

April 26, 2019

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Reply to: Irvine Office  
File No: 7588-122439

**VIA EMAIL**

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Geoff Poole  
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Borrego Water District  
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**RE: AAWARE REQUEST FOR GROUNDWATER SUSTAINABILITY AGENCY  
APPROVAL OF METER SYSTEM**

Dear Messrs. Bennett and Poole:

We represent the Agricultural Alliance for Water and Resource Education (“AAWARE”). AAWARE’s members comprise the majority of the agricultural property owners in Borrego Valley. By this letter, we ask that the Borrego Valley Groundwater Sustainability Agency approve acceptable propeller meter systems so that the AAWARE members can make plans to install groundwater production meters, and not have to wait until Groundwater Sustainability Plan approval to do so.

Enclosed is information on the SWIIM well meter system that Mike Seley of AAWARE has discussed with Geoff Poole. Benefits of the SWIIM meter system include significant cost savings by:

- Eliminating the need for manual, monthly readings of groundwater production (the meter system provides real time data by cellular transmission, or if cellular is interrupted, by radio transmission); and
- Eliminating the need for semi-annual calibration verification and annual meter accuracy checks. Under the service agreement, each flow meter is regularly checked for accuracy. The maintenance schedule also includes technician visits to each site at least every four to six weeks. In addition to maintaining the telemetry and solar charging systems during these visits, technicians perform visual inspections of flow meters to ensure there are no erratic or unreasonable flow readings, blank LCDs, or damaged registers.

Borrego Valley GSA  
c/o Mr. Jim Bennett & Mr. Geoff Poole  
April 26, 2019  
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We are additionally awaiting information on the similar McCrometer meter system and service agreement. Enclosed is information from the McCrometer web site about their meters and reporting technology.

Please let us know as soon as possible whether the SWIIM or McCrometer meters, along with their data collection and reporting systems, and their calibration systems, are approved as acceptable metering systems. Please also let us know whether there are any other meter systems acceptable to the GSA.

Sincerely,



Michele A. Staples

Enclosures: SWIIM and McCrometer systems information

cc: Jim Seley, AAWARE\*  
Mike Seley, AAWARE\*  
Jack McGrory, AAWARE\*  
Boyd L. Hill, Esq., for AAWARE\*  
\*by email only



You can't protect what you don't quantify  
and you can't manage what you don't measure.



On-Farm Water Accounting





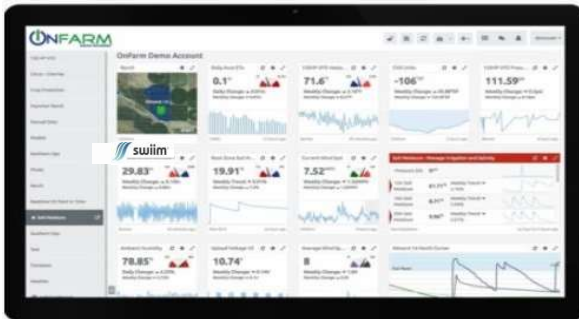
1. Introduction
2. Case Studies
3. How SWIIM Works
4. Delivery & Water Balance Reports
5. Remote Sensing & Software
6. Questions & Discussion



# Introduction: SWIIM Overview

A full service, **turn-key solution** that produces a very accurate on-farm water budget. It provides cost-effective, field- or crop-level, actionable data. It includes a software suite that enables agricultural water users to plan, manage and optimize crop water use through the use of sensors, data loggers, telemetry and remote sensing via satellite.

