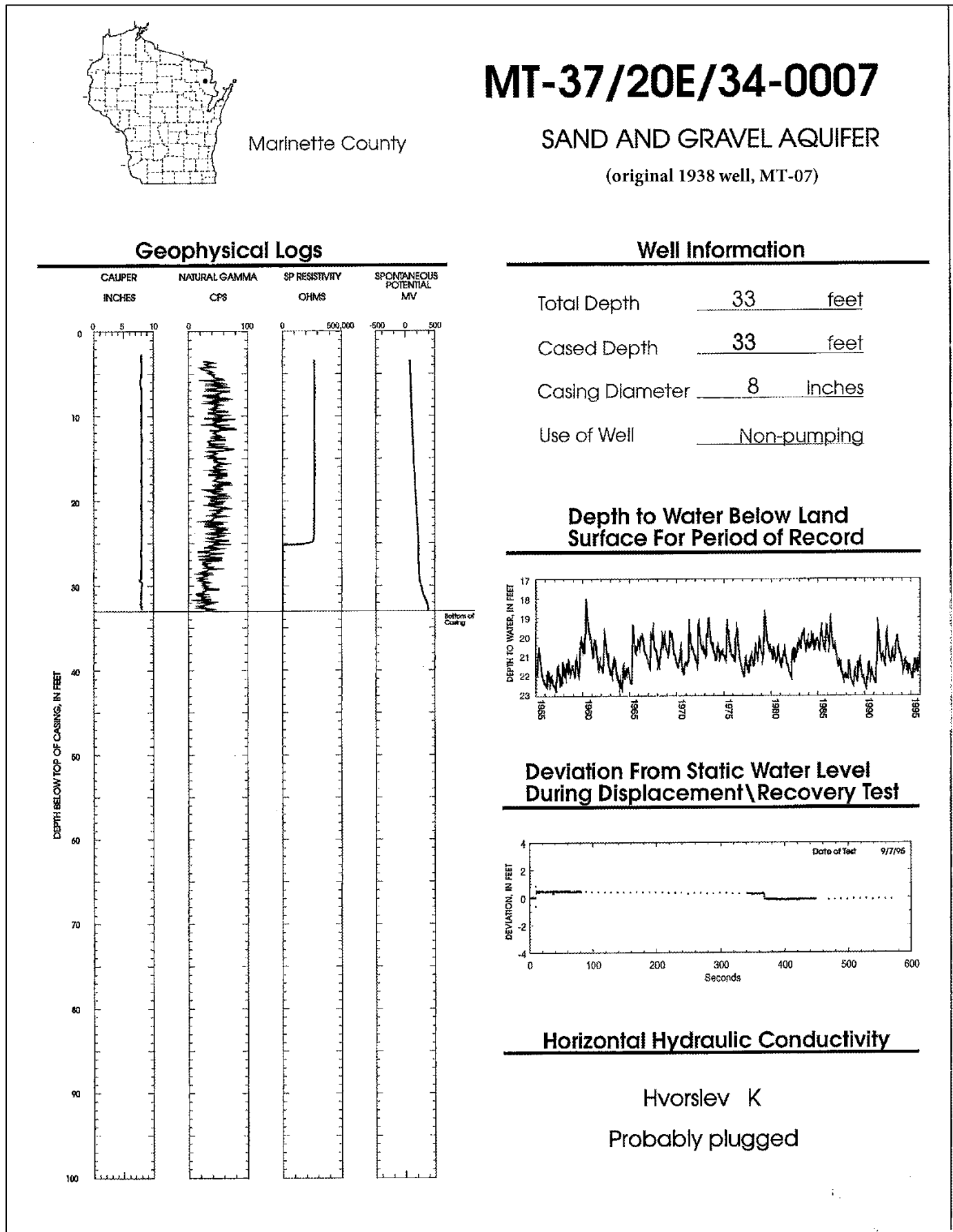


MT-07 Historic water-level data, 1996–1999 (original 1938 well)

Historic well information compiled by WGNHS, page 1 of 1

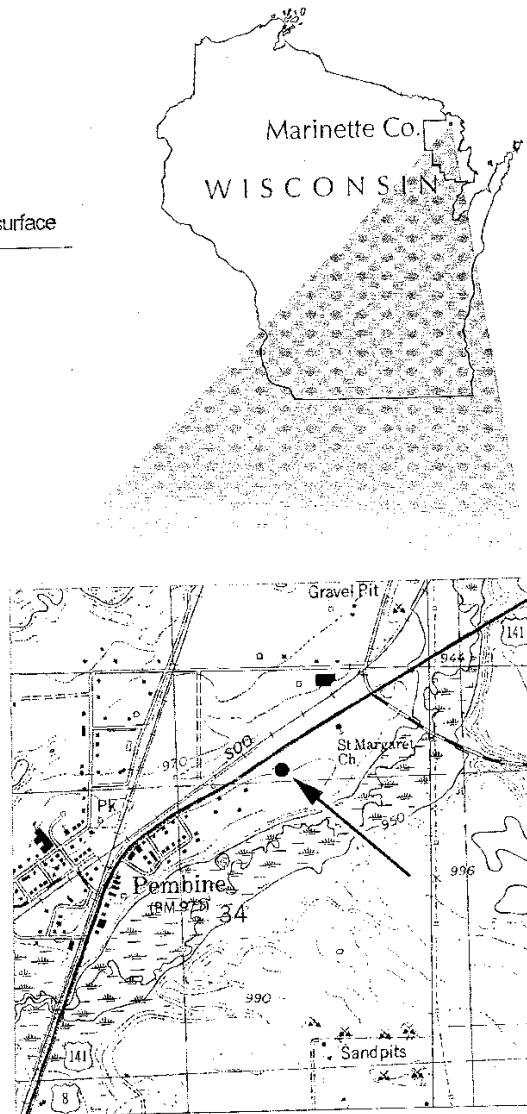
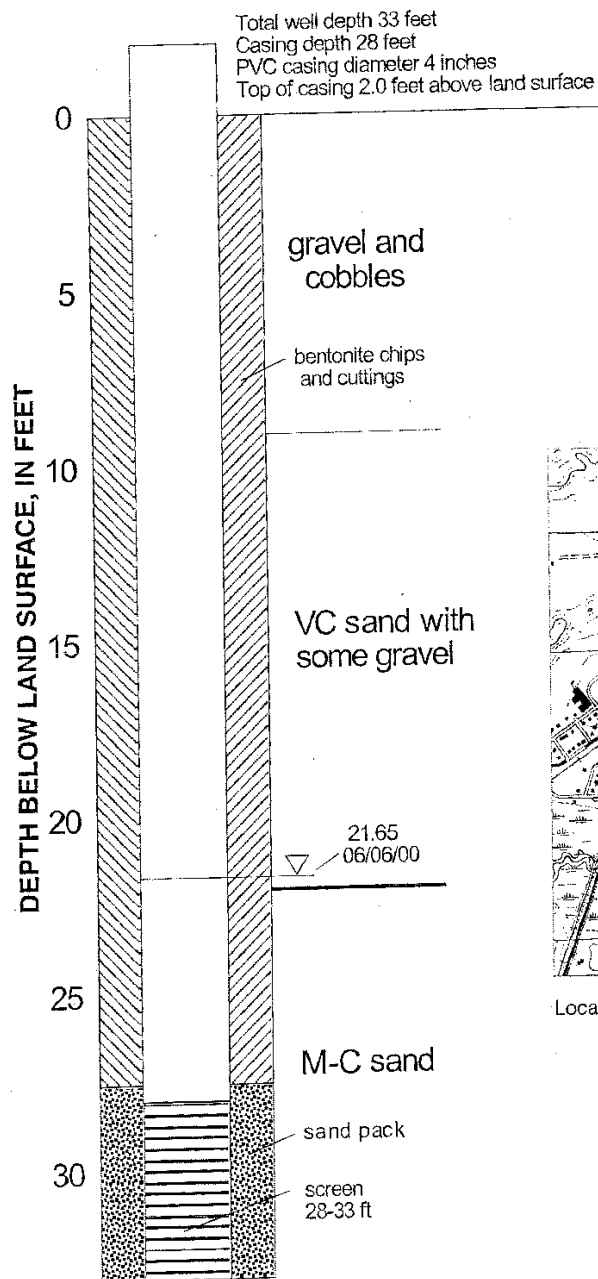


MT-07 Page 30 extracted from project 118 report (original 1938 well); Dunning and others (1996)
Page 30 of report, page 1 of 1



MT-07 Page 13 extracted from DNR-149 report (second MT-07 well); Batten and others (2000)
Page 4 of Appendix A, page 1 of 1

MT-37/20E/34-0007



Location: SE 1/4, NW 1/4, NE 1/4 of section 34, T37N., R20E.

Second MT-07, drilled in 2000, which replaced the original 1938 well with the same name. Was drilled in the same location as the original well.

MT-488 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 1 of 7

- 1 -		DOC. #: 877796 RENEE MILLER, REGISTER OF DEEDS MARINETTE COUNTY October 10, 2023 at 3:24 PM Fee Amount: \$30.00 Pages: 7 *The above recording information verifies this document has been electronically recorded Returned to Wisconsin Department of Natural Resources
Document Number	Document Title	
State of Wisconsin Department of Natural Resources Box 7921 Madison, WI 53707	GROUNDWATER MONITORING STATION EASEMENT Section 23.09(2), Wis. Stats. Form 2200-296 Rev. 10/2021	
THIS GROUNDWATER MONITORING STATION EASEMENT (“Easement”) made by and between the State of Wisconsin Department of Natural Resources (“Grantor”), and the Board of Regents of the University of Wisconsin System, Wisconsin Geological and Natural History Survey – University of Wisconsin - Madison (“Board”) (“Grantee”).		
RECITALS		
WHEREAS, the Grantor is the owner of certain real estate located in Marinette County, Wisconsin known as Pembine Ranger Station (“Premises”).		
WHEREAS, the Grantor and Grantee are entering into an agreement to cooperatively collect long-term groundwater levels in order to fulfill the Grantor’s requirement to regulate high-capacity wells under s. 281.34, Wis. Stats., and Chapter NR 820, Wis. Adm. Code, and its responsibility to implement the Great Lake Compact under s. 281.343(4)(a), Wis. Stats.;		
WHEREAS, the Grantee desires to install a monitoring station in order to collect said data;		
WHEREAS, the Grantee requests an Easement allowing it to access the Premises in order to collect groundwater data by constructing, installing, and operating and maintaining, repairing, removing and replacing a monitoring station containing one groundwater well; and		
WHEREAS, the portion of Grantor’s property subject to this Easement (“Easement Area”) is described below and more particularly depicted on Exhibit “A”:		
Part of the NW ¼ of the SW ¼ of Section 3, Township 36 North, Range 20 East, Town of Pembine, Marinette County, Wisconsin. Monitoring Well location within a 30-foot-wide radius around Lat: 45.61587; Long: -87.99452		
NOW, THEREFORE, the Grantor hereby agrees to convey to the Grantee, and its assigns, for and in consideration of mutual benefits, a non-exclusive perpetual easement to access, construct, install, operate, maintain, repair, remove and replace a monitoring station drilled and/or placed on the above-described Easement Area, along with duties related to water sampling as deemed necessary.		
It is understood by the Grantor and the Grantee that this Easement is subject to the following conditions:		
1. Recitals. The Grantor and Grantee hereto confirm and agree that the recitals set forth above are true and		

Recording Area

Return: Department of Natural Resources
Bureau of Facilities & Land - LF/6
P.O. Box 7921
Madison, WI 53707-7921
Attn: Bill Peterson (CE 10142)

Parcel Identification Number (PIN):
022-00088.005

MT-488 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 2 of 7

- 2 -

correct and incorporate the same herein for all purposes.

