

WATER CONSERVATION PLAN

prepared pursuant to

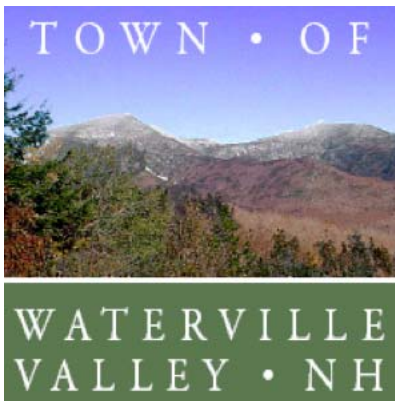
Env-Wq 2101 Water Conservation Rules

for a proposed

300 GPM Municipal Supply Well

for the

Town of Waterville Valley, New Hampshire



September, 2011

Applicant:

Mark Decoteau, Town Manager
Town Offices
14 TAC Lane
Waterville Valley, New Hampshire 03215
603.236.4730

Preparer:

Britt E. Audet, PE
CMA Engineers, Inc.
55 S. Commercial Street
Manchester, NH 03101
603.627.0708

Water Conservation Plan
Proposed 300 GPM Municipal Supply Well
Waterville Valley, NH

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I. System Overview

The Town of Waterville Valley, New Hampshire is planning to develop a new drinking water supply well to supplement the existing water system that serves the entire community. The new well will consist of a gravel-packed well, pump and controls, distribution piping and blending with water from the existing wells. The project is in the preliminary design stage and is anticipated to be advertised for bid in the Spring of 2012. The Town is currently working with the White Mountain National Forest Service (WMNF) to initiate an Environmental Assessment and develop a special use permit for the proposed new well located on WMNF property (*see Figure 1 for Locus Map*).

The Town is pursuing development of a new source well to supplement the current supply and to meet the demand during peak periods with the Town's largest well, DW-2, out of service. The existing water distribution system serves a variety of users. There are no industrial or heavy commercial operations in Town, nor are they expected in the future. Table 1 provides a breakdown of the property types and number of units served by the system.

Table 1. Property Types Served by the Water Distribution System

| <u>Description</u> | <u>Existing</u> | <u>Future</u> |
|--------------------------------|-----------------|---------------|
| Low Density Residential | 137 | 47 |
| High Density Residential | 1 | 0 |
| Commercial | 22 | 6 |
| Special Civic | 8 | 0 |
| Recreation | 3 | 6 |
| Greenbelt | 0 | 1 |
| White Mountain National Forest | 1 | 0 |
| <u>Condominium / Resort</u> | <u>30</u> | <u>0</u> |

Water use trends are indicative of a resort community with the greatest daily/monthly demands occurring during the winter and summer periods (approximately 30% of annual use during each of these seasons). Water use during the "shoulder" seasons (April-May and October-November) is typically less than 20% of the annual use for each of the "shoulder" seasons.

The year-round population of Waterville Valley is approximately 350 persons. Seasonal and daily population figures fluctuate with the prime tourist periods of winter (ski-season) and summer (hiking and other outdoor recreation) when the daily population can surge to as many as 4,000 or more persons for a holiday weekend or during school vacation weeks in December and February.

The Town employs full-time public works staff, some who are certified water system operators. The certified operators oversee, operate and maintain the water system in accordance with the requirements of the NHDES. The plan outlined below address the requirements of the NHDES Conservation Plan.

II. System-Side Management

A. Meters

In accordance with Env-Wq 2010.04(b and c), water meters will be installed for all water uses including raw water pumping and individual customers. Raw water will be metered at the pump house prior to being conveyed to the distribution system or storage tanks. The three existing wells are each metered with a venturi tube with a Rosemount pressure transmitter. When the new well and water main are constructed, the existing source meters will be replaced with electro-magnetic type meters for each well, sized and located based on the expected range of flows. The meter for the new well (well #4) will also be an electro-magnetic type meter. (Electro-magnetic meter product information is included in Attachment 1.) Output signals from the source meters will be collected and trended on the existing SCADA system. Source meters will be data-logged continuously and checked at least once every 30 days.

In accordance with Env-Wq 2010.05 (b), all customers connected to the water system will be metered with meter size based on manufacturer's specifications with consideration for the type of water use and anticipated flow rates of each connection. Condo properties will be metered on the building service for the building (hotel, lodge, apartments). The mag-meters do not require frequent calibration checks.

Water meters will be selected, installed and maintained as described in "Manual of Water Supply Practices, Water Meters – Selection, Installation, Testing and Maintenance", document identification number AWWA M6, American Water Works Association, 1999, as required by Env-Wq 2010.04(d). A total of 316 new water meters will be installed by the Town from 2011 through 2013 as part of the ongoing waster system improvement projects. Of these, approximately 138 meters will be installed at residential properties, 151 at condominium/resort properties, 22 at commercial properties and 5 in the special civic zone.

All existing (commercial) meters and all new meters, including the source meters, will be electromagnetic meters. The electromagnetic meters contain magnetic couplings and sealed registers along with synthetic polymer chambers that are corrosion resistant. Because of the more efficient operation and design of the electromagnetic meters the Town will proceed as follows:

- a. Year 1 - Set up reserve fund to replace meters equivalent to the cost of 15 residential meters per year.
- b. Year 5- Begin testing 5% of the meters in the system for proper calibration per the manufacturer's recommended protocols. Repair all meters found to be out of spec for calibration. Repairs may include replacing the measuring chamber or register assemblies.
- c. Year 10 – Begin testing 10% of the remaining (untested) meters in the system for proper calibration per the manufacturer's recommended protocols. Repair all

meters found to be out of spec for calibration. Repairs may include replacing the measuring chamber or register assemblies.