OnFarm  
Software Dashboard



Instrumentation  
Full-service installation & maintenance



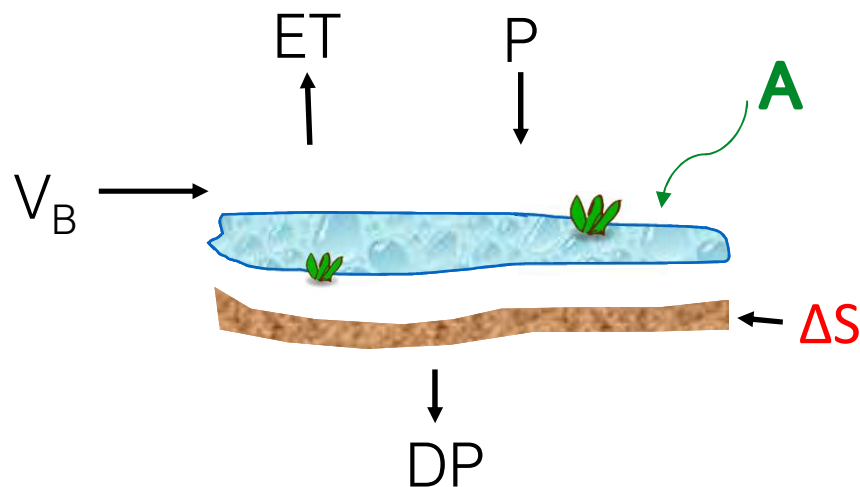
Remote Sensing  
ET data with satellite images