2. **Purpose.** The Grantor grants and conveys to the Grantee this non-exclusive Easement for the construction, installation, operation, maintenance, repair, replacement and removal of a monitoring station consisting of, but not limited to a drilled well which shall be constructed in compliance with Ch. NR 141 or Ch. NR 812, Wis. Adm. Code, as applicable, along with vehicle and walk in access to the Easement Area, as is reasonably deemed necessary for installation and collecting data including, but not limited to water-level measurements, geophysical measurements and /or water quality sampling purposes. The Grantee shall share all information gained from said monitoring upon request of the Grantor.
3. **Parties.** This Easement is limited to the Grantee, and its assigns and is not transferrable to any other third party, except after prior written notification to Grantor. The Grantee will not have the right to allow additional co-location of other facilities in the Easement.
4. **Non-Exclusive Use.** The Easement shall be non-exclusive and the Grantor may use the Easement Area and shall have the right to lease or convey other easements to one or more other person(s), company(ies) or other entity(ies); provided that any such subsequent use, lease or conveyance shall not interfere with the Grantee's rights.
5. **Construction.** Grantee shall submit a written notification of project commencement to the Grantor's Property Manager identified in Paragraph (17) herein at least thirty (30) days prior to the initiation of any well construction work in the Easement Area. The Grantee may commence said work unless the Grantor informs the Grantee not to proceed ten (10) days prior to commencing work. If an emergency situation arises within the Easement Area requiring immediate action by the Grantee, the Grantee shall immediately notify the Grantor's project manager that an emergency exists and that the Grantee is proceeding to correct the emergency situation.
6. **Access.** If approved in writing in advance by Grantor's Property Manager, Grantee may enter upon the Easement Area at a specified location outside of the Easement Area to gain access to the Easement Area in order to construct, install, operate, maintain, repair, remove and replace a monitoring station and to do any and all other such work as is reasonably necessary in accordance with the rights granted under this Easement.
7. **Vegetative Management.** No cutting or trimming of trees shall be done without the prior written approval of the Grantor's Trail Manager, except for dead and down trees that obstruct the Trail may be removed without such written approval. Any trees removed from the Premises remain the property of the Grantor. All trees having commercial value including firewood shall be cut in standard lengths and be piled at a location on the Premises designated by the Grantor's Trail Manager. All stumps, slash, waste materials and other debris shall be disposed of by the Grantee as directed by the Grantor's Trail Manager. Use of pesticides and herbicides shall only be allowed with the prior written approval of the Grantor. Any pesticides or herbicides used as part of a management plan must conform to the Forest Stewardship Council list found at [Pesticides Policy | FSC Connect](#) or supplied by Grantor's Trail Manager. Grantee shall report to the Grantor at least annually, the chemicals that are applied on the Easement Area including the date, product trade name, active ingredient(s) and corresponding CAS number(s), purpose, rate, location with a map, total area treated, and total amount of chemical used.
8. **Signage.** Any signage placed by the Grantee shall have prior written approval from the Grantor.
9. **Maintenance.** The Grantee shall maintain the Easement Area in a decent, sanitary, and safe condition during construction, installation, operation repair, maintenance, removal and replacement, and at no time shall the Grantee allow its work to cause a hazard or unsafe conditions.

MT-488 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 3 of 7

- 3 -

10. **Existing Utilities.** The Grantee is responsible for identifying any existing utility lines located within the Easement Area and for any and all damages, costs or liabilities that result from damages caused by the Grantee to any exiting utilities within the Easement Area.
11. **Non-Warrantable Title.** Grantor does not warrant that title to the Premises is free and clear of all encumbrances or that it has sole ownership or that it will defend the Grantee in its peaceful use and occupancy of the Easement Area. The Grantee assumes all liability in determining the sufficiency of the Grantor's right to convey this Easement.
12. **Compliance with other Laws.** The Grantee shall obtain all necessary permits, approvals, and licenses and comply with all applicable federal, state, and local statutes, regulations and ordinances affecting the design, materials or performance of exercising any and all rights granted by this Easement.
13. **Abandonment.** The Grantee shall properly abandon the monitoring station pursuant to s. NR 812.26, Wis. Adm. Code and restore the Easement Area to pre-existing conditions prior to installation of the monitoring station when its monitoring work has been completed unless Grantor agrees in writing to take over operation and maintenance of the well. Upon removal and proper abandonment, this Easement shall terminate.
14. **Termination.** The Easement shall automatically terminate upon:
 - a. Grantee's acknowledgement that it is abandoning the Easement Area; or
 - b. An implied abandonment as evidenced by Grantee's non-use of the Easement Area for a period of two consecutive years.

Upon termination of the Easement pursuant to this paragraph, the Grantor shall execute and record a Release of Groundwater Monitoring Station Easement in the Register of Deeds Office for the county where the monitoring station is or was located.

Grantee's duties as reflected in paragraph (13) shall survive the reversion.

15. **Indemnification.** The Board agrees to hold harmless Grantor, its officers, agents and employees from any and all liability, including claims, demands, losses, costs, damages, and expenses of every kind and description (including death), or damages to persons or property arising out of or in connection with or occurring during the course of this Easement where such liability is founded upon or grows out of the acts or omissions of any of the officers, employees or agents of the Grantee while acting within the scope of their employment where protection is afforded by secs. 893.82 and 895.46(1), Wis. Stats.
16. **NR 45 enforcement.** The Grantor retains management, supervision and control over the Premises for the purpose of enforcing pertinent state laws needed to protect the Premises, its natural resources or the general public, including Chapter NR 45, Wis. Admin. Code, which governs the conduct of visitors to state lands.
17. **Notices.** With the exception of emergency notice provided to the Property Manager, all notices or other writings this Agreement requires to be given, or which may be given, to either party by the other shall be deemed to have been fully given when made in writing and either by certified mail, return receipt requested or through regular commercially available overnight delivery service with proof of delivery as follows:
 - a. To the Grantor: Department of Natural Resources, Bureau of Facilities and Lands PO Box 7921, Madison, WI 53707-7921
 - b. To the Grantee: UW-Madison, Real Estate, Suite 6101, 21 N. Park Street, Madison, WI 53715.

MT-488 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 4 of 7

- 4 -

- c. The address to which any notice, demand, or other writing may be given, made or sent to either party to this Easement may be changed by written notice.

18. **Headings.** The headings of clauses contained in this Easement are used for convenience and ease of reference only and do not limit the scope or intent of the clause.

19. **Governing Law.** This Easement shall be construed and enforced in accordance with the internal laws of the State of Wisconsin.

20. **Acknowledgement.** This Easement sets forth the entire understanding of the parties and may not be changed except by a written document executed and acknowledged the Grantor and the Grantee.

21. **Invalidity.** If any term or condition of this Easement shall be deemed invalid or unenforceable, the remainder of this Easement shall not be affected thereby, and each term and condition shall be valid and enforceable to the fullest extent permitted by law.

22. **Enforcement.** Enforcement of this Easement may be by proceedings at law or in equity against any person or persons violating or attempting or threatening to violate any term or condition in this Easement, either to restrain or prevent the violation or to obtain any other relief.

END OF CONDITIONS

MT-488 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 6 of 7

- 6 -

IN WITNESS WHEREOF, Wisconsin Geological and Natural History Survey – UW Madison, c/o hydrologist, 3817 Mineral Point Road, Madison, WI 53705 hereby accepts and consents to the terms and conditions of this Easement this 29 day September, 2023.

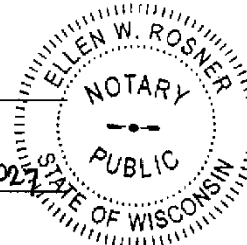
Board of Regents of the University of Wisconsin System

By Alexandria C. Roe (SEAL)
• Alexandria C. Roe
Senior Associate Vice President Capital Planning & Budget

State of Wisconsin)
) ss.
County of Dane)

Personally came before me this 29 day of September, 2023, the above named, Alexandria C. Roe, Senior Associate Vice President Capital Planning & Budget, Board of Regents of the University of Wisconsin System, to me known to be the person who executed the foregoing instrument and acknowledged that he executed and delivered the same as and for the act and deed of the Grantee.

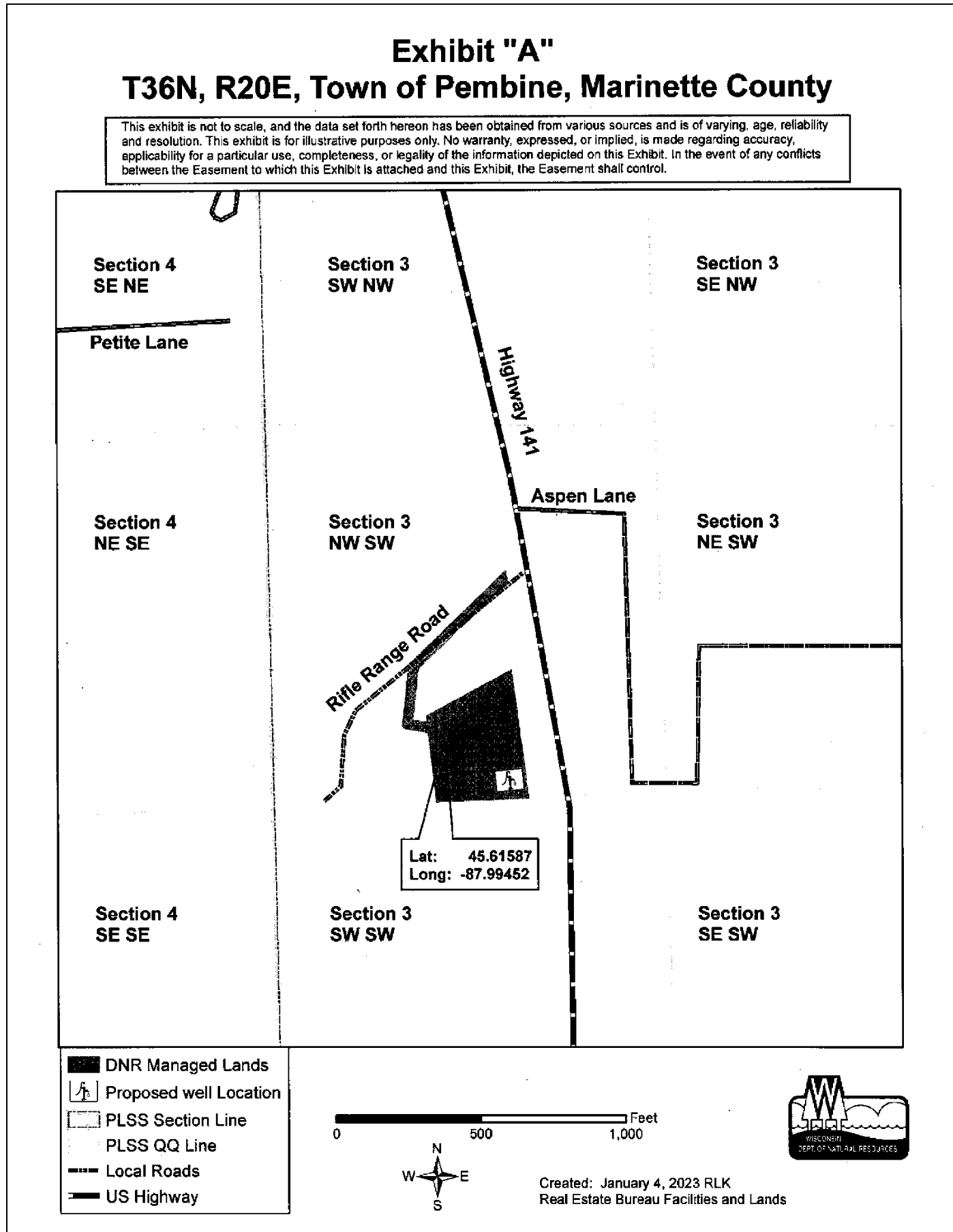
Ellen W. Rosner
* Ellen W. Rosner
Notary Public, State of Wisconsin
My Commission (expires)(is) 5/22/2027



*Please print names

This instrument drafted by:
State of Wisconsin
Department of Natural Resources

MT-488 WDNR groundwater monitoring station easement, 2021
Form 2200-296, page 7 of 7



MT-488 WDNR monitoring well construction form, 2023

Form 4400-113A, page 1 of 1

38000488 aka (MT-488), replaces MT-07

State of Wisconsin Department of Natural Resources		Route to: Watershed/Wastewater ☐ Remediation/Redevelopment ☐ Other ☐		Waste Management ☐		MONITORING WELL CONSTRUCTION Form 4400-113A Rev. 7-98	
Facility/Project Name Statewide Groundwater Monitoring Network (replaces MT-07)		Local Grid Location of Well ft. ☐ N. ☐ S. ☐ E. ☐ W.		Well Name 38000488 aka MT-488		Wis. Unique Well No. ☐ DNR Well ID No. ☐	
Facility: Pembine Ranger Station		Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 45° 36' 57.05" Long. -87° 59' 40.51" or 45.615847 -87.994586		Date Well Installed 11 / 13 / 2023		Well Installed By: Name (first, last) and Firm Ben Phillips	
Type of Well 11 mw		Section Location of Waste/Source NW 1/4 of SE 1/4 of Sec. 3 T. 36 N. R. 20 ☒ E ☐ W		Well Code 11 / mw		ECS Midwest LLC	
Distance from Waste/Source ft. ☐ Apply ☐		Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known		Gov. Lot Number			

A. Protective pipe, top elevation 976.84 ft. MSL

B. Well casing, top elevation 974.01 ft. MSL

C. Land surface elevation 973.51 ft. MSL

D. Surface seal, bottom 0.5 ft. MSL

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ☒ 41
Other ☐

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☒ 99

16. Drilling additives used? ☐ Yes ☒ No

Describe

17. Source of water (attach analysis, if required):
NA

E. Bentonite seal, top 973.5 ft. MSL or 0.5 ft.

F. Fine sand, top 959 ft. MSL or 15.0 ft.

G. Filter pack, top 957 ft. MSL or 17.0 ft.

H. Screen joint, top 953 ft. MSL or 21.0 ft.

I. Well bottom 938 ft. MSL or 36.0 ft.

J. Filter pack, bottom 938 ft. MSL or 36.0 ft.

K. Borehole, bottom 938 ft. MSL or 36.0 ft.

L. Borehole, diameter 8.4 in.

M. O.D. well casing 2.5 in.

N. I.D. well casing 2.1 in.

All depths are in feet below land surface datum

1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.5 in.
b. Length: 6 ft.
c. Material: Steel ☒ 04
Other ☐

d. Additional protection? ☐ Yes ☒ No
If yes, describe:

3. Surface seal: Bentonite ☒ 30
Concrete ☐ 01
Other ☐

4. Material between well casing and protective pipe:
#40 Red Flint Bentonite ☐ 30
Other ☒

5. Annular space seal: a. Granular/Chipped Bentonite ☒ 33
b. Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. Lbs/gal mud weight . . . Bentonite slurry ☐ 31
d. % Bentonite . . . Bentonite-cement grout ☐ 50
e. Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01
Tremie pumped ☐ 02
Gravity ☒ 08

6. Bentonite seal: a. Bentonite granules ☐ 33
b. 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 32
c. Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
#15 Red Flint
a. Volume added 0.5 ft³

8. Filter pack material: Manufacturer, product name & mesh size
#40 Red Flint
a. Volume added ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 23
Flush threaded PVC schedule 80 ☐ 24
Other ☐

10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11
Continuous slot ☐ 01
Other ☐

b. Manufacturer Monoflex
c. Slot size: 0.010 in.
d. Slotted length: 15 ft.