- d. Year 15 – Begin replacing 5% of the meters in the system with the latest electromagnetic meter by the same or by a superior manufacturer. Continue testing 10% of the remaining (untested) meters until all meters in the system have been tested.
- e. Year 20 – Continue replacing 5% of the meters in the system with the latest electromagnetic meter by the same or by a superior manufacturer.
- f. Year 25 - Begin testing 5% of the oldest meters in the system. Repair all meters found to be out of spec for calibration. Repairs may include replacing the measuring chamber or register assemblies. Repeat steps “c” thru “f” at five year intervals, testing newer meters and replacing oldest meters as needed.
- g. Note - All new meters added to the system after year one as a result of future build-out will be of the same type or, if improved, of the improved electromagnetic meter design by the same or by a superior manufacturer.

Meters for water service customers will be read at least once every 90 days (Env-Wq 2101.04(e)). The Town is considering remote read devices as the method for reading customer meters. Meters on Town water supply sources will be read continuously through the existing SCADA system as required by Env-Wq 2010.04(f).

B. Water Audits / Leak Detection

The existing distribution system consists of approximately 9 miles of metallic pipe. (*See Figure 2 for Town Water System Map*). The Town will conduct a water audit and leak detection program using contract personnel every two years as described in “Manual of Water Supply Practices, Water Audits and Leak Detection”, document identification number AWWA M36, 1999 as required by Env-Wq 2010.04(g).

The Town currently monitors the daily, monthly and annual water well pumping versus wastewater treatment facility inflow data compiled in the SCADA system as one means of identifying a change in water consumption from historic records. Average daily water use in 2010 was approximately 125,000 gallons per day with the peak day water use for 2010 recorded as 395,000 gallons. Comparison of well pump records to unadjusted wastewater treatment facility inflow records reveals a “net gain” of approximately 10,000 gallons per day to the wastewater system in 2010 (likely from sump pumps or infiltration to the collection system). Historically the unadjusted daily wastewater inflow volume exceeds the daily well pumping volume by 5% to 10%. Unaccounted for water or “lost” water is quickly identified by the operators when the daily well pump volumes exceed the daily wastewater inflow volumes. Other monitoring methods will also be considered, but recent experience has shown that the SCADA system monitoring, with operator attention, has identified leaks in the system that were promptly repaired (same day or next day repairs). Otherwise, the Town will repair all leaks found during the water audit and leak detection program within 60 days of their discovery unless a waiver is obtained as required by Env-Wq 2101.04(h).

In the future, the Town will estimate the volume and percentage of unaccounted-for water in the water system once every year using methods and procedures as described in AWWA manual M36, 1999, as required by Env-Wq 2101.04(i). If the percent of unaccounted-for water exceeds 15% of the well water introduced into the water distribution system, then the Town will prepare and submit a response plan to NHDES within 60 days of the completion of the estimate. This response plan will describe activities that the Town will conduct to reduce the percentage of unaccounted-for water to below 15% within 2 years. Upon receipt of NHDES approval of the response plan, the Town will conduct the activities outlined in the response plan following the approval schedule as required by Env-Wq 2101.04(m).

C. Pressure Management

The existing water supply and distribution system consists of three water supply wells and the water storage tanks. (See Figure 2 for Town Water System Map) The first water supply well was installed in 1968, followed by Well 2 in 1973 and Well 3 in 1985. One concrete storage tank (400,000 gallons) was installed in 1973-74 and a second storage tank (500,000 gallons) constructed in 2004. Both storage tanks are located in the same section of Town at approximately the same elevation. Residential and commercial development in Town expanded considerably since the late 1960's. Today there are several properties close to the storage tanks (one development is served by a booster station) and other properties are quite far from and much lower in elevation than the storage tanks. The only source of intentional water loss is the periodic flushing of water mains throughout the system. The water and sewer utility project currently under construction will add a loop in the distribution system to service additional properties as well as provide improved system operation.

The Town is planning to develop a water system model in 2011-2012 to assess areas that might be subject to high/low pressures that do not meet AWWA guidelines. The model results, in conjunction with field measurements, will be used to plan for system improvements in these areas. The Town will strive to provide minimum and maximum operating pressures as required by Env-Wq 2101.04 (n). The current estimated minimum pressure is 45 psi and the estimated maximum pressure is 100 psi. In areas having distribution system pressures greater than 80 psi, the Town will increase its leak detection surveillance.

III. Consumption-Side Management

A. Rate Structure

The Town is currently evaluating alternative rate structures to its current flat rate structure. New rates may be based upon a flat or constant rate structure at a unit price for a minimum volume of water consumed with escalating fees for exceeding threshold levels for a given type of use (residential, commercial, resort, etc.). Other water conservation measures considered include installation of low flow devices on all water fixtures installed such as shower heads, sink faucets, appliances and toilets. The Town will submit a proposed rate structure to the NHDES within 12 months of activating the proposed Well #4. This new well is expected to be operational by 2013.

B. Educational Outreach

The Town will conduct annual water conservation educational outreach for water system customers. The Town will issue conservation materials available from NHDES as required by (Env-Wq 2101.05 (p)). The Town will conduct public notification and outreach activities as required by Env-Wq 2101.11 including posting water conservation literature at the Town office, post office and other public places. The Town will also insert educational materials with customer's bills and may consider conducting water audits for its customers as a public service.

