DELIVERABLE 5.3: REPORT TO DEPARTMENT OF ECOLOGY
ESTIMATING WATER USE BY EXEMPT WELLS IN THE METHOW RIVER BASIN (WRIA 48)

FUNDED BY WASHINGTON STATE DEPARTMENT OF ECOLOGY GRANT
WRPIFA-1719-METWAF-00030

VOLUNTARY METERING PILOT PROGRAM REPORT

TECHNICAL REVIEW COMMITTEE

JUNE 14, 2022

Methow Watershed Foundation
providing funding and support to the Methow Watershed Council

Methow Watershed Council

Introduction

In 2009, Aspect Consulting prepared a *Water Use Study Plan* for the Methow Watershed Council (MWC). That plan included five recommended tasks and an optional well-metering task, with metering data to be used to verify or refine water-use estimates. The recommended tasks were completed in 2011 and documented in Aspect Consulting's *Water Withdrawal Study*. When additional funding became available for the work funded by Washington State Department of Ecology (Ecology) Grant WRPIFA-1719-MetWaF-00030 in 2019, Ecology and the MWC agreed to add a task to the grant scope and use the additional funding to conduct a pilot metering program to monitor water use by single-family residences using individual wells on qualifying parcels.

The MWC conducted a very small pilot metering program to evaluate the feasibility of installing flow meters to determine the amount of water being withdrawn by owners of qualifying parcels in WRIA 48. The purpose of the pilot program was to determine the feasibility of using metering to verify or refine water-use estimates.

As described in Amendment 2 to the grant scope, the pilot metering program task included the following components:

- Develop a work plan and protocols for the pilot program—completed and submitted to Ecology in 2019; included here as Attachment A.
- Purchase, install, and collect data from a minimum of five, and up to 12, water meters to monitor water use by single-family residences using exempt wells in WRIA 48. The installation of the initial five meters was documented in a report submitted to Ecology in 2020 and included here as Attachment B. This *Voluntary Metering Pilot Program Report* includes additional information about all 12 meters.
- Document the process of developing and implementing the program so that lessons learned can be used to develop a protocol and funding proposal for a larger metering program to estimate water use and fine-tune estimates of debits to the reserve resulting from post-Rule development of parcels, if such a program appears warranted. This report provides the required documentation, along with recommendations regarding a future larger metering program.
- Analyze and report metering data after meters have been in place for at least one full year—completed and submitted to Ecology in May, 2022 as part of the Water Use Study Work Plan (Deliverable 4.1); included here as Attachment C.

Developing and implementing the pilot metering program

The pilot metering program involved installing smart water meters at 12 single-family residences (SFRs) on parcels in unincorporated areas of WRIA 48 not served by Group A or Group B systems, to measure Single Domestic and Stock Use subject to the 1976 Methow Instream Flow Rule (Rule; 173-548 WAC). The MWC recruited volunteers who were willing to have meters installed and allow the MWC to monitor their water use. The MWC also worked with the Methow Housing Trust (MHT) to have meters installed in four new houses being built by the MHT.

Work plan

The MWC developed a work plan and protocols for the pilot metering program in 2019. That plan was submitted to Ecology and is also included here as Attachment A. Because of delays related to COVID-19 and difficulties in engaging a plumber, the meter-installation timeline was extended. The last meters were installed in April, 2022.

Meter sourcing

In 2018, the Washington State Legislature provided funding for two pilot metering programs, one in Kittitas County (WRIAs 39 and 40) and the other in Clallam County's Dungeness watershed (WRIA 18). The MWC sought information about the meters being used in those programs, including contacting Kittitas County Public Health and the Clallam Conservation District and talking with people who were working on the pilot programs to learn about the meters they were using. The MWC contacted both pilot programs' vendors (Badger Meter and Metron-Farnier), and ultimately purchased 12 Spectrum 30D residential smart water meters from Metron-Farnier.

Each meter includes an electronic register, antenna, and 10-year Verizon data plan. The electronic registers are integrated in the meter housing and upload water-use data directly to the Verizon cellular network. The meters report water withdrawn in gallons per minute (GPM) via the Verizon network. Data are available to the MWC through a secure online utility portal (WaterScope). Individuals whose water use is being metered can set up accounts and view their own use through a customer portal; they can also monitor use with an app that includes leak notification capability.