## How SWIIM Works

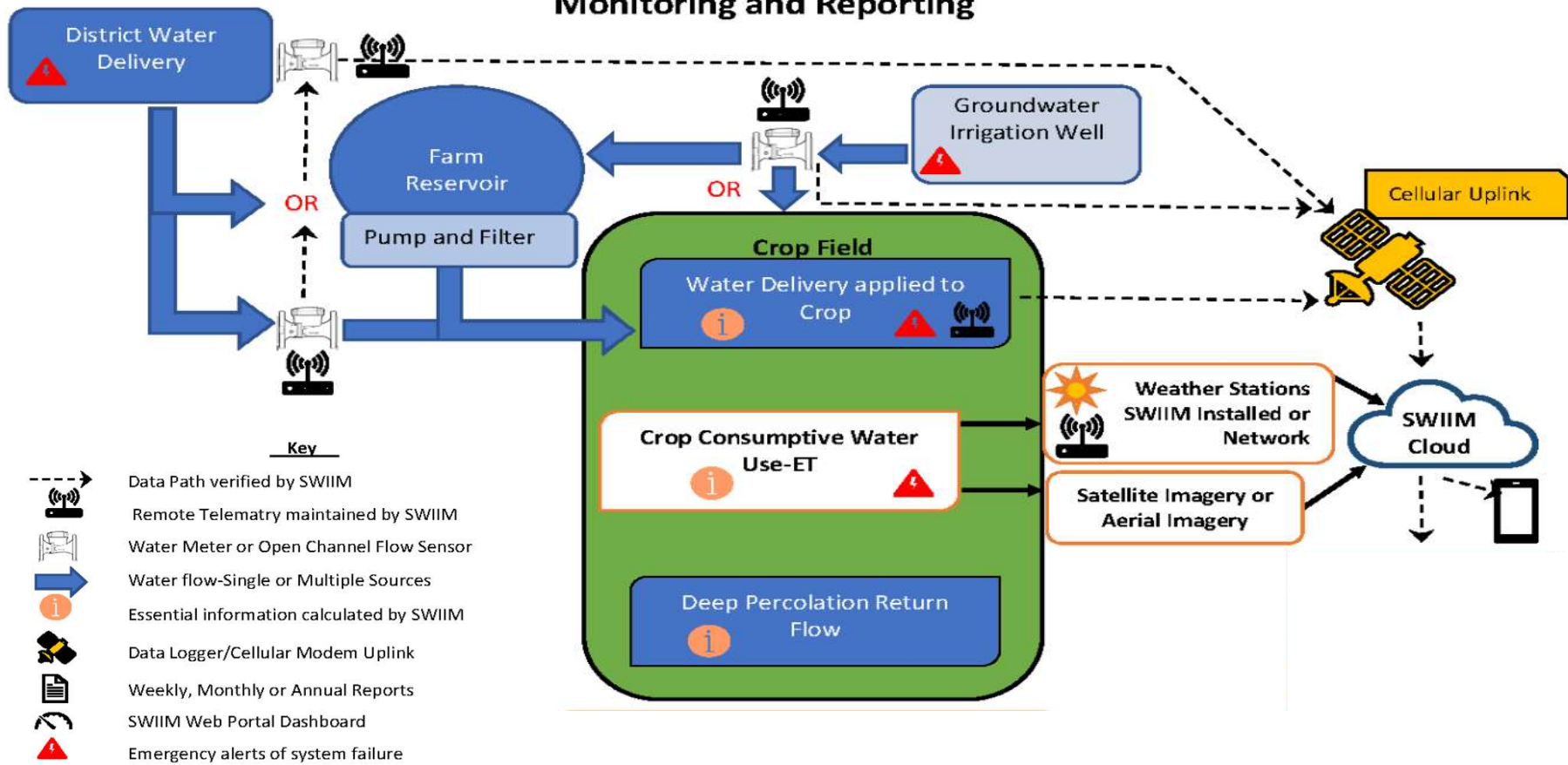
# Daily Ledger Water Balance Approach



- $i$  = 1, n where n is number of days of recharge
- DP = deep percolation below the root zone
- $V_B$  = daily inflow (measured) =  $Q_B * t$
- $\Delta S$  = volumetric change in soil moisture storage (assumed zero over water balance period)
- ET = evapotranspiration (from weather station data calibrated with regular remote sensing)
- P = precipitation (measured)
- A = average surface water area
- $d_w$  = average depth of water

For each day,  $i$ :  $DP_i * A_i = V_{Bi} + (P_i - ET_i) * A_i \pm \Delta S \pm \Delta d_w * A_i$

## SWIIM SYSTEM Monitoring and Reporting







# Equipment in the Field



Reservoir Water Balance



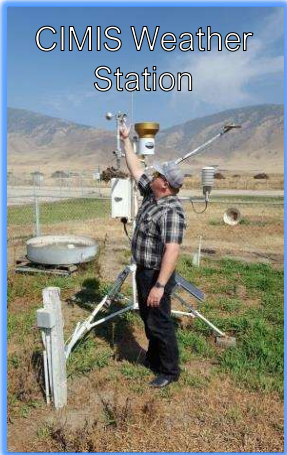
Closed Conduit Flow Monitoring



District Turn-out (recently approved)

## Telemetry Interface for Equipment Configuration and Maintenance

-IF-301...	
#	
Num Display	Status Historic Cust Collect
Timestamp	4/26/17 19:43:55
GPP1	3.184
PPAF1	0
CFPerPulse1	0.425639
GPP2	0
PPAF2	0
CFPerPulse2	1
MeasuredValues	
BattV	12.6734 Volts
Pulse1_cnt	102 Count
Pulse2_cnt	0 Count
Flow1_cfs	2.89434 cfs
Flow2_cfs	0 cfs
StatusData	
PulseCnt1_Tot	1,227



CIMIS Weather Station



SWIIM Weather Station



Open Channel Flow Monitoring (not used on this deployment but is available)



## Reports & Technical Data



# Delivery & Water Balance Reports

## Deliveries



Date Range: 1/1/2017 - 11/25/2017

Farm Name: [Redacted]  
 Client Name: [Redacted]  
 County: Kern  
 Notes: Provisional Data

### Cost/Value of Water/Source (\$/af)

Field Name	Price Of Water
Reservoir Inflow	\$150
Reservoir Inflow	\$150
Reservoir Inflow	\$150
Reservoir Inflow	\$150
Inflow	\$150
Inflow	\$150
Inflow	\$150

### Monthly Summary



Created by SWIIM Manager - 11/26/2017

Page 1 of 3

## Water Balance Full Report



Description: [Redacted]  
 Date Range: 2/15/2017 - 11/26/2017

### Farm Summary

Farm Name: [Redacted]  
 Client Name: [Redacted]  
 County: Kern  
 Notes: Provisional Data