11. Backfill material (below filter pack): None ☒ 14
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature Peter M. Chase Firm Wisconsin Geological and Natural History Survey

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

MT-488 WDNR soil boring form, 2023

Form 4400-122, page 1 of 1

State of Wisconsin
Department of Natural ResourcesSOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Replaces well MT-07

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐

Page 1 of 1

Facility/Project Name Statewide Groundwater Monitoring Network		License/Permit/Monitoring Number		Boring Number 38000488 aka MT-488	
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Ben Last Name: Phillips Firm: ECS, Inc		Date Drilling Started 11 / 13 / 2023 m m d d y y y y		Date Drilling Completed 11 / 13 / 2023 m m d d y y y y	
Drilling Method 4.25" HSA		Final Static Water Level 21.1 Feet MSL		Surface Elevation 971 Feet MSL	
Borehole Diameter 8.2 inches		Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒		Local Grid Location	
State Plane NW 1/4 of SE 1/4 of Section 3, T 36 N, R 20E		Lat 45.615847' "		Long -87.994586' "	
Facility ID WDNR RANGER STATION		County Marinette		County Code 39	
Civil Town/City/ or Village Pembine					

Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					P 200	RQD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index			
Split spoon every 5 ft.	12	2,2,2	5-7	Poorly Sorted SAND 95% F-C sand, trace fines, trace gravel, reddish brown to strong brown, moist, loose, OUTWASH											
	12	2,2,4	10-12	As above											
	12	3,6,7	15-17	As above											
	10	3,4,4	20-22	As above but wet											
	14	1,2,3	25-27	As above											
	8	2,6,13	30-32	As above, cobble in shoe											
	14	5,3,6	35-36	As above											
				EOB 36 ft. Set 2" PVC well w/ 15'x 0.010 slot screen 21-36' All depths are in ft below land surface											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature Peter M. Chase P.G.

Firm Wisconsin Geological & Natural History Survey

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Appendix 5: Wells MO-17 and MO-334 documents

Well MO-334 replaced well MO-17

Historical Documents: MO-17

MO-17 Federal real estate use agreement, 2011

Property access agreement, 5 pages

Additional historical records for this well can be found in appendix 14 of Bremmer and others (2022).

Documentation of work done for this report: MO-17

MO-334 WDNR filling & sealing report, 2025

Form 3300-005, 2 pages

Documentation of work done for this report: MO-334

MO-334 WDNR groundwater monitoring station easement, 2021

Form 2200-296, 7 pages

MO-334 WDNR well construction report, 2024

Form 3300-077A, 2 pages

MO-334 WDNR soil boring form, 2024

Form 4400-122, 1 page

MO-17 Federal real estate use agreement, 2011

Property access agreement, page 1 of 5

This Federal Real Estate Use Agreement Supersedes Permit No. DACA45-4-75-6087

NO. DACA45-4-11-6025

DEPARTMENT OF THE ARMY
FEDERAL REAL ESTATE USE AGREEMENT
TO USE PROPERTY LOCATED ON
FORT McCOY
MONROE COUNTY, WISCONSIN

THIS FEDERAL REAL ESTATE USE AGREEMENT is made between the **SECRETARY OF THE ARMY**, acting by and through the Chief, Real Estate Division, U.S. Army Engineer District, Omaha, hereinafter referred to as the “Grantor” and the **U.S. Department of Interior, U.S. Geological Survey**, acting by and through the **Center Director, U.S. Geological Survey, 8505 Research Way, Middleton, Wisconsin**, hereinafter referred to as the “Grantee.”

NOW THEREFORE:

The Grantor under authority of the Secretary’s general administrative power hereby grants to Grantee a Use Agreement for the use of an abandoned 10-inch well located on Fort McCoy for the installation, operation and maintenance of an automatic water-level recorder at the location identified in Exhibit “A,” which is attached hereto and made a part hereof, and hereinafter referred to as the “Premises;”

Grantee shall have the right to use in common with Grantor, and with such other parties as Grantor may authorize: All roads for ingress and egress to the Premises, subject to approval of access by the Grantor’s representative having immediate jurisdiction over the Premises.

THIS FEDERAL REAL ESTATE USE AGREEMENT, hereinafter the “Use Agreement,” is granted subject to the following conditions:

1. TERM

This Use Agreement is hereby granted effective 27 February 2010 for a term of fifty (50) years, ending 26 February 2060 unless sooner terminated by Grantor, and so long as the Grantee remains in compliance with any or all of the conditions of this Use Agreement.

2. CONSIDERATION, MITIGATION, AND DAMAGES

a. The consideration for this Use Agreement is the Grantee’s use of the Premises for the benefit of the public interest in accordance with the conditions hereinafter set forth.

Federal Real Estate Use Agreement

Enclosure

MO-17 Federal real estate use agreement, 2011

Property access agreement, page 2 of 5

NO. DACA45-4-11-6025

b. In addition to this Use Agreement, there also shall be a separate Intergovernmental Support Agreement, DD form 1144, prescribing the support to be performed by Grantor and by Grantee. The financial responsibilities under the support agreement shall be in accordance with DODI 4000.19, 9 August 1995. Reimbursements for support provided via the support agreement must be executed with an appropriate funds transfer instrument between agencies.

c. The Grantee will mitigate damages caused to the Premises, surrounding areas, or to Fort McCoy by the Grantee's activities.

3. NOTICES

a. All correspondence and notices to be given pursuant to this Use Agreement shall be in writing and addressed, if to the Grantee, to **U.S. Geological Survey, 8505 Research Way, Middleton, Wisconsin 53562-3581**; and if to the Grantor, to the **U. S. Army Engineer District, Omaha, ATTN: CENWO-RE-M, 1616 Capitol Avenue, Suite 9000, Omaha, Nebraska 68102-4901**, or as may from time to time otherwise be directed by the parties. Both Grantor and Grantee have an obligation to ensure that the other party has their accurate address.

b. Notices shall be mailed by certified mail, postage prepaid, return receipt requested, addressed to the addresses above. The effective date of the notice shall be the earlier of the actual date of receipt or the date the addressee is notified of the attempted delivery of the certified mail, whether or not the addressee actually accepts delivery.

4. AUTHORIZED REPRESENTATIVES

Except as otherwise specifically provided, any reference herein to "Grantor" or "Chief, Real Estate Division" or "Grantee" shall include their duly authorized representatives.

5. SUPERVISION BY THE GRANTOR

a. The construction, operation, maintenance, repair, replacement, additions or alterations of said Facilities, including related facilities, and the Premises shall be performed at no cost or expense to the Grantor, except as set out in the support agreement, under the general supervision and subject to the approval of the Grantor's representative having immediate jurisdiction over the Premises, and in such manner as not to endanger personnel or property of the Grantor or obstruct travel on any road thereon.

b. The use and occupation of the Premises incident to the exercise of the privileges and purposes hereby granted shall be subject to such rules and regulations as the Grantor may from time to time prescribe.

c. Siting of Grantee facilities shall conform to the Fort McCoy Master Plan, except as otherwise provided in writing by Grantor. Standards of design and construction shall conform to criteria and directives of Grantor.

MO-17 Federal real estate use agreement, 2011

Property access agreement, page 3 of 5

NO. DACA45-4-11-6025

d. Prior to the initiation of any major structural changes in any facility and/or demolition or removal of any facility, Grantee shall obtain written authorization from Grantor.

e. The Premises and Facilities, existing and to be constructed, shall be carried on the Inventory of Military Real Property of the Grantor.

6. APPLICABLE LAWS AND REGULATIONS

a. The Grantee shall comply with all applicable Federal, State, county and municipal laws, ordinances and regulations wherein the premises are located. The Grantee shall be solely responsible for obtaining at its cost and expense any permits or licenses required for its operations under this Use Agreement, independent of any existing permits or licenses held by the Grantor.

b. The Grantee shall promptly report to the Grantor any incident for which the Grantee is required to notify a Federal, State or local regulatory agency or any citation by Federal, State or local regulatory agency of non-compliance with any applicable law, ordinance or regulation.

7. CONDITION OF PREMISES

a. The Grantee acknowledges that it has inspected the premises, knows the condition, and understands that the same is granted without any representation or warranties whatsoever and without any obligation on the part of the Grantor.

b. The Grantee shall, at its own expense and without cost or expense to the Grantor, maintain and keep the premises in good repair and condition.

8. COST OF UTILITIES

The Grantee shall pay the cost, as determined by Grantor's representative having immediate jurisdiction over the Premises, of producing and/or supplying any utilities and other services furnished by the Grantor or through Grantor-owned facilities for the use of the Grantee, including the Grantee's proportionate share of the cost of operation and maintenance of the Grantor-owned facilities by which such utilities or services are produced or supplied. The Grantor shall be under no obligation to furnish utilities or services. Payment shall be made in the manner prescribed by the Grantor. Payment for utilities may be by separate agreement or in the support agreement.

9. ENVIRONMENTAL PROTECTION

a. Within the limits of their respective legal powers, the parties to this Use Agreement shall protect the Premises against pollution of its air, ground and water. The Grantee shall comply with any laws, regulations, conditions, or instructions affecting the activity hereby authorized if and when issued by the Environmental Protection Agency, or any Federal, State, interstate or local governmental agency having jurisdiction to abate or prevent pollution. The

MO-17 Federal real estate use agreement, 2011

Property access agreement, page 4 of 5

NO. DACA45-4-11-6025

Grantee shall not discharge waste or effluent from the Premises in such a manner that the discharge will contaminate streams or other bodies of water or otherwise become a public nuisance.

b. The Grantee will protect the environment and natural resources, and where damage nonetheless occurs from the Grantee's activities, the Grantee shall be liable to restore the damaged resources.

c. The Grantee must obtain approval from the Grantor's representative having immediate jurisdiction over the Premises before any pesticides or herbicides are applied to the premises.

10. RESTORATION

a. On or before the expiration of this Use Agreement, its revocation by Grantor or its termination by Grantee, the Grantee shall vacate the premises and remove its personal property. Temporary structural changes, additions, alterations or installations may be removed by Grantee, at its option, after giving notice of its intent, provided that, if removal is accomplished, the Facility shall be returned to its original condition, upon the request of Grantor.

b. To the extent directed by Grantor, Grantee shall remove all permanent alternations, additions, betterments, and improvements made, or installed, and restore the Premises or Facilities to the same or as good condition as existed on the date of entry under this Use Agreement, reasonable wear and tear excepted.

11. TRANSFERS AND ASSIGNMENTS

The Grantee shall neither transfer nor assign this Use Agreement or any part thereof nor attempt to grant any interest, privilege or license whatsoever in connection with this Use Agreement without approval by Grantor. The provisions and conditions of this Use Agreement shall extend to and be binding upon and shall inure to the benefit of the Grantee.

12. TERMINATION

This Use Agreement may be terminated by the Grantee at any time by giving the Grantor at least six (6) months notice in writing, subject to the Condition on RESTORATION.

13. SPECIAL CONDITION - ENVIRONMENTAL BASELINE STUDY

An Environmental Baseline Study (EBS), undated, documenting the known history of the property with regard to the storage, release or disposal of hazardous substances thereon, is attached hereto and made a part hereof as Exhibit "B." Upon expiration, revocation or relinquishment of this agreement, another EBS shall be prepared which will document the environmental condition of the property at that time. A comparison of the two EBSs will assist the Grantor in determining any environmental restoration requirements. Any such requirements will be completed by the Grantee to the satisfaction of the said officer.

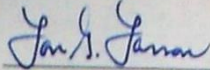
MO-17 Federal real estate use agreement, 2011

Property access agreement, page 5 of 5

NO. DACA45-4-11-6025

THIS USE AGREEMENT is not subject to Title 10, U. S. C. § 2662, as amended.

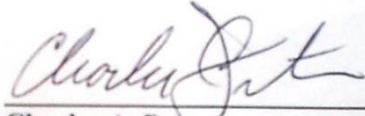
IN WITNESS WHEREOF, I have hereunto set my hand by authority of the Secretary of the Army, this 4th day of October, 2011.



Lon G. Larson
Chief, Real Estate Division
Real Estate Contracting Officer

This Use Agreement is also executed by the Grantee this 29th day of September, 2011.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



Charles A. Peter
Center Director

5

Federal Real Estate Use Agreement

MO-17 WDNR filling & sealing report, 2025

Form 3300-005, page 1 of 2

42000017 (aka MO-17) replaced by MO-334

Wisconsin Department of Natural Resources

Well / Drillhole / Borehole Filling & Sealing

Form 3300-005

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295 and 299, Wis. Stats., and ch. NR 141 Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295 and 299, Wis. Stats., failure to file this form may result in a forfeiture of between \$10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose.