Materials used for conservation outreach will be obtained from a variety of sources including:

- NHDES water conservation fact sheet database located at:

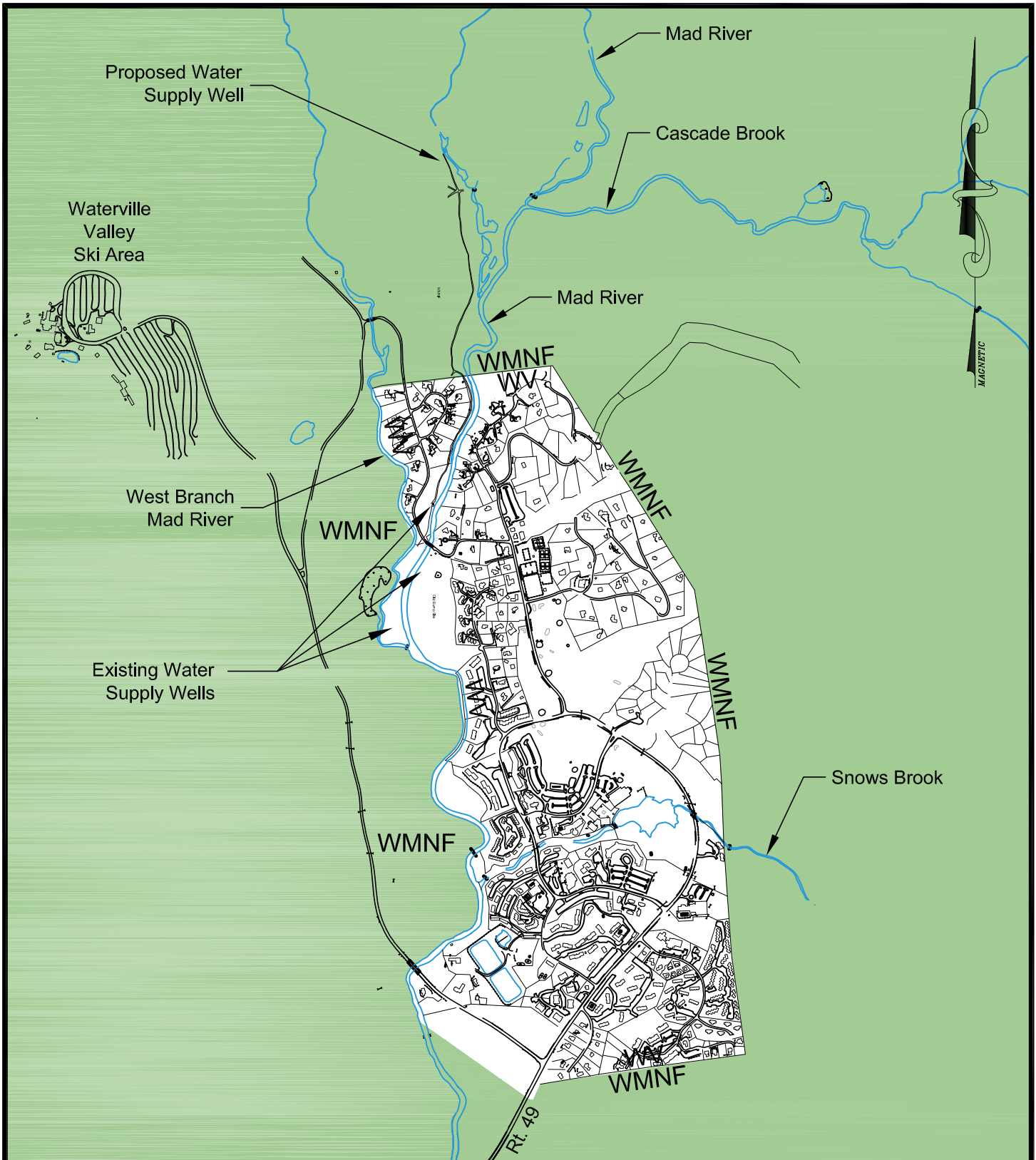
<http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm#efficiency>

- USEPA WaterSense database located at:

<http://www.epa.gov/watersense/>

C. Conservation Plan Action

The Town of Waterville Valley is actively engaged in designing and implementing a number of water and sewer utility improvements as part of a three-year infrastructure upgrade plan. The Town's goals are to preserve water quality around the existing drinking water supply wells, add a fourth water supply well, improve water treatment reliability, add water meters to the distribution system, and continue with active leak detection monitoring. Activities outlined in this conservation plan will be completed over the next three years under the direction of a certified water system operator pursuant to Env-Ws 367 as required by (Env-Wq 2101.05 (q)).