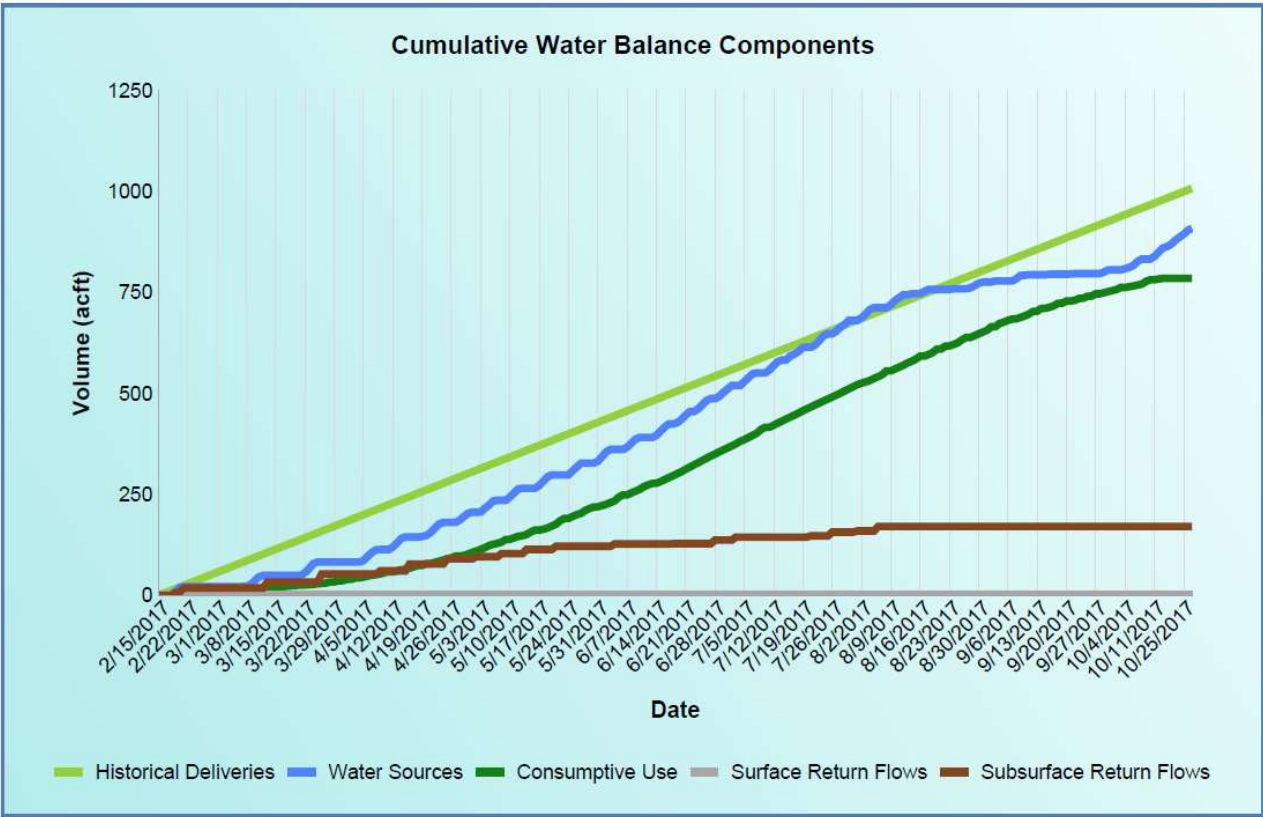
### Field Summary

Description	Size (ac)	Crop	Planting Date	Harvest Date	Soil Type	Irrigation Method	Energy Source	CU (af)
2017	40.00	Almond	2/15/2017		Sandy Loam	Micro Spray	Electricity	136.01
2017	40.00	Almond	2/15/2017		Sandy Loam	Micro Spray	Electricity	136.01
2017	38.00	Almond	2/15/2017		Sandy Loam	Micro Spray	Electricity	129.21
2017	36.00	Almond	2/15/2017		Sandy Loam	Micro Spray	Electricity	122.41
2017	77.00	Almond	2/15/2017		Sandy Loam	Micro Spray	Electricity	261.82
<b>Totals:</b>	<b>231.00</b>							<b>785.46</b>