Because the meters communicate with the Verizon network, each meter must be able to connect with a Verizon cell tower. The MWC recognized that that would limit participation in the program—not all locations in the Methow Valley have reliable cell reception.

Qualifying volunteers

The Technical Review Committee decided not to seek a geographic sampling of volunteers or collect information about factors such as number of residents, seasonal *vs*. year-round use of property, and types of outdoor water use.

Volunteers were qualified to participate if they lived in a single-family residence in an unincorporated area of WRIA 48 not served by a Group A or Group B water system, and completed and returned a volunteer information form. The form includes an acknowledgment that the MWC will install a water meter and collect metering data for the purpose of estimating indoor and outdoor use of water subject to the Rule.

Program implementation

Pilot program phases

The pilot program included two phases, Pilot 1 and Pilot 2. The Pilot 1 phase included five meters. The Technical Review Committee elected to start with a small number of meters since the cost of installing the meters was not known. Following installation of the Pilot 1 meters, the MWC purchased additional meters and engaged a plumber to install them.

In the Pilot 1 phase, one meter was installed in 2019 and the remaining four were installed in 2020. The initial meter was installed by a member of the MWC's Technical Review Committee, to identify installation needs and any challenges that might be involved. The remaining four meters were installed in new houses being built by the MHT, by a plumber engaged by the MHT's building contractor. Both building construction and meter installation were delayed by COVID-19.

The Pilot 2 phase entailed installing seven meters at existing residences. Installation dates ranged from February, 2021-April, 2022. All of the Pilot 2 meters were installed by a plumber engaged by the MWC, and installation was staggered to ensure adequate funds would be available for installation. Ten of the

12 meters have now operated through at least one peak-use period. As will be discussed below, installing meters at existing residences proved far more challenging than placing them in new houses under construction.

Recruiting volunteers

The MWC began to recruit volunteers to have meters installed during a series of public outreach meetings held in April and May, 2019. The MWC also used a variety of other means to publicize the metering program and recruit volunteers, including posting information and a metering volunteer form on its web site, creating inserts that were placed in Okanogan County building permit packages, sending a news release to the *Methow Valley News*, and word of mouth.

Ultimately, about 50 households expressed interest in having meters installed and 18 completed and returned volunteer information forms.

Meter installation

The MWC arranged for the plumber to visit nine households that were among the first to return volunteer information forms, to evaluate the feasibility of installing meters. Installing meters at three of those locations proved infeasible (see "Lessons learned," below). One household opted out. Meters were installed at the remaining five sites in February and July, 2021. As noted above, installation dates were staggered because the cost of installing each meter was hard to predict. The last two meters were installed in April, 2022. The plumber's schedule was responsible for the long delay.

Lessons learned

The Technical Review Committee chose to have most of the meters installed by plumbers. The project was delayed for some time by difficulty in finding a plumber able to complete the work, reflecting a widespread lack of skilled tradespeople that is magnified in the isolated, rural Methow Valley community, and became even more pronounced during the COVID-19 pandemic. The Methow Valley "zoom town" phenomenon, which attracted many remote workers to the valley during the pandemic, created even more pressure on local tradespeople. Ultimately, the MWC engaged a plumber from Okanogan.

All metering systems had to be installed at locations from which a signal could be transmitted to the Verizon cell network. Because cell coverage is not universal in the Methow Valley, the plumber checked for a cell signal in the place where the antenna would be located.

The greatest challenge was installing meters in existing water systems during the Pilot 2 phase. Careful planning, including site visits, was needed. Estimating costs was difficult for a couple of reasons: each situation was unique, and working with smart meters was new to the plumber. The MWC needed to work closely with both the meter manufacturer's representative and the plumber. The MWC was fortunate in engaging a plumber who was very easygoing and easy to work with. Nevertheless, clear communication was important to the program's success.

Ideally, each meter would be placed between the well and the first location at which water was diverted from the line. Some systems include a diversion close to the well for outdoor water use, and when that diversion was buried, it wasn't possible to install a meter upstream of the diversion without excavating.

