

# USGS Water-Use Data and Research Program

## Workplan for Mississippi



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Developed by:

Mississippi Department of Environmental Quality  
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## 1. INTRODUCTION

The mission of the Mississippi Department of Environmental Quality (MDEQ) is to safeguard the health, safety, and welfare of present and future generations of Mississippians by conserving and improving our environment and fostering wise economic growth through focused research and responsible regulation. The Office of Land and Water Resources (OLWR) is charged with conserving, managing, and protecting the water resources of Mississippi. The OLWR regulates water quantity issues affecting the beneficial use of these resources in the best interest and welfare of the citizens of the state.

MDEQ has developed this workplan to improve water use reporting consistency and accuracy statewide. The workplan looks to expand metered water use reporting for irrigation, industrial, and public supply wells located in drinking water aquifers. It addresses ways to increase both the consistency of water use survey responses and the quality of the data submitted. This workplan serves as a mechanism to develop better compliance tools for tracking permitted water users and to further identify key areas for improvement in data classification for each of the identified water use categories. This workplan explores ways to improve the availability, quality, compatibility and delivery of water use data collected and/or estimated by OLWR to the USGS.

## 2. BACKGROUND

### 2.1 Water Use Survey

MDEQ is the state agency charged with management of the water resources of the state. As part of that management, the OLWR started surveying public supply and industrial groundwater permit holders in 1992. The primary purpose of the survey program is to provide OLWR with the information needed to effectively manage the resources of the state and secondarily to provide information to partner agencies and the public. The survey is voluntary.

OLWR started sending out the voluntary survey in 1993 and has collected water usage for public supply and industrial groundwater wells ever since, with the exception of water usage for calendar years 2006 and 2007. The data collected through this survey are a mixture of water use read from metered usage, estimates by the respondents, and water use estimated by OLWR staff based on population (for public supply systems which do not provide their own estimate). As participation in the survey has been for the most part voluntary, the return rate of the survey has been approximately 65% in any given year. The 35% of those surveyed who do not respond to the survey are not the same 35% from year to year. Water consumption amounts do not change

drastically for most public supplies or industries from year to year. Permit holders that pump significant amounts of water, especially in areas with quantity or quality concerns, consistent non-response to the survey can lead to mandatory reporting requirement for that permit holder, which is allowed by law.

## 2.2 MRVA Metering Program

There is a long-term declining trend in water levels in the Mississippi River Valley Alluvial (MRVA) Aquifer which underlies the Delta (the northwest portion of the state, see Figure 1 for withdrawal points) and supplies the majority of water for irrigation in that region. In 2013 MDEQ, in partnership with other stakeholders in the Delta Sustainable Water Resources Task Force (DSWRTF), initiated the Delta Voluntary Metering Program to collect metered water use data in the Delta. The goal was to have fixed, mechanical flowmeters installed on 10% of the active MRVA wells permitted for each county in the Delta within 3 years and to have annual reporting of the water use from those wells by February 1, 2016, and annually thereafter. That goal was met and data are currently being analyzed.

In 2014, as part of the implementation of the MRVA metering program, OLWR developed a web-based reporting portal called the Groundwater Usage Survey Tool (GUST). GUST was developed specifically for the purpose of capturing owner/operator reported meter readings from irrigation water wells in the Delta. Annual reporting of meter readings may be submitted either through the GUST tool or by traditional methods of email, mail, or fax. For the 2015 reporting, 22% of those reporting did so using the GUST tool. MDEQ will encourage more of the reporting permit holders to use the GUST tool to submit readings as this significantly cuts down workload for OLWR staff. Reporting using GUST is also more convenient for the permit holders as they can submit their data from any device that has an internet browser and connection.

## 3. CURRENT WATER USE PROGRAM

The water use program is administered by the OLWR's Permitting, Certification, and Compliance Division for the purpose of informing permitting decisions. Data entry and analysis is primarily handled by one staff member with additional staff participating in preparing and sending out surveys and reporting forms. Additionally, partner agencies assist in the collection of metered agricultural water use reports.

There are two data collection efforts per year, a survey sent out at the beginning of the year for non-agricultural users and a metered reporting form sent to agricultural users after the end of

the growing season. A summary of each category of water-use and the status of how the data are collected can be found in Attachment I.

### 3.1 Water Use Survey

The voluntary survey is mailed out at the beginning of the year to all permitted groundwater public supplies and to industrial and other users of at least 20,000 gallons per day. The survey consists of two parts, a well owner information sheet (Figure 2) and a well data form (Figure 3).