CMA
ENGINEERS
 CIVIL/ENVIRONMENTAL ENGINEERS

35 Bow Street
 Portsmouth, New Hampshire
 03801-3819

Phone: 603/431-6196
 Fax: 603/431-5376

E-mail: info@cmaengineers.com

Langer Place
 55 South Commercial Street
 Manchester, NH 03101

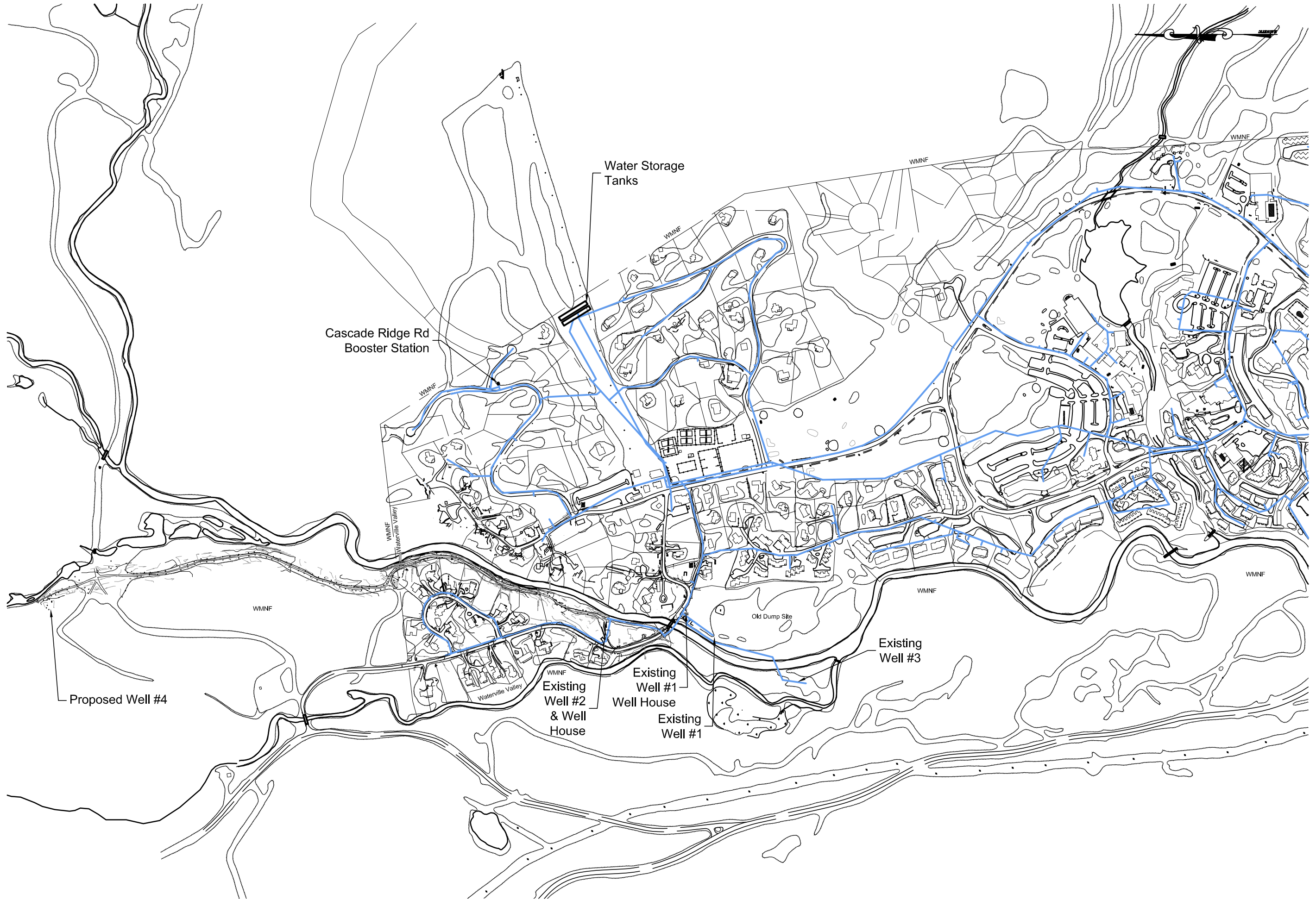
Phone: 603/627-0708
 Fax: 603/627-0746

*Town of Waterville Valley, NH
 Water Conservation Plan*

Fig. 1 - Town Locus Map

Scale: 1 in = 1500 ft

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| Town of Waterville Valley, NH | |
| Water Conservation Plan | |
| Existing Critical Water System Components | |
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CMA ENGINEERS
 CIVIL/ENVIRONMENTAL ENGINEERS

36 Bow Street
 Portsmouth, NH
 603.431.6196

55 So. Commercial Street
 Manchester, NH
 603.627-0708

Lafayette Center
 Slater Street Building,
 Keene, NH
 207.965-8717

www.cmaengineers.com
 info@cmaengineers.com



evoQ₄

Electromagnetic Water Meter

Make every drop count



www.elsteramcowater.com
www.elster-evolution.com

evoQ₄ Electromagnetic water meter

Today's water meters need to be more reliable, accurate and durable with advanced flow technology that has the capability to capture revenue while reducing overall operating costs. The evoQ₄ provides a total solution for commercial water utility metering, by filling the needs of turbines, compounds, single jets and electromagnetic.

With advanced measurement and flow technology, the evoQ₄ battery powered mag meter delivers high accuracy through a wide range of flows and varied conditions and applications. Typical accuracy performance ranges from 99.25% to 100.75% (+/- 0.75% error) of true value through the normal flow range.

The meter line can be sized to suit either predominantly high or low flow rates, and is ideal for a wide variety of bulk flow metering applications, such as network monitoring, leakage detection and commercial billing.

Reliable connectivity

With a choice of bi-directional pulse or encoded outputs, the evoQ₄ provides dependable connectivity to critical distribution management and billing systems, including AMR and data-logging devices. The evoQ₄ is compatible with evolution™ AMI and other AMR/AMI devices.

Accurate measurement

The evoQ₄ has a standard, continuous sampling rate of 0.5 second, so you can be confident of accurate and reliable measurement. It also features anticorrosive electrodes to ensure consistently accurate performance throughout its entire life.