Some wells were located in outdoor vaults. Ideally, the meter would be located in the vault, where it could measure water withdrawn from the well before any diversion. Installing meters in vaults with existing plumbing presented a number of challenges:

- The size of the vault and the configuration of pipes and other components of the water delivery system within the vault. In two cases, meters could not be installed because of vault size and configuration
- Antenna placement. To successfully install a metering system in a vault, the concrete vault lid needs to be drilled to accommodate the antenna that transmits meter readings to the cell network.
- Freezing hazard—meters must be drained or removed before cold weather if there is a danger that they will freeze. One vault had a history of frozen pipes, and access to drain or remove the meter each year would have been difficult.

Where no water was diverted between the well and the house (or, in one case, an insulated outbuilding), and assuming no leaks in the line between meter and house, a meter placed in the house could measure all of the water withdrawn. In some cases, the homeowner did not know whether there was a diversion between the well and the house. In one case, the diversion was for a hydrant that had been used only during construction of the house and was not expected to contribute to the total quantity of water withdrawn.

Where the meter was placed indoors, it was at times difficult to know how and where to fit it into the water system due to cramped quarters and multiple water-treatment components.

The Technical Review Committee's meter-installation approach was to use a small pilot program to discover the requirements for installation of SFR meters by actually installing 12 meters in the residences of the first 12 volunteers. During that process the following items of concern became clear:

1. Additional funding would be required to scientifically define the number of meters in each reach to meet the "statistically viable use number."
2. The conversation that Okanogan County and the Technical Review Committee have had with the Methow community about SFR meter installation revealed serious concerns. Some landowners made outright "not in my house" comments.
3. Cost of SFR meter installation ranged from under $300 to over $500 per meter, depending on the complexity of the installation and other factors that influenced the amount of time and cost of supplies required. In addition, the plumber's per-hour rate increased in the course of the program. Currently, a cost estimate of $850.00 per meter for equipment purchase and installation would be appropriate for budgeting purposes. However, that amount would need to be re-evaluated if additional meters were to be installed. Costs of both materials and labor have increased significantly since the program started, partly as a result of COVID-19, and may continue to fluctuate. The cost of meter acquisition and installation, data collection and analysis, and program administration for enough meters to develop a statistically-viable water-use number would be significant.
4. The Technical Review Committee's estimate of the amount of time that would be required to compute a "scientifically-viable use number" would be in excess of five years after the last meter was installed.

5. Providing the Methow community and Okanogan County with a scientifically-sound consumptive-use number that is valid throughout WRIA 48 is necessary to allow additional SFR development in WRIA 48 in accordance with the Rule, and to support long-range planning.
6. Aspect Consulting's recommendation to use a single "gallons per day" (GPD) value throughout WRIA 48 may provide that scientifically-justifiable SFR consumptive-use number if peer review upholds the recommendation.

Data analysis

The number of meters installed during the pilot program is not sufficient to establish a statistically-valid consumptive-use quantity. However, the data provided enough insight into Single Domestic and Stock Use patterns for the MWC to conclude that further metering would not be valuable or cost-effective as a means to validate or refine the consumptive-use estimate.

The MWC received an interim report on the pilot metering program from its Technical Review Committee during the October, 2021 MWC meeting. A motion "To end the Metering project and to complete Task 4 keeping the Single Domestic and Stock Use number of 710 gpd and updating with best available science" passed.

Existing meters will stay in place, and the MWC and interested landowners will be able to monitor the data until the 10-year Verizon plan associated with each meter expires in 2029 or 2030.

Metron-Farnier's WaterScope data collection and analysis program allows users to tag different values (GPM)/time (minutes) as leak, irrigation, broken pipe, etc. A detailed discussion of those parameters has not been included herein as the MWC's May 19, 2022 Water Use Study Work Plan (submitted to Ecology as grant WRPIFA-1719-MetWaF-00030 Deliverable 4.1) recommends discontinuing SFR meter installation.

A copy of the *Annual Report of Individual Meters 5-12-2021 through 5-11-2022* is attached in Attachment C as an example of the data collected.

Recommendations

The MWC recommends against developing a larger metering program to estimate water use and fine-tune estimates of debits to the reserve resulting from post-Rule development of parcels.