The well owner information sheet requests updated owner/operator contact information along with aggregate population, pumpage, and sales information for the systems. As withdrawal permits are only renewed every ten years, the updated contact information received on this form assists OLWR in keeping permit contact information current. The population data are primarily useful as a way to check the quality of the pumpage and sales information submitted, but can also indicate consolidation of systems if not noted by the survey respondent. The amount of water pumped by the system is compared by OLWR staff with the amount sold both as a data check and to estimate water loss in the system.

The well data form provides a list of the recipient's permitted wells along with some basic data about the wells. It requests that the respondent correct inaccuracies and report changes, with the most common and important change being to pump rate. Updated well status indicating which wells on the system are currently active, inactive, or are no longer in service is also requested and if available, individual well pumpage information. Since withdrawal permits are issued before the well is drilled, this form also provides notice of well construction in cases where the driller did not submit a state well report upon completion of construction.

The respondent reports aggregate system total pumpage or individual well amounts. Metered pumpage and sales are requested, but estimates are accepted if that is all that is available.

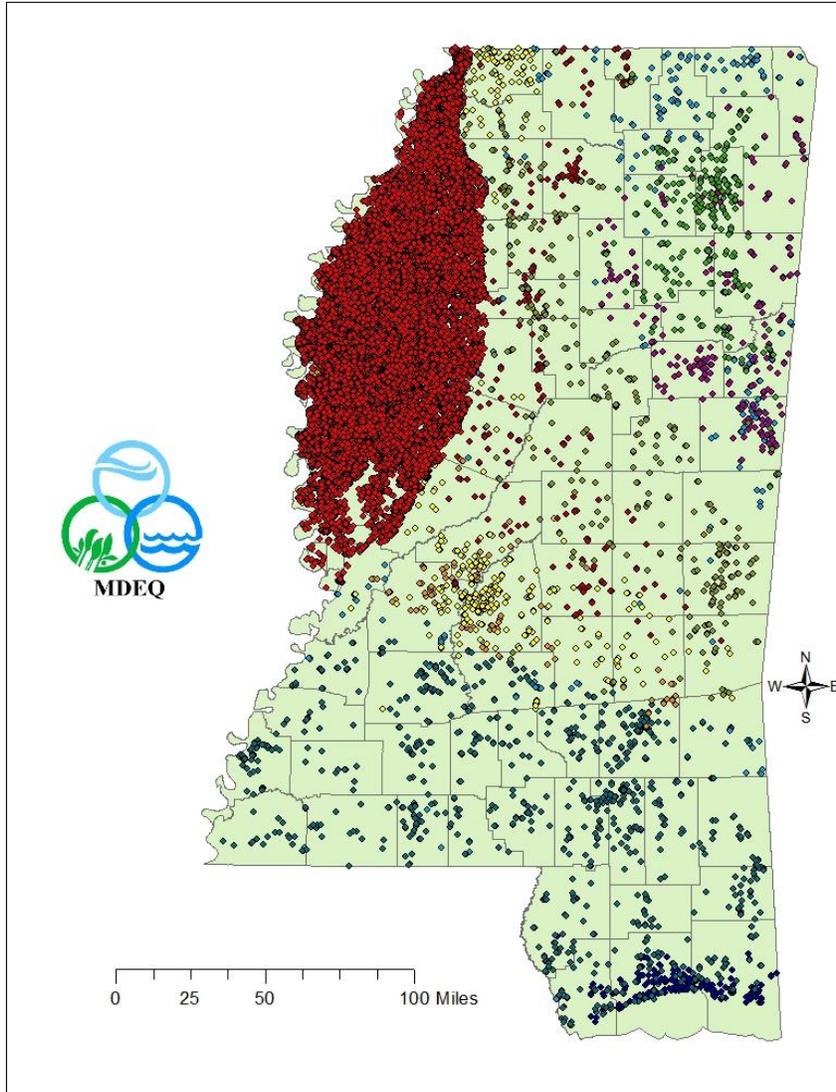
The return rate for public supply surveys is 60-65% and for industrial surveys it is 65-70%. After the initial mailing, additional attempts for participation in the survey are not made unless: a permit holder is required by permit terms and conditions to participate; they have not participated for several years; or they use a large volume of water. Additional mailings have not proven effective in the past to significantly increase the percentage of voluntary participation, and the lack of resources hinders contacting permittees individually.