Date of Filling & Sealing: 07/03/2025

Rec #: 186662

Verification. Check only if well filling & sealing was done previously and you are just verifying that work.: No

1. Well Location Information

County: Monroe	WI Unique Well #: N/A	DNR Hicap Well #: N/A
Latitude: (DD.DDDDD°) 44:007-N 44.0760664	Longitude: (DD.DDDDD°) 90:6505-W -90.615821	GPS Method Code: GPS008
Gov't Lot #:	Qtr/Qtr:	Quarter: Section #: Township #: North Range #:
Well Street Address: HWY 21		Subdivision Name:
Well City/Village/Town: Town of GREENFIELD	Well Zip Code:	Lot #: Does a new well replace this well? -No Yes, MO-334
Reason for Filling & Sealing: NO LONGER IN USE poor connection to aquifer		WI Unique Well # of Replacement Well:

2. Facility / Owner Information

Facility Name:	FID #:	License/Permit/Monitoring #:
Original Well Owner:	Service Category:	
Present Well Owner: FT MCCOY USAG	Mailing Address of Present Owner: 2171 SOUTH 8TH AVE	
	City: FT MCCOY	State: WI Zip Code: 54656

3. Well / Drillhole / Borehole Information

Well Type: Water Well	Original Construction Date: (mm/dd/yyyy) 1940	Construction Type: Drilled
Formation Type: sandstone bedrock	Total Well Depth From Ground Surface (ft.): 189.00 191	(specify Other):
Casing Diameter (in.): 10.00	Lower Drillhole Diameter (in.):	Casing Depth (ft.): ~ 108.5
Was well annular space grouted?	If yes, to what depth (ft.):	Depth to Water (ft.):

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	Yes	Liner(s) removed? If no liner mark as N/A	Yes	If no, was liner perforated?	
Screen removed?	N/A	Well casing (or loop if geothermal) left in place?	Yes	Was casing cut off below surface?	No
Did sealing material rise to surface?	Yes	Did material settle after 24 hours?	No	If yes, was hole retopped?	
If bentonite chips/pellets were used, were they hydrated from a known water source?					No
Method of Placing Sealing Material: Screened & Poured (Bentonite Chips)		(Explain Other):			
Well Sealing Materials: Bentonite Chips		Product Name and Manufacturer:			
Other Drillholes:					

5. Material Used to Fill Well / Drillhole

Material:	From (ft.):	To (ft.):	# and Units of Sealant:	Mix Ratio or Mud Weight:
3/8 BENTONITE CHIPS	Surface	189.00	97	

MO-17 WDNR filling & sealing report, 2025

Form 3300-005, page 2 of 2

6. Comments			
WELL LOG SAID LOWER HOLE WAS 10" DRILLED. I AM THINKING PROBABLY 9 1/4 OR 8 3/4 FOR HOW MANY BAGS IT TOOK TO FILL INTO THE 10" CASING. CASING COULD NOT BE CUT OFF BELOW GRADE BECAUSE OF A 36" CULVERT THAT IS BURIED AROUND THE WELL AND FILLED WITH CONCRETE. CASING IS CUT OFF FLUSH WITH GROUND.			
7. Supervision of Work			
Name of Person or Firm Doing Filling & Sealing: NELSONS PLBG & ELEC INC		License #: 0042	Phone: 608-372-5469
25269 HWY 12 TOMAH WI 54660-5174		Email Address: NELSONSPLUMBING1906@OUTLOOK.COM	
8. DNR Use Only			
Signed On: 07/16/2025	Submitted By: hanson9922	Received On: 07/16/2025	Approved On:

The Official Internet site for the Wisconsin Department of Natural Resources
101 S. Webster Street . PO Box 7921 . Madison, Wisconsin 53707-7921 .

MO-334 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 1 of 7

- 1 -

Document Number	Document Title	
State of Wisconsin Department of Natural Resources Box 7921 Madison, WI 53707	GROUNDWATER MONITORING STATION EASEMENT Section 23.09(2), Wis. Stats. Form 2200-296 Rev. 10/2021	717441 DEB BRANDT REGISTER OF DEEDS MONROE COUNTY, WI 10/10/2023 02:48:41 PM PAGE COUNT: 7 RECORDING FEE 30.00 TRANS FEE: TAX EXEMPT #: ** The above recording information verifies that this document has been electronically recorded and returned to the submitter. **
THIS GROUNDWATER MONITORING STATION EASEMENT ("Easement") made by and between the State of Wisconsin Department of Natural Resources ("Grantor"), and the Board of Regents of the University of Wisconsin System, Wisconsin Geological and Natural History Survey – University of Wisconsin - Madison ("Grantee") ("Grantee"). RECITALS WHEREAS, the Grantor is the owner of certain real estate located in Monroe County, Wisconsin known as Scattered Forest Land ("Premises"). WHEREAS, the Grantor and Grantee are entering into an agreement to cooperatively collect long-term groundwater levels in order to fulfill the Grantor's requirement to regulate high-capacity wells under s. 281.34, Wis. Stats., and Chapter NR 820, Wis. Adm. Code, and its responsibility to implement the Great Lake Compact under s. 281.343(4)(a), Wis. Stats.; WHEREAS, the Grantee desires to install a monitoring station in order to collect said data; WHEREAS, the Grantee requests an Easement allowing it to access the Premises in order to collect groundwater data by constructing, installing, and operating and maintaining, repairing, removing and replacing a monitoring station containing one groundwater well; and WHEREAS, the portion of Grantor's property subject to this Easement ("Easement Area") is described below and more particularly depicted on Exhibit "A": Part of the NE ¼ of the SE ¼ of Section 33, Township 19 North, Range 2 West, Town of Grant, Monroe County, Wisconsin. Monitoring Well location within a 30-foot-wide radius around Lat: 44.07197; Long: -90.61889 NOW, THEREFORE, the Grantor hereby agrees to convey to the Grantee, and its assigns, for and in consideration of mutual benefits, a non-exclusive perpetual easement to access, construct, install, operate, maintain, repair, remove and replace a monitoring station drilled and/or placed on the above-described Easement Area, along with duties related to water sampling as deemed necessary. It is understood by the Grantor and the Grantee that this Easement is subject to the following conditions: 1. Recitals. The Grantor and Grantee hereto confirm and agree that the recitals set forth above are true and		<u>Recording Area</u> Return: Department of Natural Resources Bureau of Facilities & Land - LF/6 P.O. Box 7921 Madison, WI 53707-7921 Attn: Bill Peterson (CE 10146) <u>Parcel Identification Number (PIN):</u> 012-00413-0000

MO-334 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 2 of 7

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correct and incorporate the same herein for all purposes.

2. **Purpose.** The Grantor grants and conveys to the Grantee this non-exclusive Easement for the construction, installation, operation, maintenance, repair, replacement and removal of a monitoring station consisting of, but not limited to a drilled well which shall be constructed in compliance with Ch. NR 141 or Ch. NR 812, Wis. Adm. Code, as applicable, along with vehicle and walk in access to the Easement Area, as is reasonably deemed necessary for installation and collecting data including, but not limited to water-level measurements, geophysical measurements and /or water quality sampling purposes. The Grantee shall share all information gained from said monitoring upon request of the Grantor.
3. **Parties.** This Easement is limited to the Grantee, and its assigns and is not transferrable to any other third party, except after prior written notification to Grantor. The Grantee will not have the right to allow additional co-location of other facilities in the Easement.
4. **Non-Exclusive Use.** The Easement shall be non-exclusive and the Grantor may use the Easement Area and shall have the right to lease or convey other easements to one or more other person(s), company(ies) or other entity(ies); provided that any such subsequent use, lease or conveyance shall not interfere with the Grantee's rights.
5. **Construction.** Grantee shall submit a written notification of project commencement to the Grantor's Property Manager identified in Paragraph (17) herein at least thirty (30) days prior to the initiation of any well construction work in the Easement Area. The Grantee may commence said work unless the Grantor informs the Grantee not to proceed ten (10) days prior to commencing work. If an emergency situation arises within the Easement Area requiring immediate action by the Grantee, the Grantee shall immediately notify the Grantor's project manager that an emergency exists and that the Grantee is proceeding to correct the emergency situation.
6. **Access.** If approved in writing in advance by Grantor's Property Manager, Grantee may enter upon the Easement Area at a specified location outside of the Easement Area to gain access to the Easement Area in order to construct, install, operate, maintain, repair, remove and replace a monitoring station and to do any and all other such work as is reasonably necessary in accordance with the rights granted under this Easement.
7. **Vegetative Management.** No cutting or trimming of trees shall be done without the prior written approval of the Grantor's Trail Manager, except for dead and down trees that obstruct the Trail may be removed without such written approval. Any trees removed from the Premises remain the property of the Grantor. All trees having commercial value including firewood shall be cut in standard lengths and be piled at a location on the Premises designated by the Grantor's Trail Manager. All stumps, slash, waste materials and other debris shall be disposed of by the Grantee as directed by the Grantor's Trail Manager. Use of pesticides and herbicides shall only be allowed with the prior written approval of the Grantor. Any pesticides or herbicides used as part of a management plan must conform to the Forest Stewardship Council list found at [Pesticides Policy | FSC Connect](#) or supplied by Grantor's Trail Manager. Grantee shall report to the Grantor at least annually, the chemicals that are applied on the Easement Area including the date, product trade name, active ingredient(s) and corresponding CAS number(s), purpose, rate, location with a map, total area treated, and total amount of chemical used.
8. **Signage.** Any signage placed by the Grantee shall have prior written approval from the Grantor.
9. **Maintenance.** The Grantee shall maintain the Easement Area in a decent, sanitary, and safe condition during construction, installation, operation repair, maintenance, removal and replacement, and at no time shall the Grantee allow its work to cause a hazard or unsafe conditions.

MO-334 WDNR groundwater monitoring station easement, 2021

Form 2200-296, page 3 of 7

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10. **Existing Utilities.** The Grantee is responsible for identifying any existing utility lines located within the Easement Area and for any and all damages, costs or liabilities that result from damages caused by the Grantee to any existing utilities within the Easement Area.
11. **Non-Warrantable Title.** Grantor does not warrant that title to the Premises is free and clear of all encumbrances or that it has sole ownership or that it will defend the Grantee in its peaceful use and occupancy of the Easement Area. The Grantee assumes all liability in determining the sufficiency of the Grantor's right to convey this Easement.
12. **Compliance with other Laws.** The Grantee shall obtain all necessary permits, approvals, and licenses and comply with all applicable federal, state, and local statutes, regulations and ordinances affecting the design, materials or performance of exercising any and all rights granted by this Easement.
13. **Abandonment.** The Grantee shall properly abandon the monitoring station pursuant to s. NR 812.26, Wis. Adm. Code and restore the Easement Area to pre-existing conditions prior to installation of the monitoring station when its monitoring work has been completed unless Grantor agrees in writing to take over operation and maintenance of the well. Upon removal and proper abandonment, this Easement shall terminate.
14. **Termination.** The Easement shall automatically terminate upon:
 - a. Grantee's acknowledgement that it is abandoning the Easement Area; or
 - b. An implied abandonment as evidenced by Grantee's non-use of the Easement Area for a period of two consecutive years.

Upon termination of the Easement pursuant to this paragraph, the Grantor shall execute and record a Release of Groundwater Monitoring Station Easement in the Register of Deeds Office for the county where the monitoring station is or was located.

Grantee's duties as reflected in paragraph (13) shall survive the reversion.

15. **Indemnification.** The Grantee agrees to hold harmless Grantor, its officers, agents and employees from any and all liability, including claims, demands, losses, costs, damages, and expenses of every kind and description (including death), or damages to persons or property arising out of or in connection with or occurring during the course of this Easement where such liability is founded upon or grows out of the acts or omissions of any of the officers, employees or agents of the Grantee while acting within the scope of their employment where protection is afforded by sccs. 893.82 and 895.46(1), Wis. Stats.
16. **NR 45 enforcement.** The Grantor retains management, supervision and control over the Premises for the purpose of enforcing pertinent state laws needed to protect the Premises, its natural resources or the general public, including Chapter NR 45, Wis. Admin. Code, which governs the conduct of visitors to state lands.
17. **Notices.** With the exception of emergency notice provided to the Property Manager, all notices or other writings this Agreement requires to be given, or which may be given, to either party by the other shall be deemed to have been fully given when made in writing and either by certified mail, return receipt requested or through regular commercially available overnight delivery service with proof of delivery as follows:
 - a. To the Grantor: Department of Natural Resources, Bureau of Facilities and Lands PO Box 7921, Madison, WI 53707-7921
 - b. To the Grantee: UW-Madison, Real Estate, Suite 6101, 21 N. Park Street, Madison, WI 53715.