As noted above, Aspect Consulting's *Water Withdrawal Study* recommended using a single value throughout WRIA 48 for peak month consumptive use of 710 gallons per day (GPD) to account for Single Domestic and Stock Use in administering the reservation. The MWC agrees with that recommendation. To validate the recommendation, the MWC has recommended that Ecology sponsor a peer review of the *Water Withdrawal Study*. The MWC does not recommend further refinement of the 710 GPD estimate unless independent review of the *Water Withdrawal Study* concludes that the estimate is not valid.

ATTACHMENT A

Methow Watershed Council 2020 Voluntary Metering Pilot Program

Work Plan and Protocols

The Methow Watershed Council's (MWC's) 2020 Voluntary Metering Pilot Program is part of a project aimed at refining existing estimates of total withdrawal and consumptive water use on developable parcels in the Methow Basin (WRIA 48). The purpose of the Pilot Program is to:

- Establish preliminary estimates of water use by single-family residences using exempt wells in WRIA 48
- Determine whether a larger metering program to estimate water use and fine-tune estimates of debits to the reserve resulting from post-Rule development of parcels is feasible and support statistically-valid refinement of existing estimates
- Inform development of a protocol and funding proposal for such a metering program if warranted. In particular, we want to identify any potential obstacles that might hinder a basin-scale metering program, learn how acceptable metering is to landowners, and develop sound procedures that will equip us to manage such a program efficiently and effectively.

Developing estimates of total withdrawal and indoor and outdoor use is a high-priority issue identified in the *Methow Basin (WRIA 48) Watershed Plan* (Methow Basin Planning Unit, 2005) and the *Final Detailed Implementation Plan* (Methow Watershed Council, 2009). Those estimates will define the allocation of the reservation established by the Instream Flow Rule (Rule) for the Methow River, allowing land use and natural resource planners and managers to prepare to meet multiple long-range objectives.

The current estimate of total and consumptive water use on buildable parcels in the Methow Basin was established in with the 2011 *Water Withdrawal Study* (Study) for WRIA 48, at 710 gallons per day (GPD). The Study includes background information and supporting data.

The MWC will install 12 Metron-Farnier smart water meters on exempt wells belonging to landowners who volunteer to participate in the Pilot Program. We will measure the total amount of water withdrawn from each well in order to establish preliminary estimates of water use by single-family residences. The cost of each meter includes a 10-year Verizon plan, which will allow the meter to connect to the existing cell phone infrastructure. Individual daily well data will be uploaded automatically via the cell network and will be available to the MWC through Water Scope, Metron-Farnier's secure portal.

The MWC will also recruit additional landowners interested in having meters installed, in order to determine interest and establish a pool of volunteers for a future basin-scale metering program. We expect that establishing a list of interested landowners will also serve to document local support for the program and assist the MWC in developing funding for a larger metering program.

Finally, the MWC will monitor the data collected by the meters to assess our assumptions about indoor *vs*. outdoor water use.

Timeline: We expect to have all of the Pilot Program meters (12) installed by the end of February, 2020. We will continue to analyze and evaluate results as data become available during 2020 and 2021.

Ongoing data collection and analysis will be reviewed regularly with Ecology in order to meet project goals. The MWC will submit a report documenting the Pilot Program to Ecology by June 30, 2021.

Protocols

Water use data to be collected

As noted above, the MWC will measure the total amount of water withdrawn from each volunteer landowner's well. Withdrawal is measured continuously and reported in five-minute increments. Metron-Farnier's Water Scope portal displays water-use data and analytics. The fine-scale reporting will allow the MWC to differentiate between indoor and outdoor use and analyze water-use data to determine quantities associated with each type of use. Water Scope will analyze flow rates and report use as "indoor" or "irrigation" based on a flow rate defined by the MWC. Currently, any use less than 5 gallons per minute (GPM) is reported as indoor use. Use measured at 5 GPM or greater is recorded as irrigation use. Water Scope will allow the MWC to adjust the indoor *vs*. irrigation use threshold as needed. Sample analysis reports are attached.