All survey forms received are maintained in hard copy form in files in the OLWR's office. The data collected on the survey forms are entered into a Microsoft Access database (Figure 4), which was set up in 2008. Survey data submitted prior to 2008 exist in our paper files, but have only been entered into the current database as needed for specific projects.

Data are entered into the current database as a system total for public supplies. This is both because the majority of the pumpage is reported that way and because OLWR's primary use for the data for public supply wells is as a system total rather than as individual well pumpage amounts. For industries and other non-public supplies, individual well pumpage is entered when provided.

For public supplies, reported pumpage and sales are compared to a calculated pumpage based on the number of connections as a quality assurance check. If they vary significantly without an explanation and were reported as metered data, the survey respondent is contacted to verify the numbers and that the meters are working.

Industries and other non-potable water users typically provide only a pumpage amount. The quality assurance for these surveys is a comparison with previous years and the information provided in the permitting process. If a reported volume is anomalous without explanation, the survey respondent is contacted for more detail. Currently the data are not available for export, but MDEQ has plans to make this data available in the future.



**Figure 1: Red dots represent the permitted withdrawal wells for irrigation in the MRVA. All other dots represent other permitted water wells throughout the state.**



**WELL OWNER INFORMATION SHEET**

**PUBLIC WATER SUPPLIERS INFORMATION**

Name of Water System An Example Operator

Mailing Address \_\_\_\_\_

City \_\_\_\_\_ Zip \_\_\_\_\_ County \_\_\_\_\_

Phone \_\_\_\_\_

Water Superintendent / Operator

Name \_\_\_\_\_

Work Phone \_\_\_\_\_ Cell/Home Phone \_\_\_\_\_

System Official (Secretary / Treasurer / Mayor / City Clerk)

Name \_\_\_\_\_

Work Phone \_\_\_\_\_ Cell/Home Phone \_\_\_\_\_

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**SYSTEM INFORMATION**  
(PLEASE FILL OUT A SEPARATE PAGE FOR EACH SYSTEM)

MS Department of Health System Number 0990001

How many usable sources of water does this system have? (wells for groundwater systems, purchase points, etc.)  
Wells \_\_\_\_\_ Purchase Points \_\_\_\_\_

How many active connections are on this system? \_\_\_\_\_

How many people does this system serve? \_\_\_\_\_

How many total gallons of water did this system:

- Gallons Pumped during 2015 (Jan - Dec): \_\_\_\_\_ (gal)  Metered  Estimate

- Gallons Sold during 2015 (Jan - Dec): \_\_\_\_\_ (Gallons not dollars)

Did this system purchase water from another source during the 2015 calendar year?  Yes  No

If so, how many gallons? \_\_\_\_\_ From? \_\_\_\_\_

Name of individual completing this form: \_\_\_\_\_

Phone Number: Work \_\_\_\_\_ Cell/Home \_\_\_\_\_

**Mail to:** Mississippi Department of Environmental Quality  
Office of Land and Water Resources  
PO Box 2309, Jackson, MS 39225

**Or Fax to:** 601-961-5228

**Or Email to:** WWilliams@deq.state.ms.us

**Figure 2: Sample Well Owner Information Sheet**

Mississippi Department of Environmental Quality  
Office of Land and Water Resources  
Annual Water Use Survey

Return to:  
MDEQ - OLWR  
P.O. Box 2309  
Jackson, Ms 39225-2309

**An Example Operator**

MDEQ-OLWR Permit Number	Health Dept. Tag Number	County Name	Well Depth	Rated (GPM)	Casing Diameter	Date Drilled	Well Status And Beneficial Use	Amount Pumped in 2015
MS-GW-99998	0990001-01	Example	875	400	8	1/1/1970	<b>STANDBY PS</b> <input type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive (will never be put back in service) <input type="checkbox"/> Abandoned (plugged per MDEQ regulations)	
Do you have a local name for this well? (optional) _____								
<b>IMPORTANT:</b> If you check either Inactive or Abandoned status, this permit will expire.								
MS-GW-99999	0990001-02	Example	800	350	12	1/1/2005	<b>ACTIVE PS</b> <input type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive (will never be put back in service) <input type="checkbox"/> Abandoned (plugged per MDEQ regulations)	
Do you have a local name for this well? (optional) _____								
<b>IMPORTANT:</b> If you check either Inactive or Abandoned status, this permit will expire.								