### Water Balance

Reporting Period Component	Depth (ft)	Volume (acft)	Value (\$)
Beginning Soil Water Deficit	0	0	0
Irrigation Deliveries	3.78	872.81	\$130,922.01
Effective Rainfall	0.16	36.33	\$5,448.90
Crop Water Use	-3.40	-785.46	\$117,818.47
Surface/Subsurface Runoff	-0.74	-170.79	\$25,617.84
<b>Current Soil Water Deficit</b>	<b>0.20</b>	<b>47.10</b>	<b>\$7,065.41</b>

# Cumulative Daily Water Balance



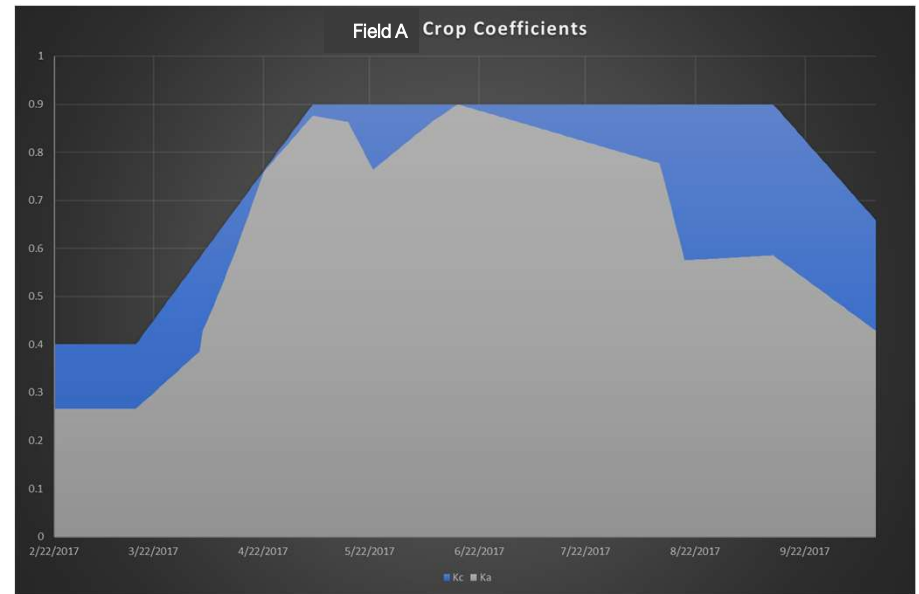
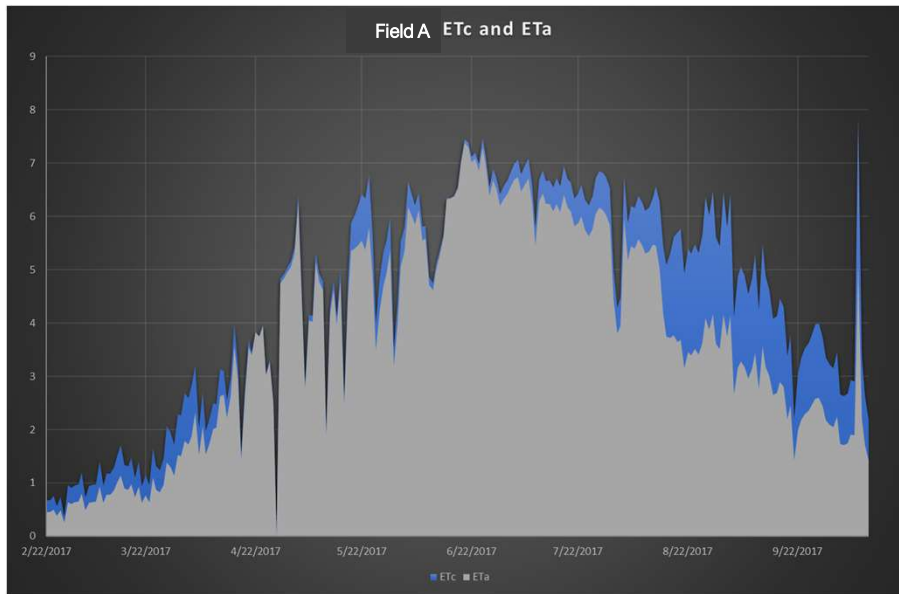
SWIIM's daily water balance tracks system inflows (irrigation and effective rainfall) and outflows (actual ET and, where applicable, surface runoff) throughout the season. It solves for the residual subsurface drainage on a daily time-step.