Information to be collected about the single-family residence being metered

- The Pilot Program is seeking a single figure for water use throughout WRIA 48. We do not intend to correlate details about individual SFRs with rates of water use and will not collect information such as parcel acreage, whether the parcel has irrigation water available, number of individuals living in the house, whether or not the occupants live there year-round, or house size.
- We will collect basic identifying and contact information: landowner name, physical and mailing addresses, tax parcel number, phone number, and email address.
- We will ask whether the parcel is part of a water system (e.g., Edelweiss, McKinney Ridge).
- We will ask each volunteer to sign an acknowledgement stating the landowner(s) understand that MWC will install a water meter and collect metering data. A preliminary volunteer information form is attached.

Attachments

- Sample water-use analysis reports
- Volunteer recruitment flier (being distributed with Okanogan County building permit packets; offered at 2019 "Water 2066" community meetings)
- Volunteer information form

ATTACHMENT B

Methow Watershed Foundation
Voluntary Metering Pilot Program
Pilot 1 Meter Installation Report

June 25, 2020

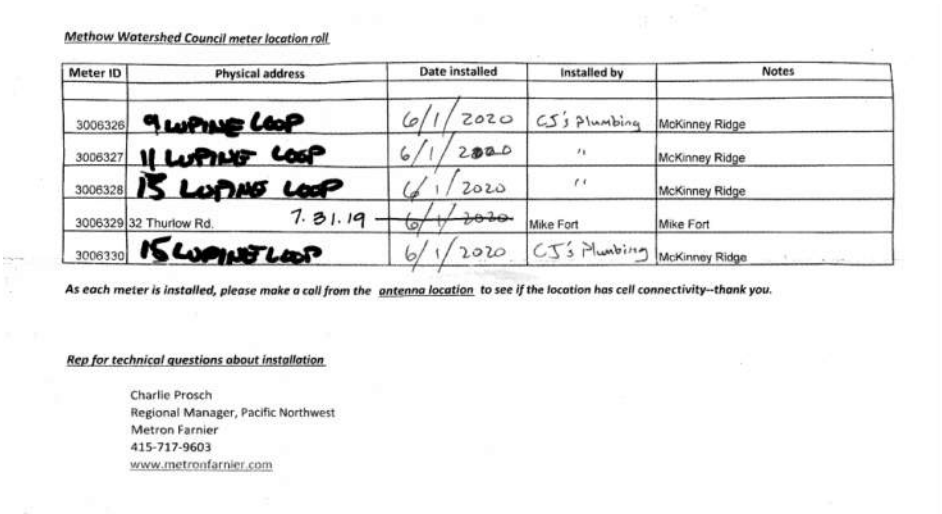
This report has been written to accompany the Methow Watershed Foundation's documentation that five smart water meters have been installed at single-family residences using exempt wells in WRIA 48.

The amended scope of work for Agreement No. WRPIFA-1719-MetWaF-00030 specifies that the Methow Watershed Foundation (MWF) will purchase, install, and collect data from a minimum of five, and up to 12, water meters to monitor water use by single-family residences using exempt wells in WRIA 48. Deliverable 5.2 is described as "Documentation that 5 to 12 smart water meters were installed at single-family residences using exempt wells in WRIA 48."

In late 2019 and early 2020, the MWF purchased 12 Spectrum S30D residential meters from Metron-Farnier. The meters include electronic registers, antennas, and 10-year Verizon subscriptions; water-use data are automatically uploaded to Metron-Farnier's Water Scope portal via Verizon's cell-tower network.

As of June 1, 2020, the MWF has installed five of those meters at single-family residences using exempt wells in WRIA 48 as part of the MWF's Voluntary Metering Pilot Program. To document installation of those meters, the MWF is submitting the following with this report:

- Meter location roll showing the meter ID, location, installation date, and installer of each meter that has been installed to date
- Screen shots from the Water Scope portal showing current water-use data for each meter