Durability

The evoQ₄'s tough stainless steel construction ensures a long, corrosion-free working life, while its lightweight body makes storage, transportation and installation both simpler and safer. An IP68 rating provides protection for internal electronics meaning long-term reliability.

Zero maintenance

Designed without moving parts and a 10-year battery life, the evoQ₄ is maintenance free, eliminating regular battery change outs and calibration often required with mechanical and electromagnetic meters.

Real-time data

A large, bright and easy-to-read LCD, displays volume and instantaneous flow rate for reference. The evoQ₄ also has alarm functions providing real time status, to ensure no loss in measuring continuity.

Easy access

The evoQ₄'s optional remote display unit provides a clear LCD for simpler access in hard-to-read applications. The unit also includes two pulse outputs for connection to ancillary devices such as AMR or process monitoring devices.

Low pressure loss

An unrestricted flow tube ensures minimal pressure loss, even at the highest flow rates. This means that overall network system pressures can be reduced, lowering energy expenditures, reducing the occurrences of burst pipes and extending the useful life of pumping stations.



Simple installation

Installation of the evoQ4 is simple.

Just fit and go, no need for grounding rings or programming with a laptop in a vault. The evoQ4 comes in AWWA C701 Class II Turbine meter lay lengths. The flanges are epoxy coated cast iron to reduce weight and prevent corrosion.

The 1.5 and 2" comes with an oval flange and the 3" and larger meters come with a round flange. All flanges conform to ANSI B16.1 Class 125 standards.

evoQ4 AL (Alternate Length)

The evoQ4 meter is now available in alternate lengths for 1.5 and 2" meter installations. The lengths are typical of C700, C702 and C712 lay lengths to facilitate direct replacement of mechanical meters without the added expense of makeup spool pieces. Additionally, these meters feature a shorter height dimension, fitting into tight spaces. The complete suite of output modules is available to provide remote display or AMR / AMI functionality.

evoQ4 FSM (Fire Service Meter)

As an optional feature, the evoQ4 comes with a full FM Standard 1044 approval for use as a fire service instrument. Replace those monstrous mechanical fire service assemblies with an easily fit solid state meter.

System options

1. Display only

Simple, visual read meter only with no output communications. Pulse or encoder output can be easily added through upgrade in-the-field with option 2 or remote and pulse with option 3.

2. Pulse or encoded output meter

As above with the addition of a plug and play pulse or encoder output transmitter for connection to ancillary devices including AMR, data-loggers or remote monitoring system.

3. Meter + remote display

As in option 1 with the addition of a pulse output and remote display unit (pictured right) connected electronically to the meter. The remote display features two pulse output channels.

Display functions

Volume – the net volume of water measured is displayed.

Flow Rate – If water is flowing in the reverse direction a minus sign is displayed to the left of the value.

Low-Battery – The indicator appears when the battery voltage is low and the meter should be replaced.

No-Water – The indicator blinks when there is an empty pipe condition in the meter.



Comparison mechanical commercial meters

| | | evoQ ₄ | AWWA C701 Turbine | AWWA C702 Compound | AWWA C712 Single Jet |
|------|-----------------------|-------------------|-------------------|--------------------|----------------------|
| 1.5" | AL Low Flow (gpm) | 1/2 | 4 | N/A | 1/2 |
| | Continuous Flow (gpm) | 176 | 80 | N/A | 50 |
| | High Flow (gpm) | 220 | 160 | N/A | 10 |
| | Weight | 9.5 | 16 | N/A | 12 |
| | Lay Length | 13 | 13 | N/A | 13 |
| | Operating PSI | 150 | 150 | N/A | 150 |
| | Warranty (years) | 5 | 2 | N/A | 2 |
| 2" | Low Flow (gpm) | 1/4 | 4 | 1/4 | 1/2 |
| | Continuous Flow (gpm) | 176 | 100 | 80 | 90 |
| | High Flow (gpm) | 220 | 160 | 160 | 160 |
| | Weight | 11 | 21* | 51* | 30* |
| | Lay Length | 10 | 10 | 17 | 17 |
| | Operating PSI | 230 | 150 | 150 | 150 |
| | Warranty (years) | 5 | 2 | 2 | 2 |
| 3" | Low Flow | 1/2 | 8 | 1/2 | 1/2 |
| | Continuous Flow | 440 | 350 | 175 | 160 |
| | High Flow | 550 | 435 | 350 | 320 |
| | Weight | 22.5 | 37* | 92* | 60* |
| | Lay Length | 12 | 12 | 17 | 17 |
| | Operating PSI | 230 | 150 | 150 | 150 |
| | Warranty (years) | 5 | 2 | 2 | 2 |
| 4" | Low Flow | 1.7 | 15 | 3/4 | 3/4 |
| | Continuous Flow | 700 | 650 | 300 | 250 |
| | High Flow | 880 | 750 | 600 | 500 |
| | Weight | 35.5 | 50* | 134* | 94* |
| | Lay Length | 14 | 14 | 20 | 20 |
| | Operating PSI | 230 | 150 | 150 | 150 |
| | Warranty (years) | 5 | 2 | 2 | 2 |
| 6" | Low Flow | 4 | 30 | 1 1/2 | 1 1/2 |
| | Continuous Flow | 1100 | 1400 | 675 | 500 |
| | High Flow | 1400 | 1600 | 1350 | 1000 |
| | Weight | 55.5 | 113* | 165* | 142* |
| | Lay Length | 18 | 18 | 24 | 24 |
| | Operating PSI | 230 | 150 | 150 | 150 |
| | Warranty (years) | 5 | 2 | 2 | 2 |
| 8" | Low Flow | 8 | 50 | 2 | N/A |
| | Continuous Flow | 2770 | 2400 | 900 | N/A |
| | High Flow | 3500 | 2800 | 1600 | N/A |
| | Weight | 81.5 | 177* | 523* | N/A |
| | Lay Length | 20 | 20 | 34.5 | N/A |
| | Operating PSI | 230 | 150 | 150 | N/A |
| | Warranty (years) | 5 | 2 | 2 | N/A |

* Average Weight of Each Manufacturer's Offering

The evoQ₄ is a single meter that meets the needs of traditional turbine, compound, single jet and mag meters.