MO-334 WDNR groundwater monitoring station easement, 2021

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- c. The address to which any notice, demand, or other writing may be given, made or sent to either party to this Easement may be changed by written notice.
- 18. **Headings.** The headings of clauses contained in this Easement are used for convenience and ease of reference only and do not limit the scope or intent of the clause.
- 19. **Governing Law.** This Easement shall be construed and enforced in accordance with the internal laws of the State of Wisconsin.
- 20. **Acknowledgement.** This Easement sets forth the entire understanding of the parties and may not be changed except by a written document executed and acknowledged the Grantor and the Grantee.
- 21. **Invalidity.** If any term or condition of this Easement shall be deemed invalid or unenforceable, the remainder of this Easement shall not be affected thereby, and each term and condition shall be valid and enforceable to the fullest extent permitted by law.
- 22. **Enforcement.** Enforcement of this Easement may be by proceedings at law or in equity against any person or persons violating or attempting or threatening to violate any term or condition in this Easement, either to restrain or prevent the violation or to obtain any other relief.

END OF CONDITIONS

MO-334 WDNR groundwater monitoring station easement, 2021

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IN WITNESS WHEREOF, Wisconsin Geological and Natural History Survey – UW Madison, c/o hydrologist, 3817 Mineral Point Road, Madison, WI 53705 hereby accepts and consents to the terms and conditions of this Easement this 29 day September, 2023.

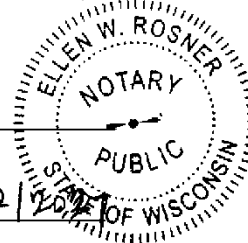
Board of Regents of the University of Wisconsin System

By Alexandria Roe (SEAL)
• Alexandria C. Roe
Senior Associate Vice President Capital Planning & Budget

State of Wisconsin)
County of Dane) ss.

Personally came before me this 29 day of September, 2023, the above named, Alexandria C. Roe, Senior Associate Vice President Capital Planning & Budget, Board of Regents of the University of Wisconsin System, to me known to be the person who executed the foregoing instrument and acknowledged that he executed and delivered the same as and for the act and deed of the Grantee.

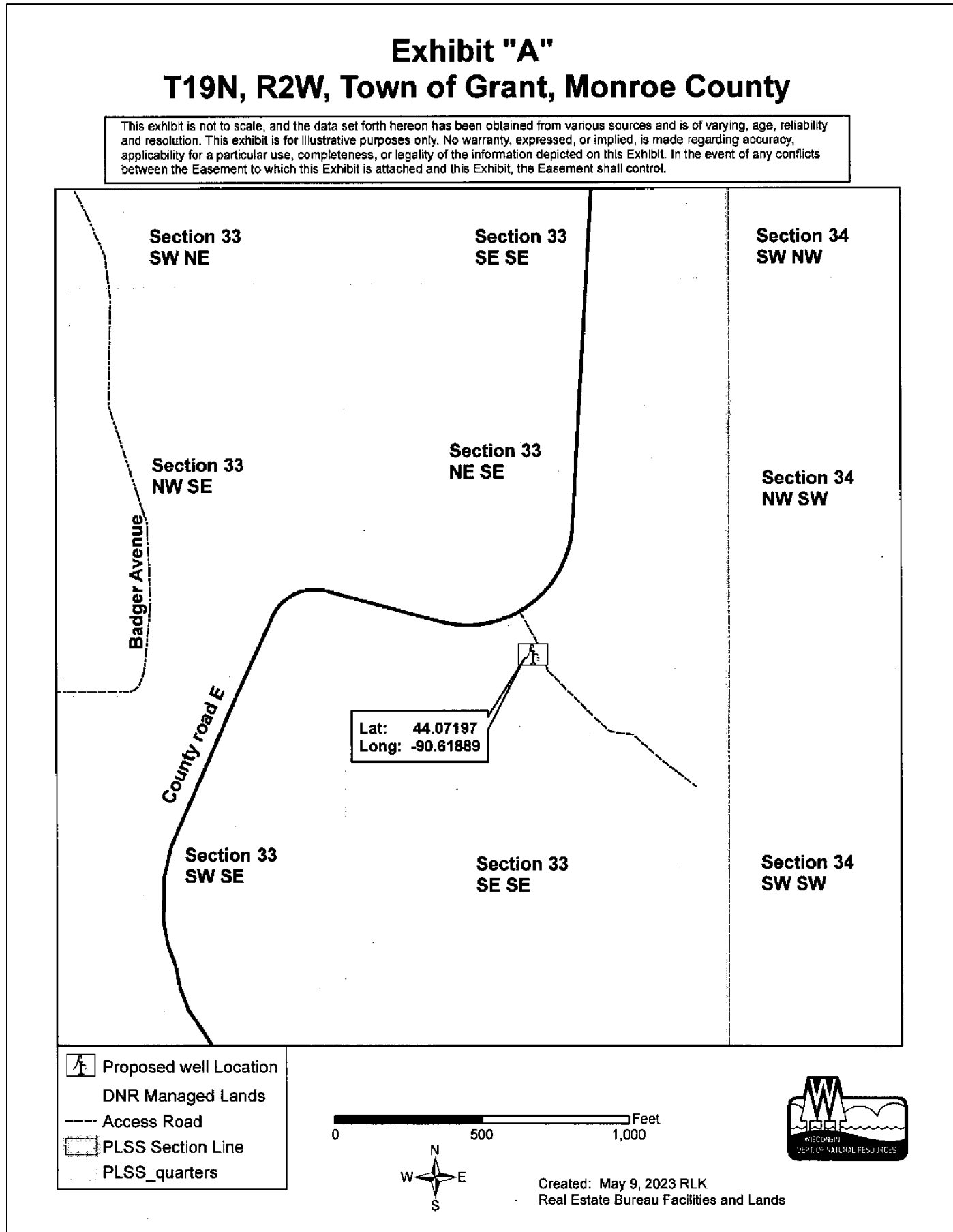
Ellen W. Rosner
* Ellen W. Rosner
Notary Public, State of Wisconsin
My Commission (expires)(is) 5/22/2027



*Please print names

This instrument drafted by:
State of Wisconsin
Department of Natural Resources

MO-334 WDNR groundwater monitoring station easement, 2021
Form 2200-296, page 7 of 7



MO-334 WDNR well construction report, 2024

Form 3300-077A, page 1 of 2

42000334 (aka MO-334), replaces well MO-17

Well Construction Report WISCONSIN UNIQUE WELL NUMBER				ABW587		Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707				
Property Owner UNIVERSITY OF WISCONSIN			Phone #			1. Well Location			Fire # (if avail.)	
Mailing Address 3817 MINERAL POINT RD						Town of GREENFIELD				
City MADISON			State WI		Zip Code 53705-5121	Street Address or Road Name and Number				
County Monroe			Co. Permit #	Notification # 9570468301	Completed 07-30-2024	Subdivision Name			Lot #	Block #
Well Constructor (Business Name) NELSONS PLBG & ELEC INC			Lic. # 42	Facility ID # (Public Wells)		Latitude / Longitude in Decimal Degree (DD)			Method Code	
			Well Plan Approval #			44.0761 °N -90.6158 °W			GPS008	
Address 25269 HWY 12 TOMAH WI 54660-5174			Approval Date (mm-dd-yyyy)			NE SE Section Township Range or Govt Lot # 33 19 N 2 W				
Hicap Permanent Well #			Common Well #		Specific Capacity 0.1	2. Well Type New Well			of previous unique well # constructed in	
3. Well serves 1 # of EXPLORATION			Hicap Well ? No		Reason for replaced or reconstructed well ?					
Private, non-potable			Hicap Property ? No		Construction Type Drilled					
Heat Exchange ___ # of drillholes			Hicap Potable ? No							
4. Potential Contamination Sources - ON REVERSE SIDE										
5. Drillhole Dimensions and Construction Method						8. Geology				
Dia. (in.)	From (ft.)	To (ft.)	Upper Enlarged Drillhole		Lower Open Bedrock	Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc...		From (ft.)	To (ft.)
10	Surface	56	Yes Rotary - Mud Circulation		No		F	F-FILL	Surface	1
6	56	205	No Rotary - Air		Yes	T	Y	T-TAN/BROWN Y-SAND & GRAVEL	1	20
			No Rotary - Air & Foam		No	T	H N	T-TAN/BROWN H-HARD/FIRM N-SANDSTONE	20	23
			No Drill-Through Casing Hammer			Q	Y	Q-CAVING Y-SAND & GRAVEL	23	34
			No Reverse Rotary			T	H N	T-TAN/BROWN H-HARD/FIRM N-SANDSTONE	34	36
			No Cable-tool Bit ___in. dia...		No	Q	Y	Q-CAVING Y-SAND & GRAVEL	36	49
			No Dual Rotary		No	I	H N	I-WHITE H-HARD/FIRM N-SANDSTONE	49	205
			No Temp. Outer Casing ___in. dia							
			No Removed? ___depth ft. (If NO explain on back side)							
6. Casing, Liner, Screen										
Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly				From (ft.)	To (ft.)				
6	KUMKANG KIND STEEL PE WELD 19.97 LB A#53				Surface	56				
Dia. (in.)	Screen type, material & slot size				From (ft.)	To (ft.)				
7. Grout or Other Sealing Material										
Method TREMIE PIPE - PUMPED										
Kind of Sealing Material		From (ft.)	To (ft.)	# Sacks Cement						
PORTLAND NEAT CEMENT		Surface	56	18 S						

WISCONSIN UNIQUE WELL NUMBER ABW587

MO-334 WDNR well construction report, 2024

Form 3300-077A, page 2 of 2

9. Static Water Level 14 ft. below ground surface 10. Pump Test Pumping level 200 ft. below surface Pumping at 15 GP M for 1 Hrs. Pumping Method ? Airlift	11. Well Is 36 in. above grade Developed ? Yes Disinfected ? Yes Capped ? Yes 12. Notified Owner of need to fill & seal ? No N/A Filled & Sealed Well(s) as needed? No N/A <table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="width: 60%;">13. Constructor / Supervisory Driller</td><td style="width: 20%;">Lic #</td><td style="width: 20%;">Date Signed</td></tr><tr><td>MN</td><td>3799</td><td>08-05-2024</td></tr><tr><td>Drill Rig Operator</td><td>Lic or Reg #</td><td>Date Signed</td></tr><tr><td> </td><td> </td><td> </td></tr></table>	13. Constructor / Supervisory Driller	Lic #	Date Signed	MN	3799	08-05-2024	Drill Rig Operator	Lic or Reg #	Date Signed			
13. Constructor / Supervisory Driller	Lic #	Date Signed											
MN	3799	08-05-2024											
Drill Rig Operator	Lic or Reg #	Date Signed											

4a. Potential Contamination Sources Is the well located in floodplain ? No

Type	Qualifier	Distance
Landfill	>	1200

Comment:

Water Quality Text:

Water Quantity Text:

Difficulty Text:

Created On: 07-31-2024Created by: HANSON9922Updated On: 08-05-2024Updated by: HANSON9922

WISCONSIN UNIQUE WELL NUMBER ABW587

MO-334 WDNR soil boring form, 2024

Form 4400-122, page 1 of 1

State of Wisconsin Department of Natural Resources		SOIL BORING LOG INFORMATION Form 4400-122 Rev. 7-98												
Route To: Watershed/Wastewater ☐ Waste Management ☐ Remediation/Revelopment ☐ Other ☐ Page 1 of 1														
Facility/Project Name Statewide Groundwater Monitoring Network new well		License/Permit/Monitoring Number	Boring Number WID:42000334 aka MO-334											
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Mike Last Name: Nelson Firm: Nelson Well Drilling		Date Drilling Started 07 / 29 / 2024 m m d d y y y y	Date Drilling Completed 07 / 30 / 2024 m m d d y y y y											
WI Unique Well No. ABW587	DNR Well ID No.	Well Name MO-334	Final Static Water Level 16 Feet MSL											
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane N, E NE 1/4 of SE 1/4 of Section 33, T 19 N, R 2W		Local Grid Location Lat 44.0761 Long 90.6758 Feet ☐ N ☐ E Feet ☐ S ☐ W												
Facility ID	County Monroe	County Code 42	Civil Town/City/ or Village Grant											
Sample		Soil Properties												
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
Grab Each Off 41 samples total			0-5	SILT 85% fines 15% F-M sand, slightly plastic, moist, v dark brown LOESS										10" mud rotary drilled to 56' set 6" steel casing to 56', tremie pumped 18 bags portland cement then 6" air rotary to EOB
			5-10	Well Sorted SAND 95% F-M quartz sand, well rounded, trace fines, strong brown, moist.										
			10-15	ALLUVIUM As above with trace gravel										
			15-20	As above with sandstone cobble										
			20-30	Well Sorted SAND 95% F-M sand, 5% gravel, well rounded, trace fines, strong brown, moist.										
			30-35	As above but light yellow brown										
			35-49	As at 20 feet but F-C sand										
			49-165	SANDSTONE, soft, non caving, F-M sand, well sorted and rounded, white to yellowish white and tan, quartzose										
		165-205	SANDSTONE as above but yellowish brown											
			END of boring 205 ft.											
I hereby certify that the information on this form is true and correct to the best of my knowledge.														
Signature P M C Peter M Chase					Firm Wisconsin Geological and Natural History Survey									
This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.														