**Please correct inaccurate or missing information in the form. Add any active wells that are not shown.**

Well Status definitions: Active - well is in use. Standby - well is maintained but only used for emergencies. Inactive - well is not maintained but is not yet plugged. Abandoned - well has been plugged per MDEQ regulations for decommissioning a well. Expired - the permit for this well is expired and must be renewed if well is still in use.

**Figure 3: Sample Well Data Form**

Permitting Water Use by System

HD System ID or Permit # 710010 System Name TISHOMINGO, TOWN OF

Primary Beneficial Use PS Primary County Tishomingo Secondary County Tertiary County Water Use required by STAC?

System Remarks TISHOMINGO GETS THEIR WATER FROM A SPRING, THEIR WELLS ARE EMERGENCY STANDBY ONLY.

Yearly Water Use Information										MGD calculated from form data		Remarks
ID	Year	Conn	Pop	Pumped	Sold	Conn MC	Pumped M	Sold M	Report MGD	Source		
710010	2015	314	800	47,450,711	15,034,500	0.094	0.130	0.041	0.130	P		
710010	2013	320	800	32,913,000	14,787,600	0.096	0.090	0.041	0.090	P		
710010	2012	323	807	45,594,000	15,465,400	0.097	0.125	0.042	0.125	P		
710010	2010	317	792	40,573,000	21,338,700	0.095	0.111	0.060	0.111	P		
710010	2009	327	817	25,849,000	16,542,500	0.098	0.071	0.045	0.071	P		
710010	2008	322	805	18,000,000	17,805,100	0.097	0.049	0.049	0.049	P	PUMPAGE IS ESTIMATE, SALES IS METERED	
710010	2005	310	775	19,200,000	17,106,100	0.093	0.053	0.047	0.053	P		
710010	2004	319	798	35,144,100	15,431,900	0.096	0.096	0.042	0.096	P		
710010	2003	315	787	34,315,060	16,056,800	0.095	0.094	0.044	0.094	P		
710010	2002	311	777	41,662,000		0.093	0.114		0.114	P		
710010	2001	306	918	44,753,900		0.092	0.123		0.123	P		
710010	2000	343	1029	49,798,000		0.103	0.136		0.136	P		
710010	1999	302	906	40,700,600		0.091	0.112		0.112	P		
710010	1998	300	900	43,849,400		0.090	0.120		0.120	P		
710010	1997			35,000,000			0.096		0.096	P		
710010	1996	738		44,280,000	14,323,337	0.221	0.121	0.039	0.121	P		
710010	1995	298	810	31,784,400	21,597,144	0.089	0.087	0.059	0.087	P		
710010	1994	300	810	31,784,400	21,597,144	0.090	0.087	0.059	0.087	P	NOTE THAT 1994 AND 1993 MATCH EXACTLY WHICH SEEMS UNLIKELY. CLOSE ENOUGH TO CONN MGD THAT I W	
710010	1993	300	810	31,784,400	21,597,144	0.090	0.087	0.059	0.087	P	NOTE THAT 1994 AND 1993 MATCH EXACTLY WHICH SEEMS UNLIKELY. CLOSE ENOUGH TO CONN MGD THAT I W	
710010	1991	300			20,062,000	0.090		0.055	0.090	C		
710010	1989	263				0.079			0.079	C		
710010	1987	280				0.084			0.084	C		
710010	1985	263				0.079			0.079	C		
710010	1984	285				0.086			0.086	C		
710010	1981	280				0.084			0.084	C		
710010	1980	280				0.084			0.084	C		
710010	1978	227				0.068			0.068	C		
710010	1974	225				0.068			0.068	C		
710010	1971	200				0.060			0.060	C		
710010	1969	200				0.060			0.060	C		
710010	1968	185				0.056			0.056	C		
710010	1967	185				0.056			0.056	C		

Figure 4: Current Access database for water use data

### 3.2 Voluntary Metering Program for Delta MRVA Wells

All the wells in the delta Voluntary Metering Program are metered. Water use report forms (Figure 5) are mailed out to participants in October and have a reporting deadline of February 1<sup>st</sup> annually. Reports may be filed either through traditional channels (mail, fax, email) or using the online GUST reporting tool (Figures 6,7, 8 & 9). All report forms are scanned and the paper copies are maintained on file in the OLWR office. Currently, 10 percent of all wells in each county report water use annually.

Location and identification information about the wells and meters are provided on the reporting form, along with blanks for reporting meter readings, crop types, and acreages. After the initial reporting year for a meter, the start reading is pre-populated on both the mailed forms and in the GUST tool with the previous year’s end reading. This is done for both quality assurance and for convenience. If the meter is replaced or repaired, this start reading is updated with the new information.