Traditional electromagnetic meter comparison

| Specifications | evoQ4 | Traditional Utility E-Mag |
|------------------------|-----------|---------------------------|
| Power Options | | |
| AC Only | No | Yes |
| AC Battery Back Up | No | Yes |
| Battery Only | Yes | Some |
| Battery Life | 10 yrs | 3 yrs (Maximum) |
| Reading Sample Rate | 0.5 sec | 15 sec |
| Reading Options | | |
| Pulse Output | Yes | Yes |
| Encoder Output | Yes | Yes |
| 4-20mA | No* | No* |
| Meter Accuracy | | |
| Typical 4" meter | | |
| Low Flow | 1.7 gpm | 5.9 gpm |
| Maximum Flow | 880 gpm | 704 gpm |
| Dimensions | | |
| Lay Lengths | AWWA C701 | Non-standard 4" |
| Weight | 35.5 lbs | 33 lbs |
| Approvals | | |
| CE | Yes | Yes |
| NSF61 | Yes | Yes |
| FM | Yes | Yes |

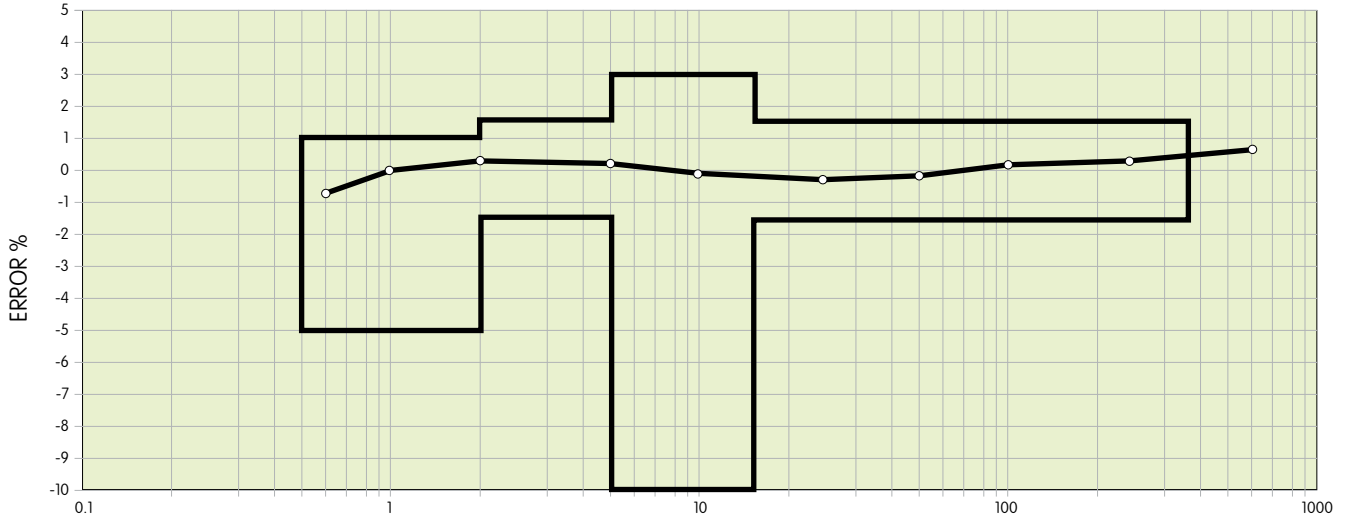
* 4-20mA output can be achieved with a converter



