

USGS National Groundwater Monitoring Network

Final Technical Report

Mississippi

- Award Number: G17AC00180
- Agency Name: Mississippi Department of Environmental Quality
- Title: Mississippi Department of Environmental Quality's Observation Well Network: A static network of observation wells in the state of Mississippi for tracking changes in groundwater levels over time
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Work previously completed to support the NGWMN as a data provider

The Office of Land and Water Resources (OLWR), a division of the Mississippi Department of Environmental Quality (MDEQ), applied for funding to become a data provider to the National Groundwater Monitoring Network (NGWMN) in 2015. The OLWR submitted a Scope of Work to the United States Geological Survey (USGS) outlining steps the OLWR would take to integrate its current monitoring well network into the NGWMN database. In the Scope of Work document, the OLWR divided this process into seven tasks with a detailed description of how each task would be executed.

Work outlined in the award period required the fulfillment of seven tasks: evaluation of monitoring sites, classification of selected sites, population of the Well Registry, establish Web Services, mapping of fields to the data portal, documentation of data collection, and production of a summary document. At the close of the initial award period, the OLWR had completed all tasks except for establishing functioning web services. This issue was resolved in May of 2017.

In July of 2017, OLWR staff began the process of locating and digitizing paper records associated with wells of the Observation Well Network. Staff located historical records such as driller's logs, electric logs, and USGS well schedules for many of the sites within the network and began entering this information into web services to be uploaded to the network. This data has successfully been uploaded into the NGWMN database. While the OLWR does have a significant amount of paper records, staff was unable to locate complete records for all wells. For those wells that had incomplete construction data, staff made observations about construction data (specifically casing data) while taking water level measurements in the field.

Updates made to web services during award period

During this award period, the OLWR staff continued entering data obtained during field observations into the web services data tables. New water levels were entered for measurements made up to the end of the award period. Other information added included observations of casing materials, more accurate measuring points, and locational data when necessary. Observations and measurements taken during this period were managed according to the requirements set forth in the data management plan (Attachment A).

In an effort to provide the most reliable data, the OLWR regularly evaluates wells in the network for measurement suitability. Parameters considered include well accessibility, measurement reproducibility, and well owner cooperation. After careful consideration, the

OLWR has determined that 14 wells are not currently suitable for measurement. A list of these wells along with a brief explanation for removal can be found below:

SITE ID	PRINCIPAL AQUIFER	YEAR REMOVED	REASON REMOVED
023G0078	Mississippi Embayment Aquifer System	2018	Consistently unable to measure
049P0072	Mississippi Embayment Aquifer System	2018	Well has been destroyed
049T0014	Coastal Lowlands Aquifer System	2018	Well has been destroyed
051N0010	Mississippi Embayment Aquifer System	2018	Well has been destroyed
053B0045	Mississippi Embayment Aquifer System	2018	Well has been destroyed
053F0016	Mississippi Embayment Aquifer System	2018	Unreliable measurements
059Q0112	Coastal Lowlands Aquifer System	2018	Unreliable measurements
079P00031	Mississippi Embayment Aquifer System	2018	Well has been destroyed
087C0030	Southeastern Coastal Plains Aquifer System	2018	Well has been destroyed
089D0022	Mississippi Embayment Aquifer System	2018	Unreliable measurements
121F0037	Mississippi Embayment Aquifer System	2018	Well has been destroyed
137C0152	Mississippi Embayment Aquifer System	2018	Safety Concerns
151D0033	Mississippi Embayment Aquifer System	2018	Well has been destroyed
151S0049	Mississippi Embayment Aquifer System	2018	Unable to reach landowner

These wells have not been completely removed from the web services database, but they have been hidden from view. The OLWR is currently working to find suitable replacements for these wells.

Problems encountered in serving data to the web portal

There were some issues encountered under previous award periods. These issues involved data formatting and conversion of the water level data table through ArcGIS into XML. These issues were resolved in March 2017 by making changes in the original data table. Work to complete the final mapping of web services with successful data transfer was finished in May of 2017. There were no issues during the current award period.

Planned changes in databases or web services that would impact web services

The OLWR is currently working with a private company in developing a new database that will house all of the OLWR’s permitting, compliance, and monitoring information. Water level monitoring information will be added to the new database within the next year, but this should not affect web services. The OLWR will communicate with the USGS in order to work through any technical problems as they arise.