The data received are stored in a SQL database that supports the GUST web portal. Unlike the data for the public supplies and industries, the data are recorded as discrete well pumpage totals.

Once the deadline for reporting is past, a staff member exports the data for the year to Excel and uses formulas to convert all the readings to totals in acre-feet. For the first full year staff performed preliminary analysis to evaluate patterns associated with precipitation, crop type, and soil type.

The USGS receives this data from MDEQ, via an excel spreadsheet, under a cooperative agreement and uses it to prepare annual water use fact sheets. The data are also used by the USGS in development of its water use model for the Mississippi Alluvial Plain (MAP) Project as input into the model.



Mississippi Department of Environmental Quality  
Office of Land and Water Resources  
MRVA Agricultural Well Metered Water Use Report for Calendar Year 2015

For questions about this form or the information pre-printed on it, contact Wayne Williams at 601-961-5610 or Wwilliams@deq.state.ms.us

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Producer **AAA Test Farm**

Phone (555) 555-5555 Address 123 Acme St City Yazoo City

Mobile (555) 555-1214 State MS

Email test@test.com Zip 39194

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Well Data	Meter Information	Meter Readings for Calendar Year 2015	List each crop irrigated
Permit # <b>MS-GW-99998</b>	Manufacturer _____	Start Date <u>12/1/2015</u> Start Reading <u>222222</u>	Crop(s) _____ Acreage(s) _____
County <b>Sunflower</b>	Serial # _____	End Date _____ End Reading _____	
Local Well Name (optional) _____	Units meter reads in (required) <u>acre feet x .01</u>		
Sec 31 Twn 17N Rng 05W	Comments _____		
Lat 33.282557 Long -90.761496	Did you irrigate this same acreage with water from an additional well or surface water source?		
Beneficial Use(s) IR _____	___ Groundwater (from a different well) ___ Surface Water ___ Both		

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Well Data	Meter Information	Meter Readings for Calendar Year 2015	List each crop irrigated
Permit # <b>MS-GW-99999</b>	Manufacturer <u>Testing</u>	Start Date <u>1/1/2015</u> Start Reading <u>123450</u>	Crop(s) _____ Acreage(s) _____
County <b>Washington</b>	Serial # <u>12345</u>	End Date _____ End Reading _____	
Local Well Name (optional) _____	Units meter reads in (required) <u>acre feet x .001</u>		
Sec 36 Twn 17N Rng 06W	Comments _____		
Lat 33.279691 Long -90.766286	Did you irrigate this same acreage with water from an additional well or surface water source?		
Beneficial Use(s) IR _____	___ Groundwater (from a different well) ___ Surface Water ___ Both		

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Complete and return form to: MDEQ Office of Land and Water Resources, PO Box 2309, Jackson, MS 39225-2309 (Fax 601-961-5228) by February 1, 2016