Methow Watershed Council meter location roll

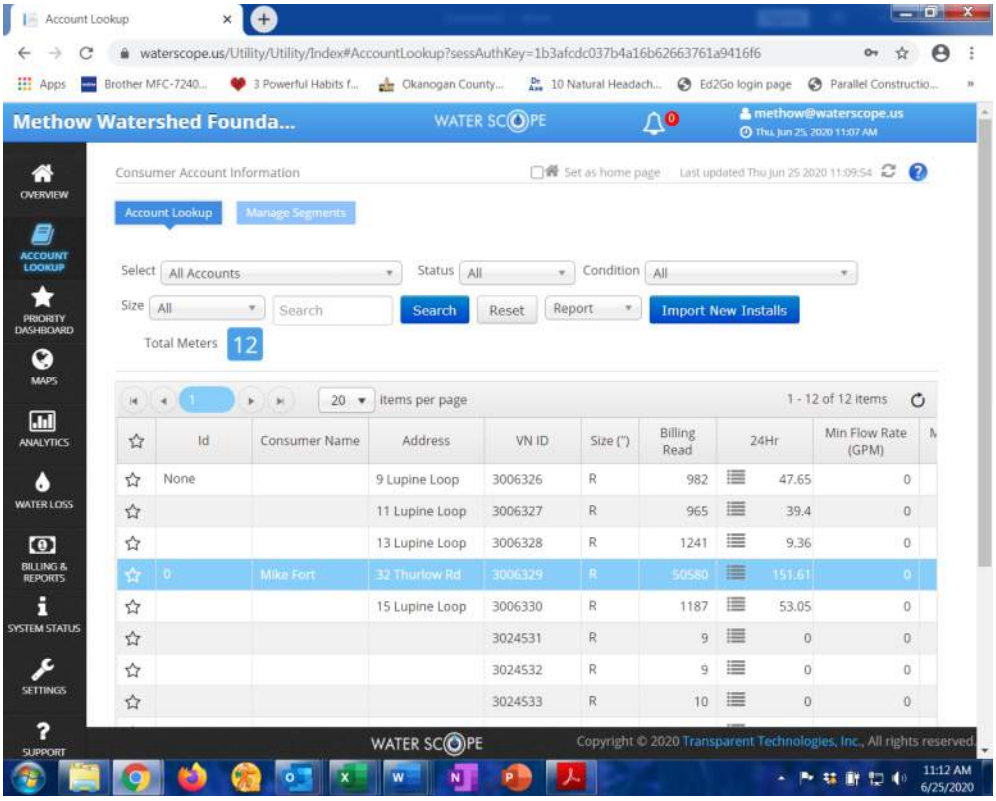
Meter ID	Physical address	Date installed	Installed by	Notes
3006326	9 LUPINE LOOP	6/1/2020	CJ's Plumbing	McKinney Ridge
3006327	11 LUPINE LOOP	6/1/2020	"	McKinney Ridge
3006328	15 LUPINE LOOP	6/1/2020	"	McKinney Ridge
3006329	32 Thurlow Rd. 7.31.19	~~6/1/2020~~	Mike Fort	Mike Fort
3006330	15 LUPINE LOOP	6/1/2020	CJ's Plumbing	McKinney Ridge

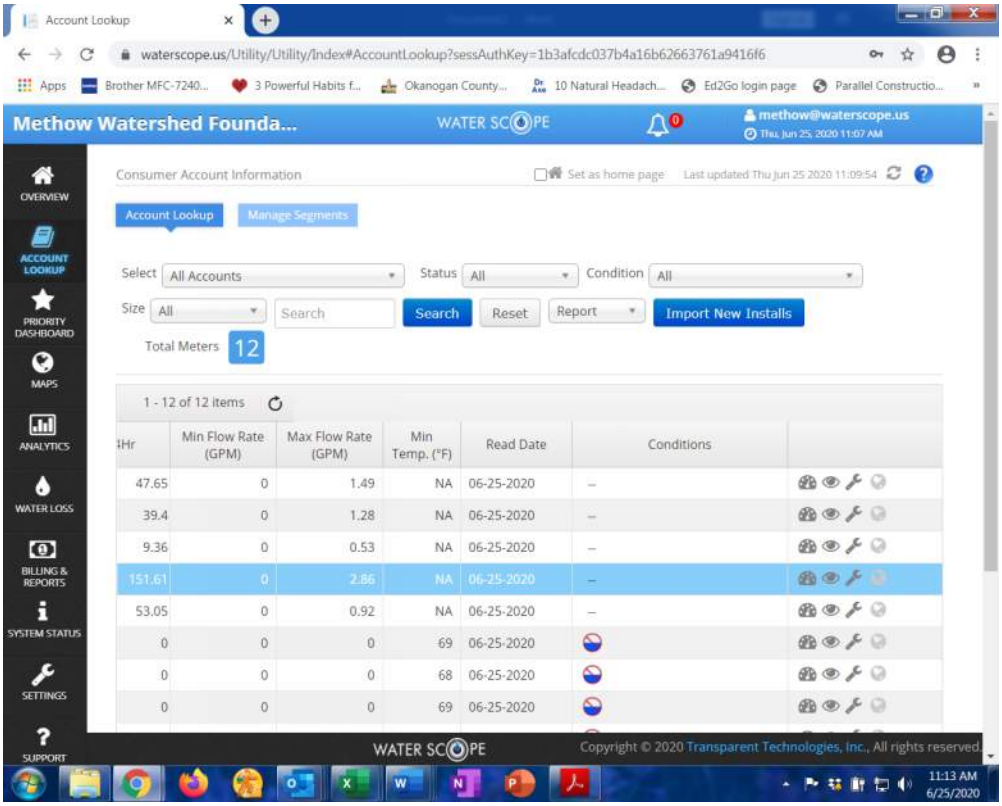
As each meter is installed, please make a call from the antenna location to see if the location has cell connectivity--thank you.