Attachment A

USGS National Ground-Water Monitoring Network Cooperative Agreement for MDEQ

1. Project and Contact Information

What is the name of the project?

National Groundwater Monitoring Network Grant Request: Data Quality Management Plan for the Office of Land and Water Resources, a division of the Mississippi Department of Environmental Quality

What is the name of the USGS Center/Program that oversees the project?

United States Geological Survey; Groundwater and Streamflow Information Program
1-703-648-5953
12201 Sunrise Valley Drive
Reston, VA 20192

Summary description of the project.

This data management plan is being created to outline policies and procedures in place for data and metadata collection, storage, analysis, and protection. The data is being collected in order to develop a long-term water quantity and quality monitoring network to aid in future water management decisions.

What is the project start date?

7/1/2017

What is the project's expected end date?

6/30/2018

Are there additional information available?

https://acwi.gov/sogw/ngwmn_framework_report_july2013.pdf

Who is the main point of contact for the project and its data?

Kristen Sorrell
ksorrell@mdeq.ms.gov
(601) 961-5301

Chris Hawkins
chawkins@mdeq.ms.gov
(601) 961-5775

Karen Stephens
kstephens@mdeq.ms.gov
(601) 961-5679

Are there collaborating/funding agencies and organizations?

There are two collaborating funding agencies for this data set. They are the United States Geological Survey and the Office of Land and Water Resources, a division of the Mississippi Department of Environmental Quality. The contact information for those agencies is: Daryl Pope (USGS) dpope@usgs.gov; USGS national Groundwater Monitoring Network, 3450 Princeton Pike, Suite 110, Lawrenceville, NJ 08648; (609) 771-3933; Kristen Sorrell (OLWR) ksorrell@mdeq.ms.us; Kristen Sorrell, PO Box 2309, Jackson, MS 39202; (601) 961-5301.

2. Plan and Acquire

How will the data be acquired?

The data provided for this project will consist of both new and existing data sets. The new data for this project will be physically collected in the field by trained staff. Existing data has already been collected, but will have additional metadata collection needs. This metadata will be collected through a combination of field methods and paper file review.

If acquiring existing datasets, include more information.

The USGS will acquire existing data sets, stored in XML format which has been generated using the map service ArcGIS.

If collecting new data, include more information.

The data will be collected via yearly measurements by OLWR staff using a steel surveyor's tape or electric tape (e-tape). The data will then be input into ArcGIS via an Excel spreadsheet and updated as measurements are taken. ArcGIS will then convert that data into XML language so that data can be queried by the NGWMN data portal.

What is the estimated volume of the data collected, transformed, and/or generated?

The data provided should be less than 1 GB.

Will the data be static or frequently updated?

Water level data will be updated as measurements are taken, usually at least once a month. Lithology and construction data will be updated as needed.

Are the appropriate equipment and staff resources accounted for in the budget?

There is appropriate equipment and staff to manage the data, with cost estimated at \$15,000.

3. Describe/Metadata and Manage Quality

How many new datasets will be created?

Initially, three datasets will be provided. They will be named "Lithology Web Services", "Water Level Web Services", and "Well Construction Web Services". Additionally, the "Lithology Web Services" and "Well Construction Web Services" may be split further into additional data sets. These data sets will be created as needed.

What are the data types and formats, in which the data will be maintained?

The data will be maintained in house as three separate Excel spreadsheets (.xlxs). These spreadsheets will be uploaded into an ArcGIS database on a Windows server. ArcGIS will then translate the data sets into

XML files. The OLWR will provide these files using a REST service, which can then be queried by the USGS.

Briefly describe the data processing steps or provide the scientific workflow.

Once data is collected in the field, it will be input into an Excel spreadsheet. This spreadsheet will be uploaded into ArcGIS. The data will be held on a Windows server, and configured by a REST service in xml file format so that it can be queried by the NGWMN.

How will the metadata for each dataset be created?

Metadata will be created using information from existing paper documents keyed into an appropriate format by a designated employee. Kristen Sorrell, an employee of the OLWR, will be responsible for metadata creation and update. Her contact information is Kristen Sorrell, PO Box 2309, Jackson, MS 39202. Phone: (601) 961-5301; Email: ksorrell@mdeq.ms.gov .

Which metadata standard will be used to describe each dataset?