Comparing trends among these components and historical data helps irrigation managers and water stewards plan and account for reasonable and beneficial water use while optimizing critical flow paths such as subsurface return flows.





# Remote Sensing Comparison



ETc    ETa

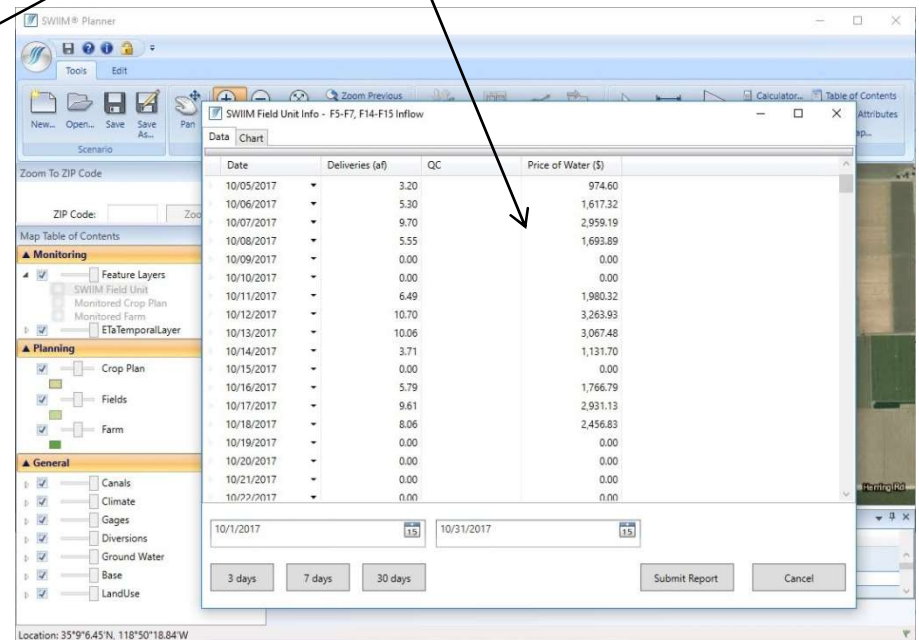
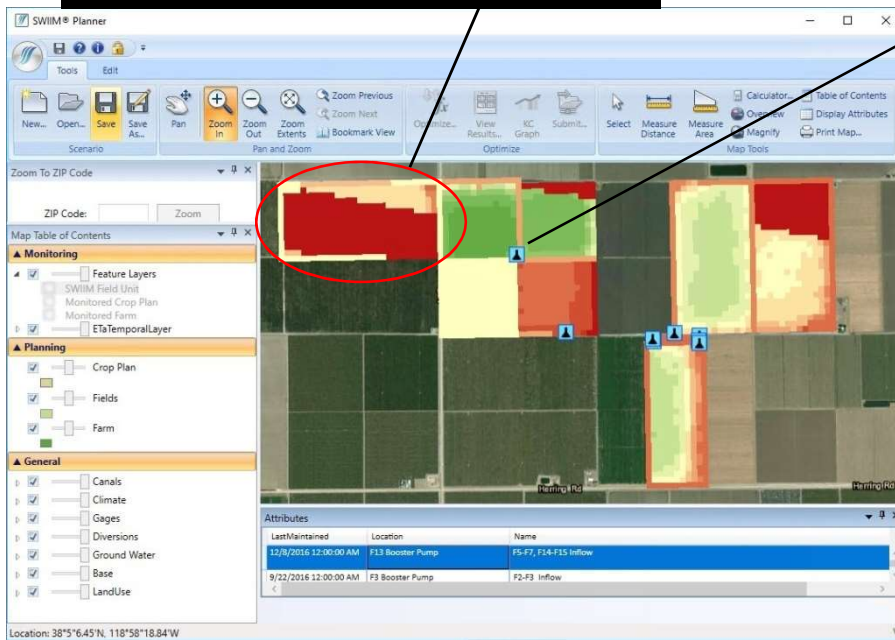
Kc    Ka



# Customized Data

Graphical overlay of actual ET derived from periodic satellite images – used in conjunction with daily reference ET from weather stations to estimate actual ET for daily water balance.