Appendix 6: Wells PT-276 and PT-1821 documents

Well PT-1821 replaced well PT-276

Historical Documents: PT-276

PT-276 Well location map, date unknown

Historic well information compiled by WGNHS, 1 page

PT-276 Well evaluation, date unknown

Historic well information compiled by WGNHS, 1 page

PT-276 Well schedule, 1967

Historic well information compiled by WGNHS, 2 pages

PT-276 Well description, 1979

Historic well information compiled by WGNHS, 1 page

PT-276 Historic water-level data, 1951–1960

Historic well information compiled by WGNHS, 1 page

PT-276 Basic well information, 1980

Historic well information compiled by WGNHS, 1 page

PT-276 Historic water-level data, 1981–2000

Historic well information compiled by WGNHS, 2 pages

Documentation of work done for this report: PT-276

PT-276 WDNR filling & sealing report, 2025

Form 3300-005, 1 page

Documentation of work done for this report: PT-1821

PT-1821 Land use and access agreement, 2023

Property access agreement, 4 pages

PT-1821 WDNR monitoring well construction form, 2023

Form 4400-113A, 1 page

PT-1821 WDNR soil boring form, 2023

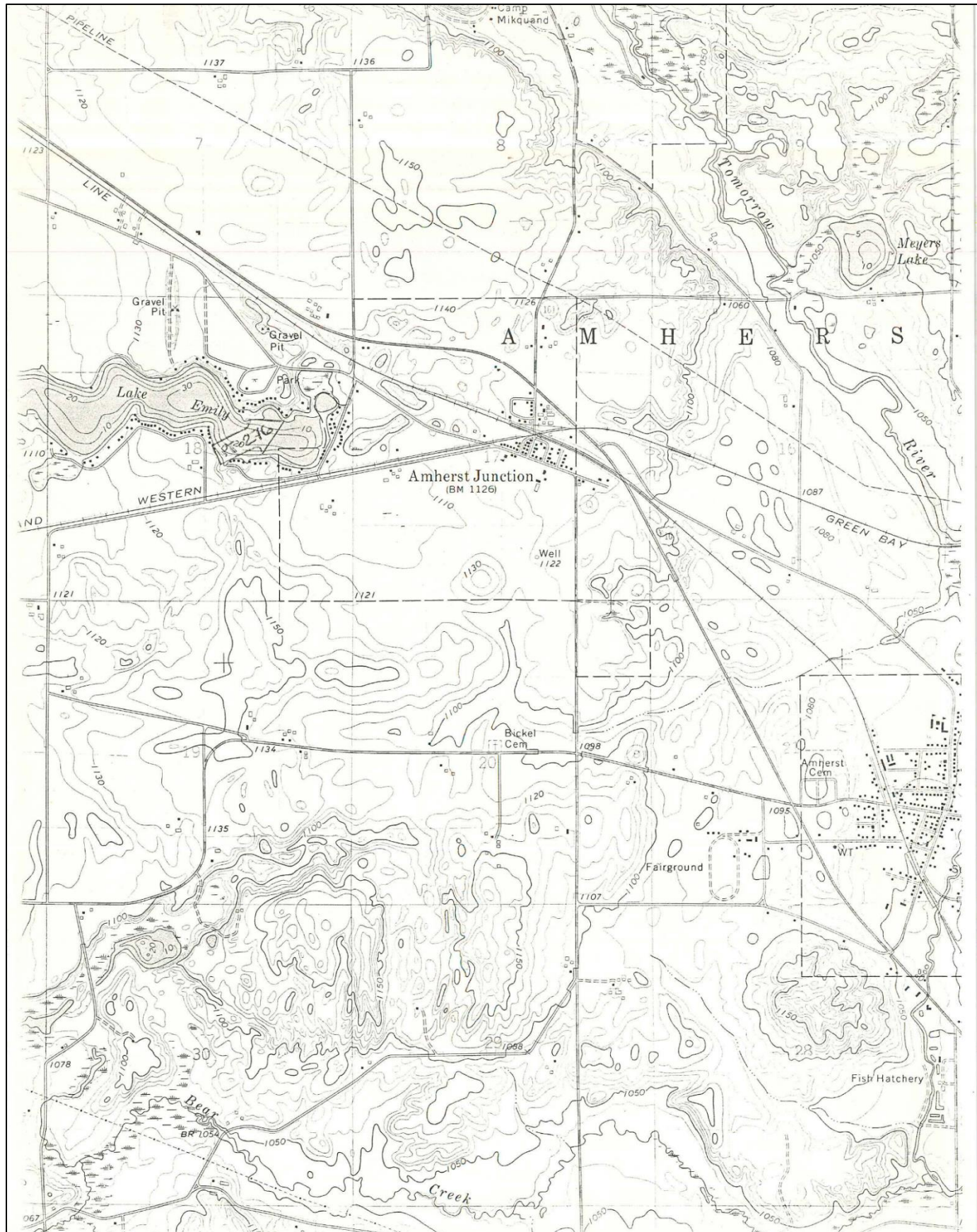
Form 4400-122, 1 page

PT-1821 WDNR monitoring well development form, 2023

Form 4400-113B, 1 page

PT-276 Well location map, date unknown

Historic well information compiled by WGNHS, page 1 of 1



PT-276 Well evaluation, date unknown

Historic well information compiled by WGNHS, page 1 of 1

PT-276

LIST OF CRITERIA FOR THE EVALUATION OF
EXISTING OBSERVATION WELLS IN WISCONSIN

1. Areal spacing -- distance from any observation well 5 mi.
-- distance from observation well in same aquifer 5 mi.
2. Ownership: private -- public
3. Use of well Observation
4. Access -- physical OK
-- owner's permission OK
5. Condition of well -- casing good
-- housing none
6. Geologic log: yes -- no
7. Construction report: yes -- no
Well completion date: 7/58
8. Diameter (4 in. minimum for recorder) 1 1/4 in.
9. Aquifer: single -- multiple
10. Good hydraulic connection with aquifer yes
11. Knowledge of pumping effect None
12. Range and character of w.l. fluctuations 10 ft.
13. Length of record 22 yrs.
14. Missing record
15. Adequacy of current measuring frequency OK
16. Probability of permanence good
17. Recommendations/Improvements

Evaluated by _____ on _____

PT-276 Well schedule, 1967

Historic well information compiled by WGNHS, page 2 of 2

Well No. PT-23/10/18-276

Latitude-longitude _____

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD Province: CENT LOW Section: ELS

Drainage Basin: G. LAKE Subbasin: FOX WOLF

Topo of well site: (D) depression, stream channel, dunes, flat, hilltop, sink, swamp, (P) offshore, pediment, hillside, terrace, undulating, valley flat BEACH

MAJOR AQUIFER: QUAT, PLEISTOC Q/G aquifer, formation, group

Lithology: SAND & GRAVEL Origin: _____ Aquifer Thickness: _____

Length of well open to: 1.5 ft Depth to top of: _____ ft

MINOR AQUIFER: _____ aquifer, formation, group

Lithology: _____ Origin: _____ Aquifer Thickness: _____

Length of well open to: _____ ft Depth to top of: _____ ft

Intervals Screened: 16'-17.5'

Depth to consolidated rock: _____ ft Source of data: _____

Depth to basement: _____ ft Source of data: _____

Surficial material: _____ Infiltration characteristics: _____

Coefficient Trans: _____ gpd/ft Coefficient Storage: _____

Perm: _____ gpd/ft²; Spec cap: _____ gpm/ft; Number of geologic cards: _____

OBS. GEORGE OLSON
AMHERST JET.

WELL

LAKE EMILY

BEACH

PUBLIC BEACH

BLUFF

OCTAGONAL SHAPED HOUSE

CUSTODIAN'S HOUSE

BALL PARK

LOG 1
Drift 0-17.4

Well No. 18

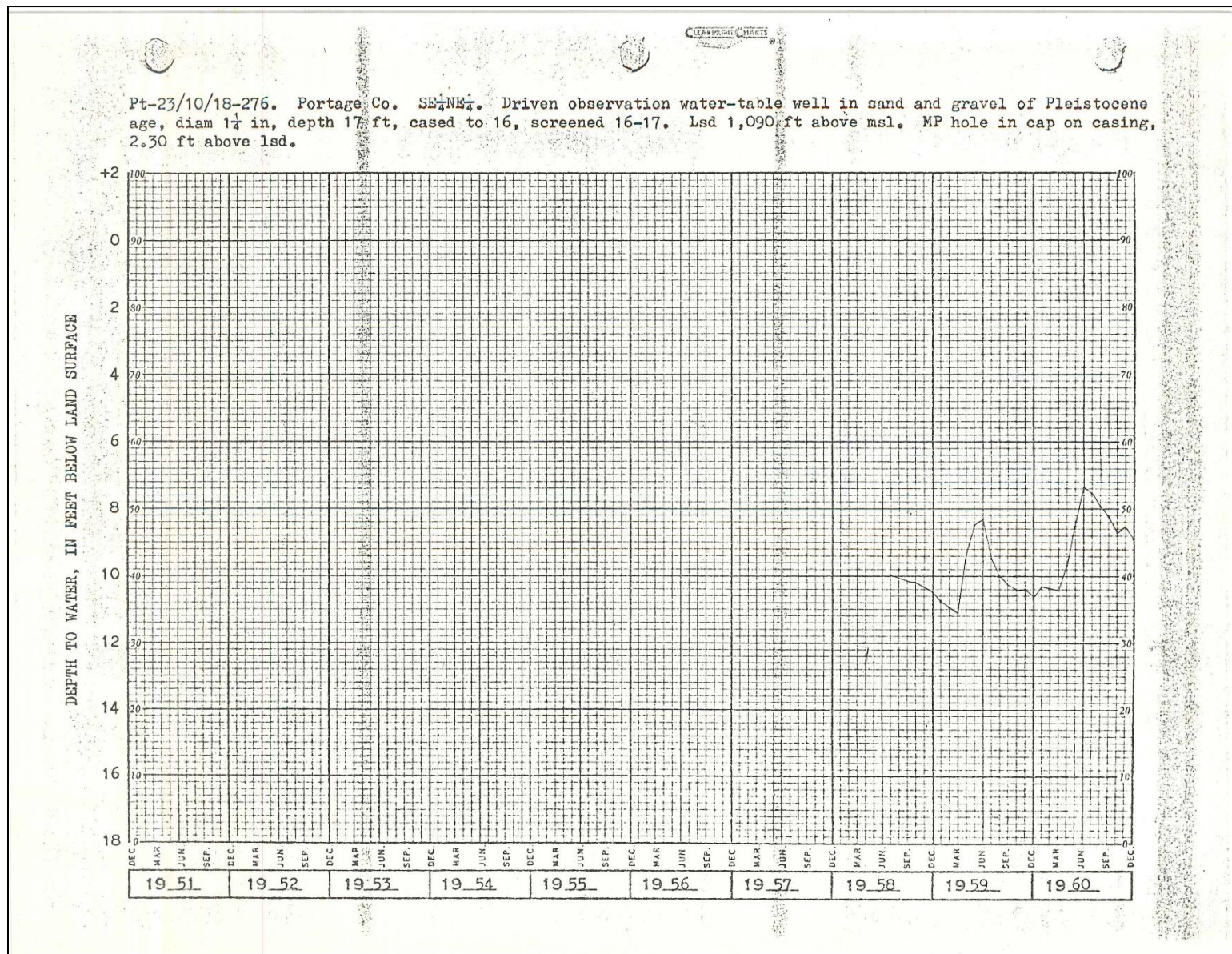
PT-276 Well description, 1979

Historic well information compiled by WGNHS, page 1 of 1

WELL DESCRIPTION SHEET	
WELL NO.: Pt 276	
OWNER: Portage County	
LOCATION	
Township/Range General Detail	SE-NE¼ Sec. 18, T23N, R10E 3/4 mi. W of Amherst Jct; Portage County At custodian's house in the park on the N shore of Lake Emily
Altitude Drainage Basin	1,090 ft above msl WOLF-FOX R.: Tomorrow R. (Waupaca R.)
NEAREST OBSERVATION POINTS	
Precipitation Stations	Waupaca (since 1895) - 15 mi. SE (relocated 4 times) Rosholt (since 1941) - 11 mi. N (relocated in 1958) Coddington (since 1921) - 12 mi. SW Stevens Point (since 1893) - 13 mi. W (relocated in 1954)
Stream-Gaging Stations	04079602 L. Wolf R. nr. Galloway (since 1973) - 15 mi. N 04079000 Wolf R. at New London (since 1896) - 30 mi. E
Observation Wells	Pt 15 (since 1950) - 4 mi. NE Wp 63 (since 1958) - 14 mi. SE Pt 376 (since 1960) - 9 mi. W
Other	
WELL DATA	
Depth: 17.5 ft Aquifer(s) Tapped Well Log	Casing: depth - 16 ft; diameter 1¼ in. Glacial drift Available: no
MEASUREMENTS	
Measuring Point Equipment Frequency First Measured Period of Record Interrupted Notes	Hole in cap on casing 2.30 ft above lsd Hand tape Weekly from April 18, 1960 (monthly from July 1958 to April, 1960) Date: July 2, 1958 ; 9.66 ft below lsd July 1958 to present Occasionally, except in 1973 when Jan. and Feb. is missing Good record, only 2.8% of measurements missing; mostly in the last 5 years (over 65% of all missing data)
4/6/79	