**Figure 5: Sample Meter Reading Report Form**

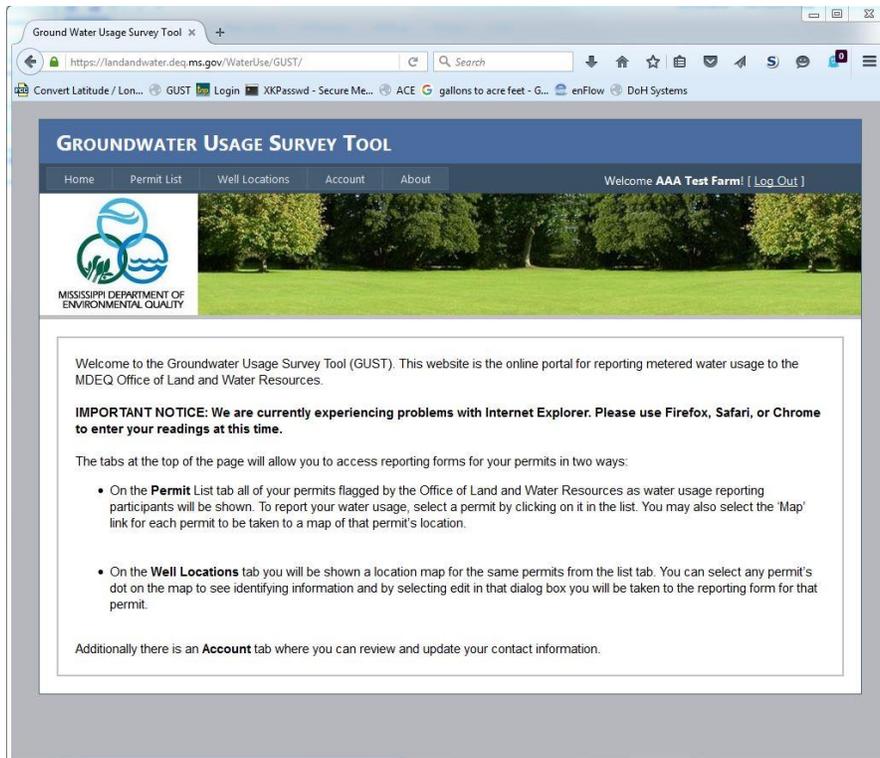


Figure 6: Login screen for meter reading reporting tool

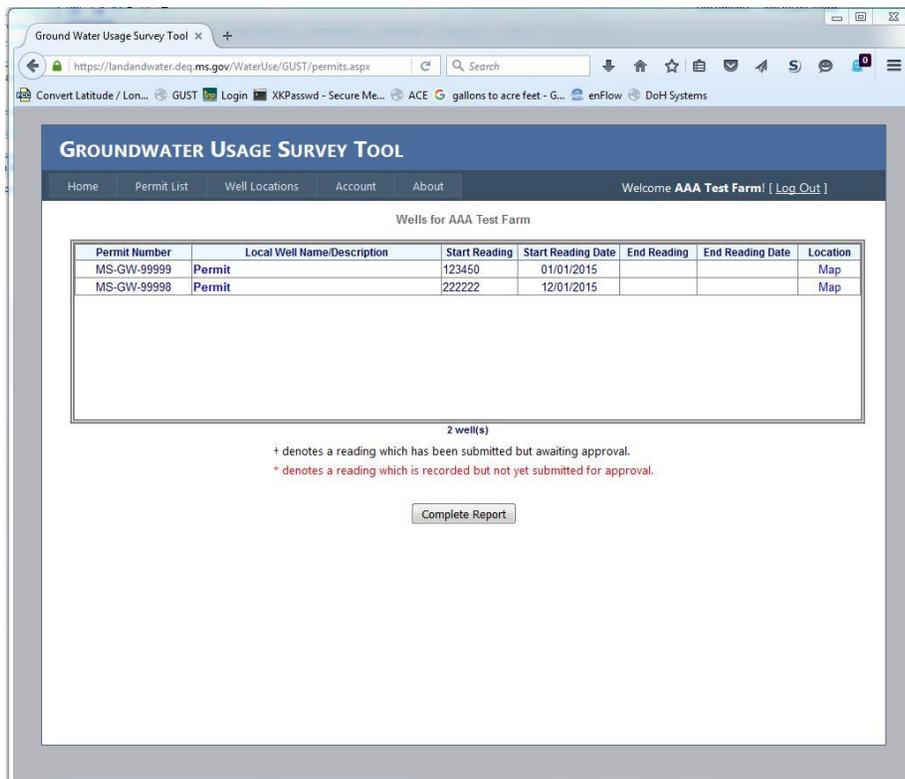


Figure 7: Permit selection tab

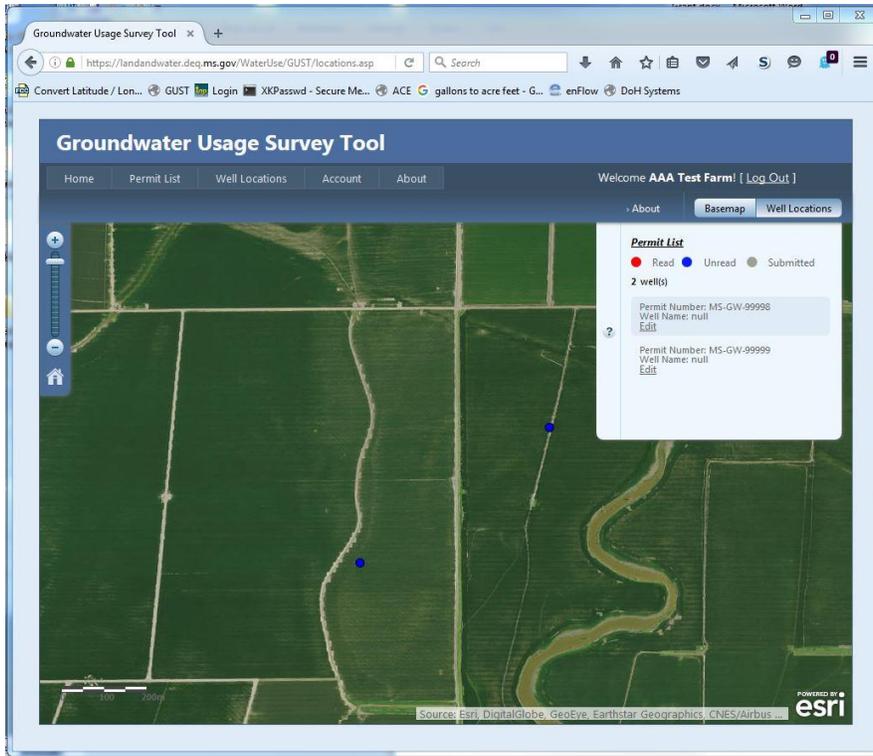


Figure 8: Permit selection from map view

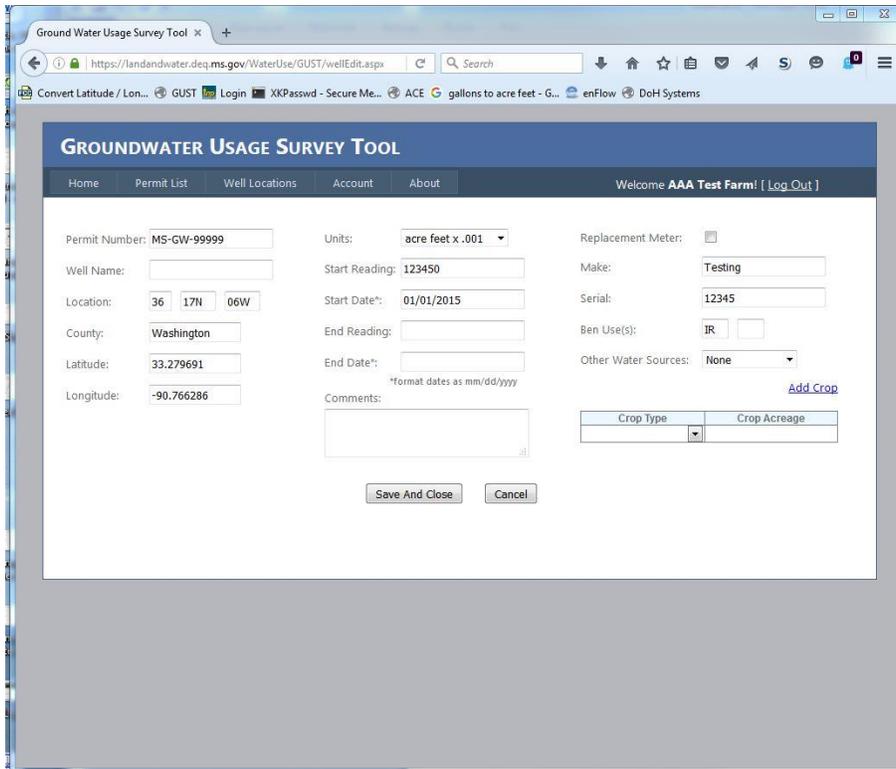


Figure 9: Reading entry screen

#### 4. PROPOSED PROGRAM IMPROVEMENTS AND EXPANSION

##### 4.1 Improving Quality, Quantity, and Consistency of Data Submitted (Medium Priority)

A significant percentage of the public supply water use data submitted through the water use survey are estimated either from population or from hours of operation. Over time MDEQ will encourage water users to install flowmeters and report actual pumpage on an individual well basis. MDEQ may also explore using permitting special terms and conditions as a tool to implement flowmeters in areas of concern or where there are gaps in data for certain aquifers/areas.

MDEQ will continue encouraging agricultural users to install meters and report pumpage. MDEQ will also work with local stakeholders in the Delta to continue education and outreach to farmers.

Because over 80% of the water use in Mississippi is groundwater, surface water usage data have not been collected for these voluntary programs. MDEQ is currently analyzing the need for voluntary surface water usage reporting, not only for each river basin, but also individual streams in order to make more informed permitting decisions.

MDEQ does not have the regulatory authority to request water-use reporting for domestic wells as they are exempt from the permitting requirement and methods of estimating domestic well water use have not been developed. Even though domestic wells do not use a large amount of water individually, there are many throughout the state. Developing a method to estimate this usage would help in understanding the total water use in each aquifer across the state. MDEQ will look to collaborate with other state, local, or federal agencies to develop or adopt estimation methods.