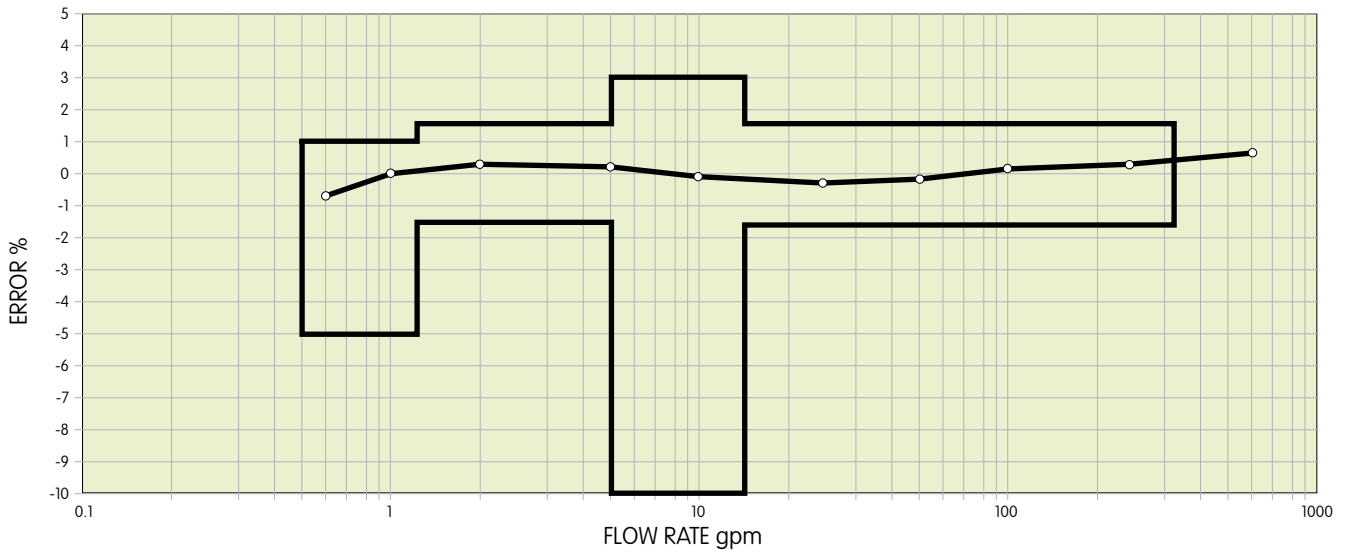
High accuracy measurement

C702 compound accuracy limits

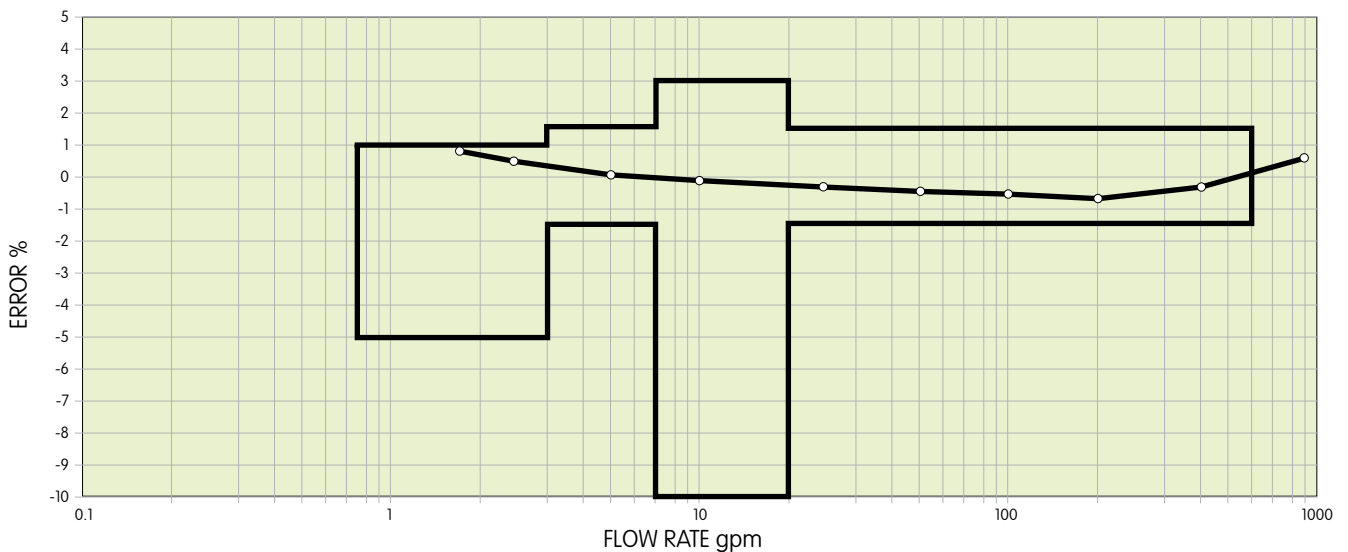
2" evoQ₄ vs C702 Accuracy Envelope



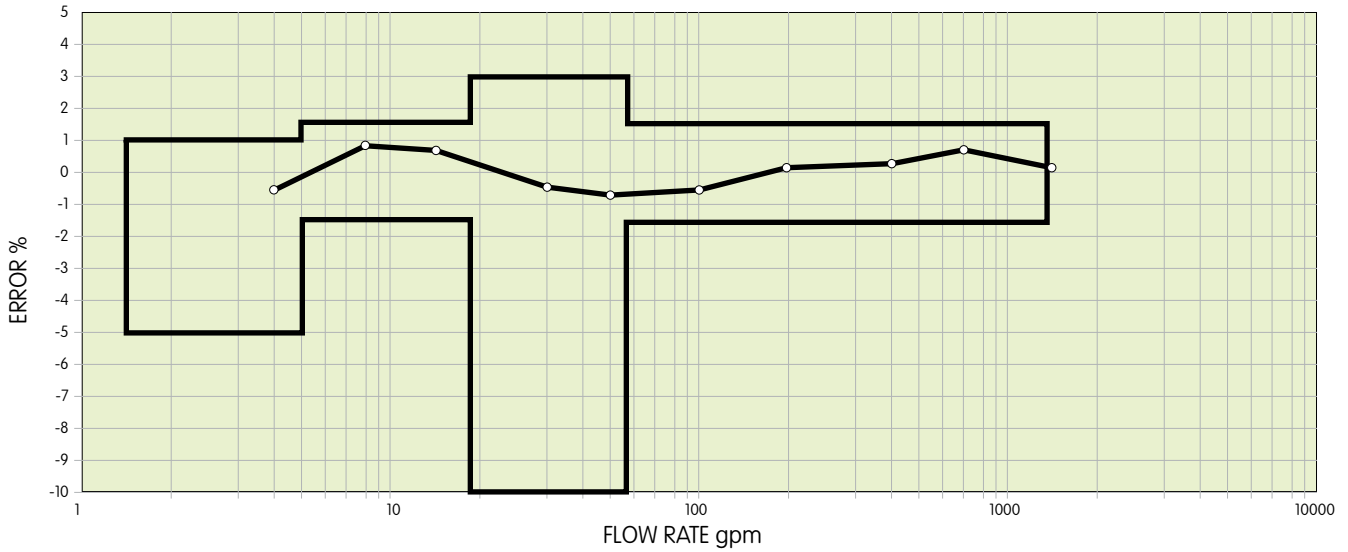
3" evoQ₄ C702 Accuracy Envelope



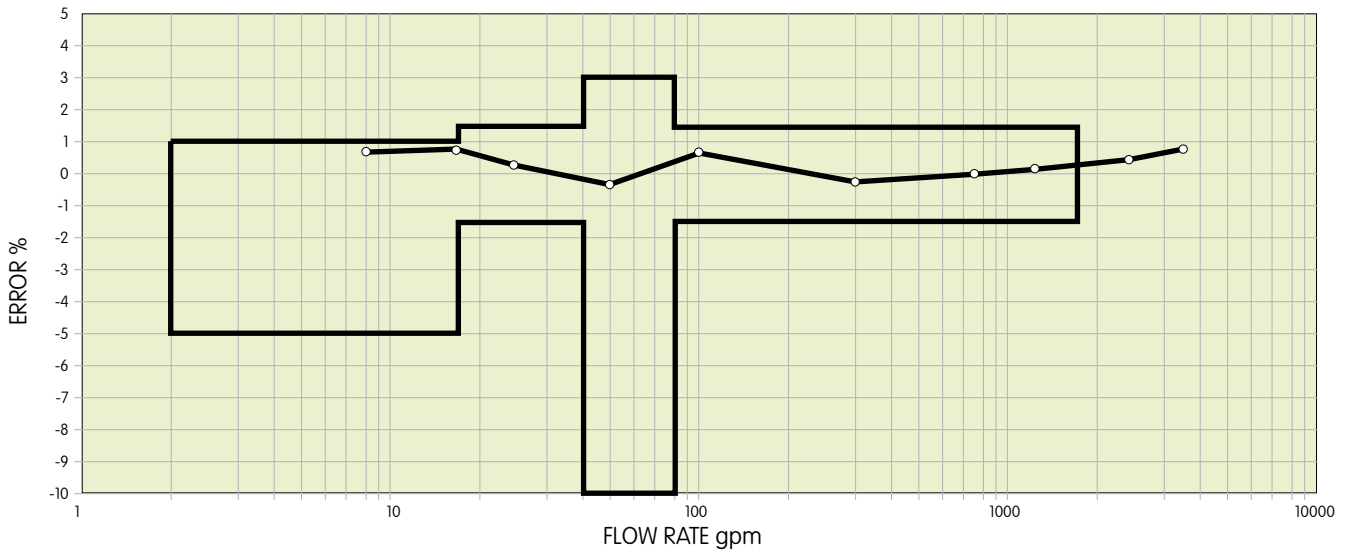
4" evoQ₄ C702 Accuracy Envelope



6" evoQ₄ C702 Accuracy Envelope



8" evoQ₄ C702 Accuracy Envelope



evoQ₄ pressure loss

| Size | Flow Rate (gpm) | Pressure Loss (PSI) |
|------|-----------------|---------------------|
| 1.5" | 220 | 4.35 |
| 2" | 220 | 4.35 |
| 3" | 550 | 3.62 |
| 4" | 880 | 3.62 |
| 6" | 1400 | 2.17 |
| 8" | 3500 | 5.80 |

About Elster AMCO Water, Inc.

Located in Ocala, Florida, Elster AMCO Water is part of Elster, the world's largest metering and smart metering system solution company. Elster AMCO Water is an industry leader in the development and implementation of innovative metering and system solutions and is committed to delivering superior customer service, quality products, solutions and services to the water utility industry.

About Elster Group