PT-276 Historic water-level data, 1951–1960

Historic well information compiled by WGNHS, page 1 of 1



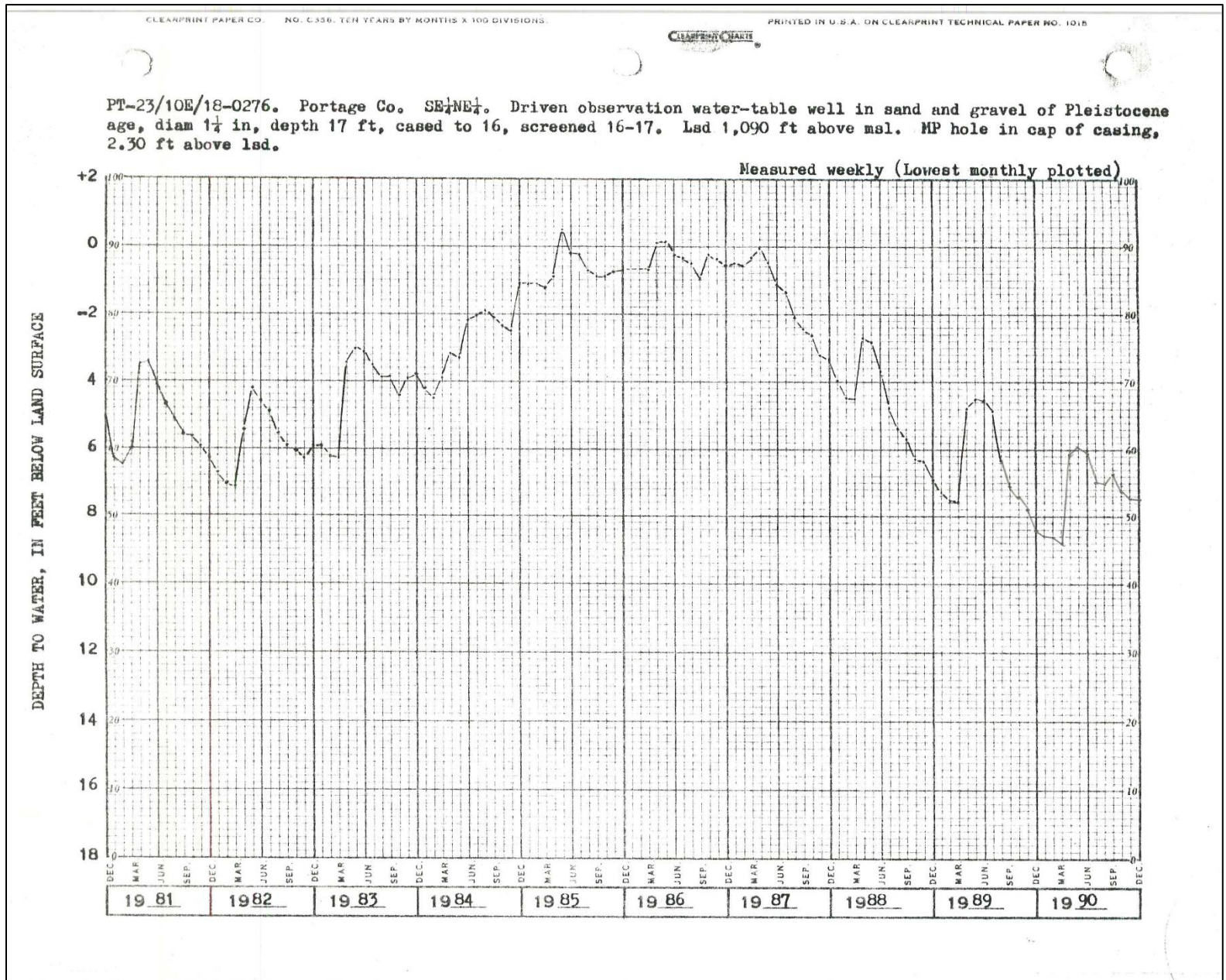
PT-276 Basic well information, 1980

Historic well information compiled by WGNHS, page 1 of 1

7/11/80	PT-276
BASIC DATA ON WATER-LEVEL OBSERVATION WELL	
Well number <u>PT-23/10E/18-0276</u> (<u>442810089194501</u>) Owner <u>PORTAGE Co.</u> Location (Co., T/R.sec) <u>PORTAGE T. 23N., R. 10E., Sec. 18 SE 1/4 NE 1/4</u> Land surface altitude <u>1,090 ft.</u> Drainage basin <u>Fox-Wolf Basin</u>	
WELL DATA	
Depth <u>17 1/2 ft.</u> Casing depth <u>16 ft.</u> Screened interval <u>16-17 ft.</u> Diameter <u>1 1/4 in.</u> Aquifers open to well <u>S&G</u> Geologic log available? <u>No</u> Construction report available? <u>No</u> Use of well <u>Observation</u> Access to measure well <u>OK</u>	
NEAREST SUPPLEMENTAL DATA POINTS	
Precipitation stations	<u>Stevenson's Point - 13 mi WNW</u> <u>Warpac - 14 mi SE</u> <u>Rosholt 9 NNE - 22 mi N</u>
Streamgaging stations <u>0407900</u>	<u>Wolf River at New London - 29 mi E</u>
Observation wells	<u>Pt 15 - 5 mi NE</u> <u>WS 53 - 18 mi SE</u> <u>Pt 376 - 8 mi WSW</u> <u>Pt 36 - 13 mi SW</u>
Other	
EXISTING RECORD	
Measuring point <u>Hole in cap on casing</u> Measuring equipment <u>Tape</u> Frequency of measurement <u>Weekly</u> Period of record -- Started <u>1958</u> Ended <u>Continuing</u> Volume of missing record	

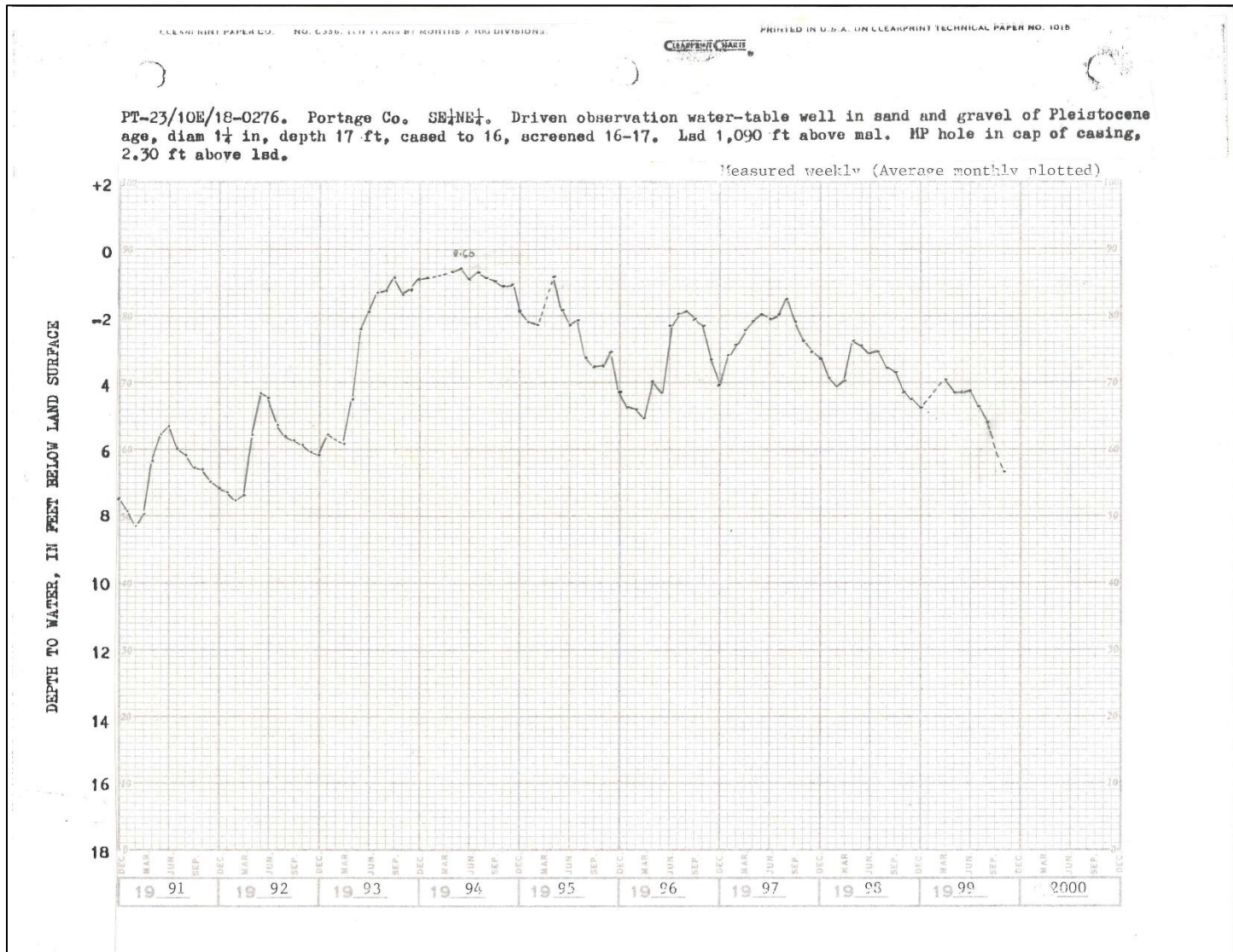
PT-276 Historic water-level data, 1981–2000

Historic well information compiled by WGNHS, page 1 of 2



PT-276 Historic water-level data, 1981–2000

Historic well information compiled by WGNHS, page 2 of 2



PT-1821 Land use and access agreement, 2023

Property access agreement, page 1 of 4

**LAND USE AND ACCESS AGREEMENT
FOR GROUNDWATER MONITORING**

This agreement is between the Wisconsin Geological and Natural History Survey (WGNHS), part of the Natural Resources Institute (Division of Extension, UW- Madison), and Portage County, Wisconsin, a quasi-municipal corporation, represented by its Park Director.

The WGNHS partners with the U.S. Geological Survey's Upper Midwest Water Science Center (USGS) to operate, maintain, and manage the Wisconsin Groundwater-Level Monitoring Network (WGLMN). The WGNHS also closely coordinates with the Wisconsin Department of Natural Resources (WDNR) regarding the WGLMN.

The purpose of this agreement is to allow WGNHS the ability to install and maintain a well for monitoring groundwater levels on property owned by Portage County. Portage County grants WGNHS access and use in common with Portage County and with such other parties authorized by Portage County to Tax Parcel #103-23-1018-04, located at SE-NE, Sect. 18, T23N, R10E, in the Village of Amherst Junction. The approximate location of the proposed well is shown on Exhibit A.

Parties agree that the following terms govern this Land use agreement:

1. The effective date of the land access will be upon mutual agreement and execution of this agreement by the WGNHS and Portage County.
2. Portage County is not responsible for the cost to install, maintain, repair, or monitor during any period of the Land Use Agreement.
3. Prior to the installation and/or removal of any well or structure WGNHS will obtain written consent from the Park Director.
4. WGNHS will mitigate damages caused to the Premises and surrounding areas and consult with the Park Director regarding specific well location and any damages or expected damages to Portage County Property.
5. WGNHS shall at its own expense and cost maintain and keep the premises in good repair and condition.
6. WGNHS shall not discharge waste or other hazardous material in such a manner to contaminate the well or other bodies of water or otherwise become a public nuisance.
7. WGNHS shall help to protect the environment and natural resources, and where damage nonetheless occurs, WGNHS will be held liable for its actions and/or activities in order to restore the damages resources.
8. WGNHS must obtain written approval from the Park Director prior to the use of any herbicide or pesticide.
9. WGNHS does not have the authority and shall not transfer nor assign said land use agreement without prior written approval from the Park Director.

PT-1821 Land use and access agreement, 2023

Property access agreement, page 2 of 4

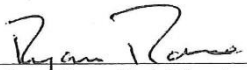
10. WGNHS shall be mindful of the Portage County employees working in the vicinity of the monitoring well.
11. WGNHS commits to maintaining the premises in a decent, sanitary, and safe condition and will at no time allow its work to cause a hazard or unsafe conditions.
12. WGNHS commits to locking or securing the monitoring well to ensure that the installation is only accessible by approved personnel.
13. Well drilling, well construction, major repairs, and well decommissioning and abandonment (as needed) will be covered under a temporary construction easement for the time period the contractor will be on site.
14. Upon final decommissioning of this monitoring station (not anticipated), this Agreement shall terminate.
15. Should the WGNHS discontinue use of this monitoring station, all equipment will be removed from this location and the site restored at the sole expense of WGNHS. Portage County agrees to provide assistance in identifying an alternative location for a monitoring well if this Agreement continues and is not terminated.
16. The use of the monitoring station shall continue unless terminated by either party upon 180 days written notice.
17. Well evaluations may consist of borehole geophysical logging, the establishment of elevation datum benchmarks, packer testing, or other hydrogeological well evaluations. WGNHS staff may perform this work in coordination with the USGS or delegate these activities to the USGS who serves as a partner in operating, maintaining, and managing the WGLMN.
18. Monitoring and maintenance consist of the deployment of water-level monitoring equipment inside the well, visits by WGNHS and/or USGS personnel to perform water-level measurements and retrieve water-level data. These visits may also include the performance of small repairs to the well such as replacing padlocks, repainting the exterior of the monitoring well, or replacing/repairing in-well monitoring equipment. WGNHS staff may perform this work in coordination with the USGS or delegate these activities to the USGS serves as a partner in operating, maintaining, and managing the WGLMN.
19. Notices required or deemed advisable under this Agreement shall be placed in writing and delivered personally or by registered or certified mail:
 - If to Portage County, upon Portage County Parks Director, Portage County Portage County Parks 1903 County Hwy Y Stevens Point, WI 54482
 - If to WGNHS, upon the State Geologist, 3817 Mineral Point Road, Madison, WI 53705, with copy to the Real Estate Specialist, Facilities Planning and Management, 21 N. Park Street 6th floor, Madison, WI 53715.
20. The laws of the State of Wisconsin shall govern this Agreement and executed amendments thereto. Venue for all legal proceedings arising out of this Agreement, or breach thereof, shall be exclusively in Portage Circuit Court, Stevens Point, WI.
21. Insurance: Each party agrees to maintain property, liability and workers compensation insurance for their employees and property in the manner provided by law.