Flow measurement location – click to open detail





OnFarm automatically aggregates data from any source to provide a real-time, unified farm decision dashboard.

- Simplified view of SWIIM data and reports.
- Integration of weather, soil moisture, agronomic, and other 3<sup>rd</sup> party data in the same view.
- Optimizes irrigation to reduce water, energy, and fertilizer.
- Enter and track manually recorded field data.
- Monitor and alerts for risks like frost.
- Plans and schedules activities more accurately to avoid field conflicts.







You can't protect what you don't quantify  
and you can't manage what you don't measure.



Thank you!





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## The Benefits of McCrometer Flow Meters for Irrigation and Agriculture

Agricultural and turf irrigators operate in difficult environments with extreme climates where water flow measurement can be the difference between profit or loss. Choosing the right irrigation flow meter doesn't need to be complicated. With 60+ years of experience in agricultural irrigation, McCrometer provides reliable and low maintenance flow meter solutions to meet this industry's tough requirements.

McCrometer flow meters offer **unbeatable value** in cost of installation and ownership, and set the standard for ease-of-use, reliability and economy. Our leading edge meters offer versatile water flow measurement that have been trusted by irrigators since 1955.

Watch the video below to learn more about McCrometer's Mc Mag<sup>3000</sup>, battery operated mag meter with a 5 year Guaranteed Battery Life.

### How to Select the Right Irrigation Flow Meter

In any irrigation network, water meters are a critical tool for irrigators. With many different choices, choosing the ideal flow meter for your application is vital. Whether you're looking for greater control, easy installation, accuracy, billing solutions, consistent irrigation schedules or improved water quality, there are a number of solutions from which to choose.

To help eliminate the guesswork and get you operating quickly and efficiently, below is a list of mechanical or electromagnetic meters to help you learn more about which choice might be right for you.

**Request a quote or more  
information on products designed  
for Agriculture & Irrigation**

**Chat Live!**



## A Few of our Agriculture Irrigation Flow Meters .... Find out More ...

- **Mc Propeller:** Affordable, easy to install and operate, easy to service in the field, long-life components. The best-selling propeller meter in the U.S. Trusted by irrigators since 1955.
- **FlowConnect:** Built in remote meter reading for collecting and transmitting flow data from McCrometer's Mc® Propeller and Water Specialties propeller meters.
- **Dura Mag:** Battery powered flanged mag meter with a 5 year battery life eliminates the need for AC power and arrives pre-calibrated with an internal datalogger with 5 years of data storage, and telemetry-ready output options.
- **FS100 Flow Straightener:** Uses breakthrough flow straightening technology for highly accurate, reliable flow measurement with minimal upstream/downstream pipe runs requirements.

	Propeller Meter	Mag Meter	Telemetry Ready	Accuracy	Line Sizes	Easy to Install & Service	Custom Lengths / Flanges
<a href="#">DuraMag</a>		✓	✓	±1%	4" - 12"		✓
<a href="#">FlowConnect</a>			✓	N/A	N/A		
<a href="#">Flow Straightener</a>	✓			±2%	6" - 12"	✓	
<a href="#">Mc Mag3000™</a>		✓	✓	±2%	4" - 12"	✓	
<a href="#">Mc® Propeller</a>	✓		✓	±2%	2" - 96"	✓	✓
<a href="#">Ultra Mag®</a>		✓	✓	±0.5%	2" - 48"		✓
<a href="#">Water Specialties Propeller Meter™</a>	✓		✓	±2%	2" - 72"	✓	✓

### What Our Customers are Saying:

"My decision to specify McCrometer is based upon these four basic facts: they are ruggedly built, simple to install, easy to read, and above all have had consistent high quality for more than 20 years."