The metadata standard ISO 19115 series will be used.

What procedures will be used for ensuring data quality (QA/QC)?

The OLWR will employ several methods for QA/QC. In order to maintain quality data there must be standards for data collection. These standards are outlined in a document outlining standard operating procedures (submitted with the Final Report for Round I funding). It includes measurement tool, method, and significant figures for measurement and specifies a specific form for recording data. This document also states protocol for data entry.

In order to verify quality data entry, QA/QC procedures will be in place. The first method will be enforced standards. Data will be entered in a defined format with defined measurement units. Double data entry will be performed with one person responsible for final assessment of data quality. Data storage will be designed so that values must only be entered once with one piece of information per cell. Data changes will be documented and maintained by one person. Once data is entered, it will be verified that each cell has been filled in correctly with no missing values. In the case of water level values, outliers can be an indication of poor data quality. Outliers will be noted at time of water level measurement, if known. Water level data will also be examined at time of entry for the possibility of outliers. This can be done through the use of hydrographs or charts for individual wells. It will also be the responsibility of one person to check the NGWMN data portal for incorrect translations of data once the data has been entered. The data portal runs a new query at night, so there will be a 24-hour period before this final data quality assessment can be done.

4. Backup/Secure and Preserve

Where will the data be stored in the short-term?

The data will be stored in a building owned by the OLWR on a Windows server. The building is secured with armed security during working hours. There are also two badge-restricted entries accessible during working hours. Access to the building during non-working hours is restricted and requires the assistance of Jackson capitol police. Further, the room housing the server requires more refined badge access (only accessible by IT staff). This room is environmentally controlled and equipped with fire suppression devices.

What will be the approach for routine backup of the data?

Data will be stored in multiple places. The data that is in connection with the web portal is stored on a dedicated server. The original data will also be stored on multiple computers in three different databases. The original data set is backed up nightly and transferred to tapes, which are stored offsite. Data is protected by Symantec virus protection and a firewall.

Describe any potential access restrictions.

All Personally Identifiable Information (PII) has been removed from the data, limiting the need for access restriction.

What will be the final format of the data product?

The final format for the data will be a .xml file. The data will also be preserved in house as a .xlsx file.

Where will the data and metadata be preserved in the long-term?

The data and metadata will be preserved through internal backups and physical copies of said backups by the OLWR. There are two funding programs responsible for the data. The United States Geological Survey is the agency funding data transfer to the public, while the Office of Land and Water Resources is the agency funding data collection and transmission to the USGS. The contact for the USGS is Daryl Pope. His contact information is: dpope@usgs.gov; USGS Groundwater Monitoring Network, 3450 Princeton Pike, Suite 110, Lawrenceville, NJ 08648; (609) 771-3933. The contact for OLWR is Kristen Sorrell: ksorrell@mdeq.ms.gov, Kristen Sorrell, PO Box 2309, Jackson, MS 39202; (601) 961-5301.

If costs are associated with long-term storage, how will they be provided for?

There are agreements made on a yearly basis for preservation of the data and metadata. The OLWR also has a commitment to the preservation of this data and metadata in house regardless of funding agreements with the USGS.

5. Publish and Share**How will the data be shared and made available to the public?**

The USGS is offering funds on a yearly basis for data transfer from the OLWR's server to the NGWMN Data Portal. Data will be provided through the portal as requested. The OLWR's data collection and storage is funded as part of its operating budget, including the cost of the computer used to store the data.

Will there be access or use restrictions on the data?

The USGS will set any access and use restrictions for the use of data provided through the portal. Any information given by the OLWR will be restricted as the USGS decides.

How can someone overcome any access restrictions?

It is at the discretion of the USGS to allow access beyond the restrictions set forth by the USGS.

Identify any anticipated publications or electronic outlets resulting from the data.

The OLWR, the data provider, has no immediate plans for publications involving this data. Any publications anticipated by the USGS will be at their discretion.

Where will metadata be stored to enable data discovery by the public?

The metadata will be stored on a Windows server housed inside of an OLWR building that the USGS can query. Original copies will also be maintained in house if the data maintained by the USGS should become corrupted.

How and where will you obtain a digital object identifier (DOI) for the data?

If a Digital Object Identifier is required, it must be created by USGS staff, as OLWR staff does not have access to the creation tool.