PT-1821 Land use and access agreement, 2023

Property access agreement, page 3 of 4

22. Liability: It is mutually agreed by Portage County and WGNHS that, as related to this Agreement, any loss or expense or resultant legal liability, involving personal injury or property damage, will be the responsibility of the party whose officer, employee or agent may have caused the loss or expense by his or her respective actions, acts, activities, or omissions which occurred or may occur in connection with this agreement.
23. Non-discrimination: No otherwise qualified person shall be excluded from employment, be denied the benefits of employment or otherwise be subject to discrimination in employment in any manner or term of employment on the basis of age, race, creed, color, sex, national origin, or ancestry, disability as defined in Section 504 and the Americans with Disabilities Act (ADA), arrest or conviction record (consistent with s. 111.32 s. HSS 83.12(3), and s. HSS 83.13(6), sexual orientation, political affiliation, marital status, or military participation. All employees are expected to support goals and programmatic activities relating to non-discrimination in employment. This clause applies to Lessee membership.
24. Americans with Disabilities Act Compliance: In connection with the performance of work under this Agreement, WGNHS agrees that no qualified individual with a disability, as defined by the Americans with Disabilities Act, shall by reason of such disability, be excluded from participation and the benefits of services, programs, or activities, including employment, or be subjected to discrimination. WGNHS is specifically notified that it is subject to all employment requirements listed under Title I of the Americans with Disabilities Act by virtue of its Agreement with the, a public entity. The Lessee is specifically notified that it is subject to federal requirements to assure participation and access to public facilities, programs, and activities under Title II of the Americans with Disabilities Act by virtue of its Agreement with, a public entity. These requirements mandate separate or special programs or reasonable modification of existing programs, services, and activities without surcharge to disabled individuals as long as safety is not compromised. WGNHS shall provide a similar notice to all its subcontractors.
25. By signing below, the parties affirm and acknowledge that they have read and understand this Agreement and its attachments, if any, consisting of four (4) typewritten pages; they have authority to enter into this Agreement on behalf of the entity, corporation, or County they are signing for; they are knowingly, freely, and voluntarily entering into this Agreement; and that they accept and agree to be bound by the terms and conditions of this Agreement and its attachments, if any, as outlined in this Agreement.

PORTAGE COUNTY BY:

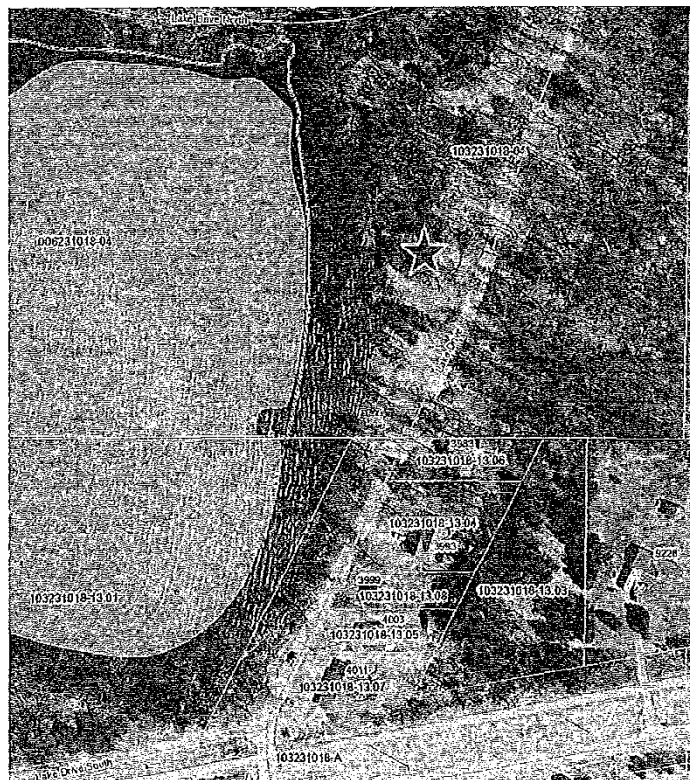
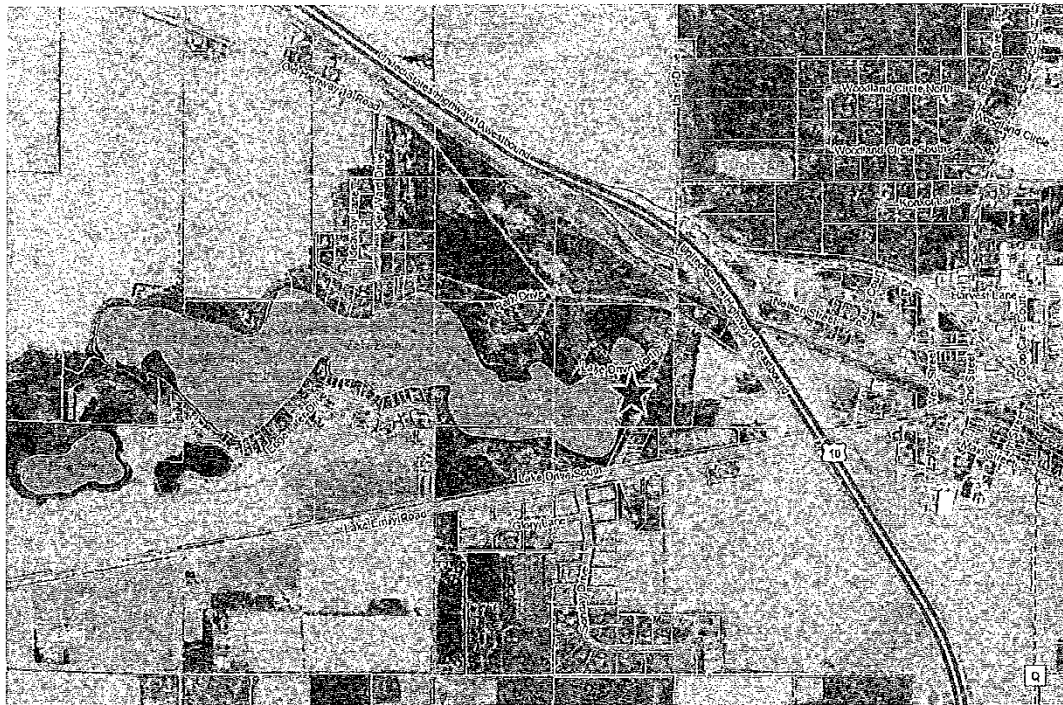
signature  02-10-23
Ryan Rose, Park Director (Date)

signature  2-17-23
Printed name [], Authorized Representative of WGNHS (Date)

PT-1821 Land use and access agreement, 2023

Property access agreement, page 4 of 4

Exhibit A



PT-1821 WDNR monitoring well construction form, 2023

Form 4400-113A, page 1 of 1

50001821 (aka PT-1821), replaces PT276

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 7-98

Facility/Project Name: Statewide Groundwater Monitoring Network
Facility License, Permit or Monitoring No.: Lake Emily Co. Park
Facility ID: _____

Local Grid Location of Well: _____ ft. ☐ N. _____ ft. ☐ E.
_____ ft. ☐ S. _____ ft. ☐ W.

Well Name: 50001821 aka PT-1821
Wis. Unique Well No.: VQ859
DNR Well ID No.: _____
Date Well Installed: 06 / 19 / 2023
Well Installed By: Name (first, last) and Firm
Gage Kapugi
On Site Environmental Services LLC

Local Grid Origin: _____ (estimated: ☐) or Well Location: _____
Lat. 44 ° 28 ' 07.89 " Long. -89 ° 19 ' 34.99 " or
Section Location of Waste/Source: SE 1/4 of NE 1/4 of Sec. 18, T. 23 N, R. 10 ☒ E ☐ W

Type of Well: _____
Well Code: 11 / MVW
Distance from Waste/Source: _____ ft. Apply ☐ Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known Gov. Lot Number: _____

A. Protective pipe, top elevation: _____ ft. MSL
B. Well casing, top elevation: 1100.98 ft. MSL
C. Land surface elevation: 1098.82 ft. MSL
D. Surface seal, bottom: _____ ft. MSL or N/A ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☒ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☐ Yes ☒ No
14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ☒ 41
Other ☐

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☒ 99
16. Drilling additives used? ☐ Yes ☒ No
Describe: _____
17. Source of water (attach analysis, if required):
City of Sun Prairie

E. Bentonite seal, top: _____ ft. MSL or 0.5 ft.
F. Fine sand, top: _____ ft. MSL or 5.5 ft.
G. Filter pack, top: 1090.82 ft. MSL or 8.0 ft.
H. Screen joint, top: 1088.82 ft. MSL or 10.0 ft.
I. Well bottom: 1073.82 ft. MSL or 25.0 ft.
J. Filter pack, bottom: 1073.32 ft. MSL or 25.5 ft.
K. Borehole, bottom: 1073.32 ft. MSL or 25.5 ft.
L. Borehole, diameter: 8.3 in.
M. O.D. well casing: 2.4 in.
N. I.D. well casing: 2.1 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.5 ft.
c. Material: Steel ☒ 04
Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☒ 30
Concrete ☐ 01
Other ☐
4. Material between well casing and protective pipe:
#40 Red Flint Bentonite ☐ 30
Other ☒
5. Annular space seal:
a. Granular/Chipped Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . Bentonite-cement grout ☐ 50
e. 1.5 Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01
Tremie pumped ☐ 02
Gravity ☒ 08
6. Bentonite seal:
a. Bentonite granules ☐ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 32
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
#15 Red Flint
a. _____
b. Volume added 0.5 ft³
8. Filter pack material: Manufacturer, product name & mesh size
#40 Red Flint
a. _____
b. Volume added 7.5 ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23
Flush threaded PVC schedule 80 ☐ 24
Other ☐
10. Screen material: PVC
a. Screen type: Factory cut ☒ 11
Continuous slot ☐ 01
Other ☐
b. Manufacturer Monoflex
c. Slot size: 0.010 in.
d. Slotted length: 15 ft.
11. Backfill material (below filter pack): None ☒ 14
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: PM Chase Firm: Wis. Geological and Natural History Survey

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

PT-1821 WDNR soil boring form, 2023

Form 4400-122, page 1 of 1

State of Wisconsin
Department of Natural ResourcesSOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐

Page 1 of 1

Facility/Project Name Statewide Groundwater Monitoring Network		License/Permit/Monitoring Number		Boring Number 50001821 (aka PT-1821)	
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Gage Last Name: Kapugi Firm: On Site Environmental Services LLC		Date Drilling Started 06 / 19 / 2023 m m d d y y y y		Date Drilling Completed 06 / 19 / 2023 m m d d y y y y	
Drilling Method Direct Push continuous samples then 4.25" HSA		Final Static Water Level Feet MSL		Surface Elevation Feet MSL	
WI Unique Well No. VQ859	DNR Well ID No.	Well Name	Borehole Diameter 8.2 inches		
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒		Local Grid Location			
State Plane N, E		Lat 44.468860		☐ N ☐ E	
SE 1/4 of NE 1/4 of Section 18, T 23 N, R 10E		Long -89.3263864		☐ S ☐ W	
Facility ID Lake Emily Co. Park		County Portage	County Code 50	Civil Town/City/ or Village Amherst Junction	

Sample		Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
30			0-5	Dark brown Loamy organic topsoil to 0.8 ft										
40			5-10	Well Sorted SAND 95% f sand, tr. fines, light brown, moist, loose to about 6.0										
48			10-15	At 6ft: 1.2 ft of LEAN CLAY 95% fines, 5% F sand, plastic, gray/green w/ FeOx staining, wet, soft Well Sorted SAND 95% f sand, tr. fines as above, wet										
60			15-20	At 10 ft: Silty Sand, 70% F sand 30% fines, brown to red brown, wet, loose, laminated w/ 1-3 mm F sand layers As above w/ color change to gray at 19 ft.										
60			20-25	At 20 ft: SILT w/F sand and clay laminations, 80% fines 20% F sand plastic to slightly plastic grey, wet EOB 25 ft. Set 2" PVC well w/ 0.010 slot screen from 10-25 ft bgs										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature
Peter M. ChaseFirm
Wisconsin Geological and Natrual History Survey

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information,