MDEQ is working to develop policies and database tools (GUST and enFlow improvements) that will allow tracking of compliance with permit special terms and conditions that relate to water use.

##### 4.2 Integration of the Water Use Survey and MRVA Water Use Reporting Databases with EnFlow (High Priority)

OLWR is currently engaged in the development of the OLWR enterprise database system called enFlow. EnFlow will be the primary data management system for all OLWR's water resources data management, including our water use data. Water use data are not part of the initial phase of the database development.

GUST has been available for water use reporting for two reporting cycles. An increase in reports received through the GUST online tool was observed over the first two years of implementation, and we expect the trend of increased digital reporting to continue over time. Given the success of the GUST tool for agricultural water use reporting, OLWR is proposing to expand GUST's capabilities over the next two years to allow online capture for other water use sectors, specifically:

- Industrial
- Public Supply
- Commercial
- Institutional
- Recreational

While the look and feel of the interface will remain the same, a substantial effort will have to be undertaken in creating new tables and logic to facilitate specific attributes about each type of water user. In addition, by increasing the reach and scope of data captured by GUST, the tables and code developed for the new tool will need to be incorporated into enFlow. In order to eliminate dual data entry, QA/QC, and IT support functions, the GUST backend will merge with enFlow. This effort will be considered part and parcel of upgrading water use survey capabilities for OLWR. Integration will allow sharing of all OLWR collected data with outside agencies and the public through web-based database reporting tools and representational state transfer (REST) services. Online reporting and the tracking functionalities already coded into enFlow will allow for better compliance and enforcement activities for both voluntary and mandatory water use reporting users.

In order to implement data integration and tool expansion for GUST, OLWR will employ a contractor to conduct design sessions, coding, testing, and implementation sessions for each step required for the upgrade. Likewise, OLWR staff will form a workgroup to act as a steering committee to oversee and approve each phase of development. OLWR believes online data capture, data integration and expansion of water use reporting to be the most important and pressing goals moving forward to immediately improve the existing MDEQ Water Use Program.

## 5. SUMMARY

Understanding water use is a major focus of OLWR, not only for managing the water resources of the state, but also in sustaining those resources. MDEQ has been diligent in developing the current water use program, believes in the value of the program, and will strive to further its development. This workplan will serve as a mechanism to continue the improvements needed to make the water use program a more valuable tool for the state of Mississippi.

### Attachment I: Category Status Sheet

Category	Current Data Collection Status
Public Supply	Water-use data are collected during the Annual Water-Use Survey. The respondent reports aggregate system total water-use or individual well amounts for the year. Metered water-use and sales are requested, but estimates are accepted if that is all that is available.
Industrial	Water-use data are collected during the Annual Water-Use Survey. The respondent reports aggregate system total water-use or individual well amounts for the year. Metered water-use is requested, but estimates are accepted if that is all that is available.
Irrigation – Crop	Water-use data are being collected annually in the Voluntary Metering Program (10% of all wells in each county report). The data captured are metered individual well water-use along with acreage and crop type.
Thermoelectric	Water-use data are not currently being collected for surface water withdrawals but may be added in the future.
Self-Supplied Domestic	Domestic wells are exempt from permitting requirements. No data for water-use are collected.
Irrigation – Golf Courses	Water-use data are collected during the Annual Water-Use Survey. The respondent reports aggregate system total water-use or individual well amounts for the year. Metered water-use is requested, but estimates are accepted if that is all that is available.
Livestock	Water-use data are collected during the Annual Water-Use Survey. The respondent reports aggregate system total water-use or individual well amounts for the year. Metered water-use is requested, but estimates are accepted if that is all that is available.
Mining	Water-use data are collected during the Annual Water-Use Survey. The respondent reports aggregate system total water-use or individual well amounts for the year. Metered water-use is requested, but estimates are accepted if that is all that is available.
Aquaculture	Water-use data are being collected annually in the Voluntary Metering Program (10% of all wells in each county report). The data captured are metered individual well water-use along with acreage and crop type.
Commercial	Water-use data are collected during the Annual Water-Use Survey. The respondent reports aggregate system total water-use or individual well amounts for the year. Metered water-use is requested, but estimates are accepted if that is all that is available.
Hydroelectric Power	No data are being collected for this category.
Wastewater Treatment	No data are being collected for this category.