Elster has delivered over 1.5 million smart metering devices worldwide with systems located in North America, Central America, Europe, Australia, New Zealand and the Caribbean. Elster smart metering systems allow utilities to implement energy conservation measures, demand response programs, smart grid initiatives, and smart home solutions as well as achieve operational efficiencies resulting in significant value creation across the utility enterprise. Elster has over 7,500 staff and operations in 38 countries, focused in North and South America, Europe, and Asia.

United States
Elster AMCO Water, Inc.
1100 SW 38th Avenue
Ocala, Florida 34474
T 800-874-0890
F 352-368-1950
watermeters@us.elster.com

Caribbean
Elster AMCO Water, Inc.
P.O. Box 225
Carretera 112 KM 2.3
Isabella, PR 00662
T 787-872-2006
F 787-872-5427
prwatermeters@pr.elster.com

Canada
Elster Metering
1100 Walker's Line, Suite 101
Burlington, Ontario L7N 2G3
T 866-703-7582
F 905-634-6705
watermeters@ca.elster.com

Mexico
Elster Medidores
Calle Norte 35 No. 983-13
Col. Industrial Vellejo
Del. Gustavo A. Madero
C P 07720
T 525 55 368 4757
F 525 55 368 4782
amcowater@prodigy.net.mx

www.elsteramcowater.com
www.elster-evolution.com

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