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Instruments: Connected Solutions

## Connected Solutions

Today's water managers face several challenges when it comes to reading the data on their flow meters. Collecting the data can be time consuming, with delivery either inconsistent or irregular due to weather restrictions or meter inaccessibility. Manual reading can be inaccurately reported, and the infrequency of the data collection is often insufficient for planning. Add to that the expensive cost of labor, vehicles and fuel, it's no wonder they're demanding more. How many times have we heard "There must be a better way!"

Fortunately, there is. McCrometer's FlowConnect™ is a built-in solution for collecting and transmitting flow data from the Mc Propeller and Water Specialties meters. Its unique one-piece design eliminates the need for cables, pole mounting and other hardware typically required with traditional telemetry systems. FlowConnect's features include ExactRead™ Technology, a proprietary technology for exact match from meter to website, affordable and reliable remote meter reading with a streamlined design, timely and accessible data for water management decisions, pre-assembled on new meters for simplified installation and retrofits on existing meters in less than 30 minutes. With multiple register input and output options, modem options and power options, McCrometer, your trusted partner for flow meters, offers innovative built-in remote meter reading. Finally, this is a much better way of automatic meter reading.

McCrometer also offers Smart Output for use with their line of electromagnetic insertion and full bore flow meters. Smart Output™ is compatible with Sensus and Itron systems, which makes these mag meters plug and play into larger AMI and AMR systems. McCrometer has an electromagnetic flow solution for nearly every application – line sizes 4"–138": hot tappable insertion meters, full bore type, battery/solar or AC/DC powered. And now, their entire line of mag meters are AMI compatible, with Smart Output.



Chat Live!



[FlowConnect](#)



[McCrometer CONNECT](#)



[Smart Output](#)



## McCrometer CONNECT



[» Gallery](#)

Series: MCCROMETER-CONNECT

[Request a Quote](#)

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I also understand my privacy choices as they pertain to my personal data as provided in the McCrometer privacy policy under "Your Privacy Choices"

### More Systems • More Sensors • More Solutions

Wireless Technology for Today's Growers

McCrometer CONNECT™ offers the most comprehensive choice in wireless remote monitoring for irrigation and crop management from the convenience of your computer, smart phone or tablet.

Complete turnkey solutions for growers and irrigators  
Highest quality local service and support  
Selection and Flexibility

With McCrometer CONNECT, you have the real-time, industrial-strength crop data and tools you need

right at your fingertips. Make timely and effective irrigation and crop management decisions from wherever you are: in the field, on the road or in your office.

- 24/7 Connectivity
- Simple. Convenient. Affordable.





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## Smart Output



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Series:

SMART OUTPUT

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Water engineers and technicians will find McCrometer has a versatile Smart Output mag meter solution that is Sensus or Itron system compatible for nearly every type of AMR and AMI application. These accurate, reliable and cost-effective mag meters are available for line sizes from 4 to 138 inches in hot tap insertion or full bore styles, which can be AC or DC powered, battery powered or solar. Smart Output gives water utility managers the flexibility they need to network the flow meters across their distribution systems with the AMI solution of their choice. Smart Output reduces costs, calls, travel, and labor, while it increases efficiency, ensuring your data is accurate.

Smart Output mag meters from McCrometer are designed with a highly intelligent module in their transmitters that is similar to a communication protocol. This capability allows McCrometer mag meters to transmit data on a schedule or on demand, as well as receive diagnostic queries to ensure or update meter operation. There's no need for technicians to gather flow data manually or check meter status with McCrometer's Smart Output mag meters.

With advanced plug-and-play, real-time Smart Output communications, McCrometer's FPI Mag Flow Meter, SPI Mag Flow Meter and Ultra Mag Flow Meter provide highly effective solutions for automatic meter reading (AMR) and advanced meter infrastructure (AMI) in support of utility smart grids that help conserve valuable water resources, reduce expensive non-revenue water costs, and simplify daily operations and routine maintenance.

McCrometer's Smart Output technology is backed by the company's 60-plus years of solving flow measurement problems.