Rep for technical questions about installation

Charlie Prosch
Regional Manager, Pacific Northwest
Metron Farnier
415-717-9603
www.metronfarnier.com

Methow Watershed Foundation_Water Scope screen shots_06.25.20

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OVERVIEW
ACCOUNT LOOKUP
PRIORITY DASHBOARD
MAPS
ANALYTICS
WATER LOSS
BILLING & REPORTS
SYSTEM STATUS
SETTINGS
SUPPORT
Consumer Account Information
Set as home page
Last updated Thu Jun 25 2020 11:09:54
Account Lookup
Manage Segments
Select All Accounts
Status All
Condition All
Size All
Search
Search
Reset
Report
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Hr | Min Flow Rate (GPM) | Max Flow Rate (GPM) | Min Temp. (°F) | Read Date | Conditions
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39.4 | 0 | 1.28 | NA | 06-25-2020
9.36 | 0 | 0.53 | NA | 06-25-2020
151.61 | 0 | 2.86 | NA | 06-25-2020
53.05 | 0 | 0.92 | NA | 06-25-2020
0 | 0 | 0 | 69 | 06-25-2020
0 | 0 | 0 | 68 | 06-25-2020
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WATER SCOPE
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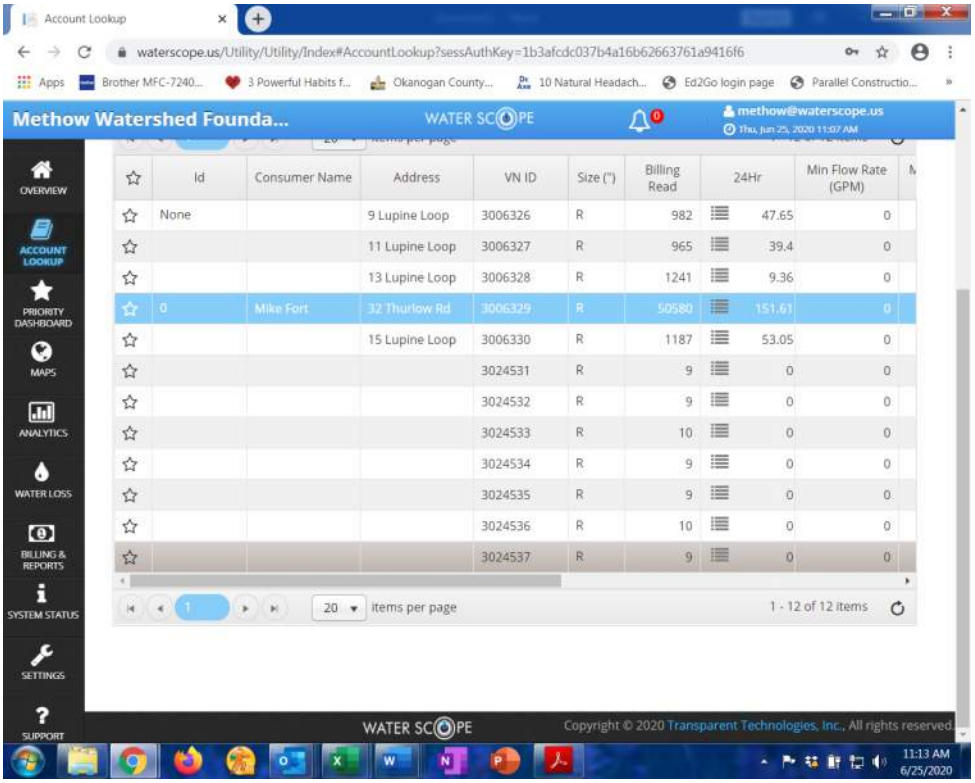
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OVERVIEW
ACCOUNT LOOKUP
PRIORITY DASHBOARD
MAPS
ANALYTICS
WATER LOSS
BILLING & REPORTS
SYSTEM STATUS
SETTINGS
SUPPORT
Id | Consumer Name | Address | VN ID | Size (") | Billing Read | 24Hr | Min Flow Rate (GPM)
None | 9 Lupine Loop | 3006326 | R | 982 | 47.65 | 0
11 Lupine Loop | 3006327 | R | 965 | 39.4 | 0
13 Lupine Loop | 3006328 | R | 1241 | 9.36 | 0
0 | Mike Fort | 32 Thurlow Rd | 3006329 | R | 50580 | 151.61 | 0
15 Lupine Loop | 3006330 | R | 1187 | 53.05 | 0
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WATER SCOPE
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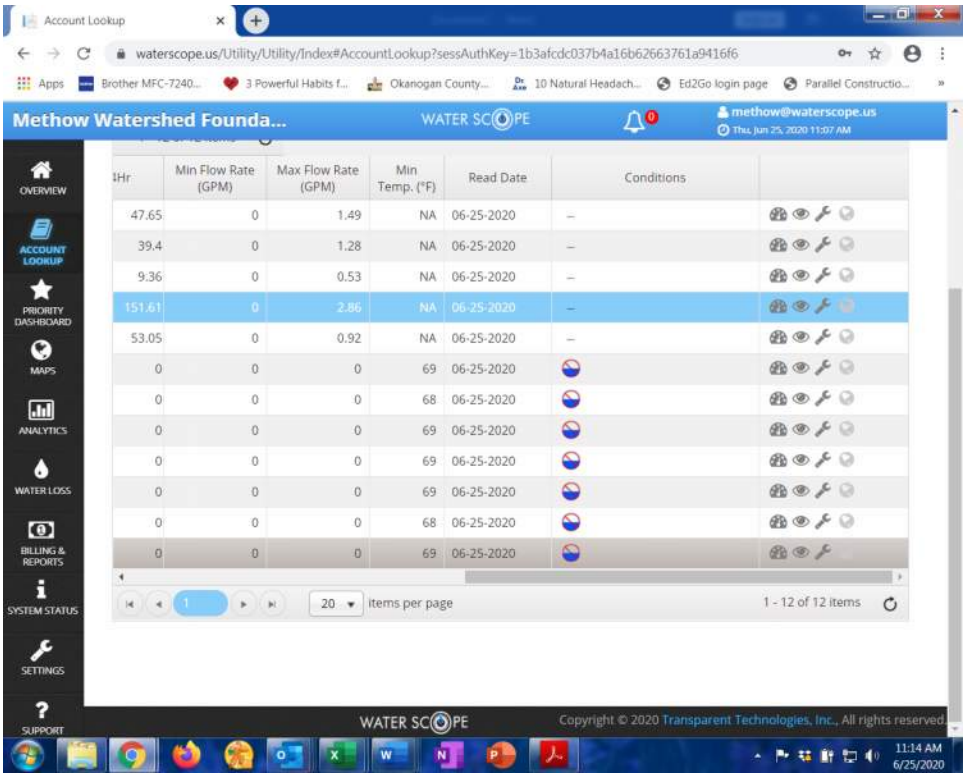
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SUPPORT
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47.65 | 0 | 1.49 | NA | 06-25-2020 | –
39.4 | 0 | 1.28 | NA | 06-25-2020 | –
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