

**ADVERTISEMENT FOR BIDS**

**WATER METER SYSTEM UPDATES**

**TOWN OF NUTTER FORT, WEST VIRGINIA**

Sealed bids will be received by the Town of Nutter Fort, West Virginia at the office of Town Hall until 4:00PM, Tuesday, June 23, 2020 for water meter system updates in the Town of Nutter Fort. All submitted proposals will be publicly opened and read aloud at the council meeting held on Tuesday, June 23, 2020 at 6:30PM in council chambers.

Complete specifications will be open to public inspection or may be secured at our website [www.townofnutterfort.com](http://www.townofnutterfort.com), or you may request a copy by phoning 304-622-7713 starting Monday, May 18, 2020.

The Town of Nutter Fort reserves the right to reject any and all bids and to waive any informality in any bid.

**TOWN OF NUTTER FORT**  
Sam Maxson, Mayor

**INFORMATION FOR BIDDERS**  
**WATER METER SYSTEM UPDATES**  
**TOWN OF NUTTER FORT, WEST VIRGINIA**

1. **Preparation of Bids**

Bids must be enclosed in a sealed envelope addressed to the Water Meter System Updates, Town of Nutter Fort, 1415 Buckhannon Pike, Nutter Fort, West Virginia 26301, and clearly marked on the outside of the envelope with the name of the Bidder, WV License Number, and the title "Bid for Water Meter System Updates 2020".

2. **Opening of Proposals**

All proposals will be opened and publicly read through live-stream at Town Hall, as all social distancing guidelines will be followed, at the Town of Nutter Fort, 1415 Buckhannon Pike, Nutter Fort, West Virginia, at approximately 6:30 P.M.; Tuesday, June 23, 2020. A link for the live-stream of the Bid Opening will be provided via Addendum. The Town reserves the right to reject any and all bids, to waive any informality in any bids and to accept whatever proposal or proposals will best serve the public interest.

3. **Conditions of the Contract**

Such stipulations and terms as are set forth above shall be considered as an integral part of the plans, specifications, and contract, whether or not these terms or stipulations may or may not be repeated, amplified, or enlarged upon in subsequent sections of the specifications and the contract.

4. **Payment**

Upon satisfactory delivery of the materials and acceptance of the same by the Owner, the Vendor shall receive complete payment in legal tender in the amount of his unit bid prices, plus incidental expenses.

5. **Change in Quantities**

The quantities on the bid schedule are approximate only and are used to evaluate the bids. Quantities of major items may be increased or decreased by thirty percent (30%) without altering the Vendor's unit bid price for any item.

**SPECIFICATIONS FOR THE  
WATER METER SYSTEM UPDATES  
IN THE TOWN OF NUTTER FORT, WEST VIRGINIA**

**General Specifications and Special Provisions**

1. **Scope of Services**

The intent and purpose of these specifications is to describe the replacement of water meters as directed by the Town of Nutter Fort

2. **Meter Specifications**

**GENERAL**

Except as otherwise modified or supplemented herein, the latest revision of AWWA Standard C715 Electromagnetic and Ultrasonic Type, for Revenue Applications shall provide theory and operation specifics on the basic ultrasonic concept. This document will govern the materials, design, manufacture and testing of all meters furnished under this specification or equal as approved by the Director or their appointed agent.

AWWA Standard C715 is considered by the Town of Nutter Fort to be only the minimum requirements and shall be supplemented herein to ensure the quality required by the utilities department.

Meters shall be manufactured by a company with a minimum of ten (10) year's of experience in manufacturing *various types* of cold water meters such as Multi-jet, Positive Displacement, Compound and Turbine Type water meters. The Manufacturer's corporate home office shall be in the United States.

Meters shall be bid without strainers and without companion couplings.

The water utilities department reserves the right to request a sample meter of a small size to study prior to awarding bids.

**METER FLOW TUBE**

Meter flow tube shall provide full compliance with ANSI/NSF 372 (AB1953 or NSF61 G) and be made of High-Performance Glass Reinforced Polymer or Brass Flow tube with approved Polymer Liner.

The meter flow tube shall withstand a working pressure of 175 PSI without leakage, seepage in the castings, or distortion affecting the free and accurate operation of the measuring unit.

The size, model, manufacturer's meter serial number, and direction of flow through the meter shall be permanently marked on the outer surface of the meter.

## **REGISTER COVER**

The register box shall be made of an engineering plastic with the manufacturer's serial number inside the register lid. Serial number of the meter shall also be permanently programmed in the electronic register.

The register cover box shall be equipped with a hinged lid that will overlap the register to protect the reading area.

## **REGISTER**

The factory sealed register shall be electronically driven only and shall be furnished with a low flow leak detection symbol and with a reverse flow notification symbol. The register shall be identical within a given size or model subject to the programming of appropriate flow factors for the particular meter. The register shall be programmed initially to read in U.S. Gallons as ordered by the Town of Nutter Fort. Serial number shall be permanently programmed in the electronic register.

As defined in these specifications, a "factory sealed" register shall mean an NEMA 6P / IP68 rating which protects the meter and register against fogging, moisture, and dust, and is electronically driven by the measuring section transit time sensors. Registers and meters must be fully submersible, therefore meters that do not meet an NEMA 6P / IP68 rating shall not be considered.

Appearance of any fogging or moisture inside the register within the warranty period shall constitute component failure and will require a factory replacement.

The register shall have a multi-line display with a minimum of 9 digits on the totalizer with a stationary decimal separating single billable units from fractional billing units. The register shall have a 4-digit rate of flow indicator with a floating decimal to allow high resolution flow measurement. The register shall have high resolution for low flow meter testing or on-site inspections. The LCD shall indicate reverse flow, rate of flow, low battery indication, leak alert, as well as no flow condition. The LCD shall clearly distinguish the digits for the output reading by displaying lines above the encoder reading.

## **MEASURING SECTION**

The measuring unit shall not include any moving parts and the measuring section shall have an unobstructed flow passage area. All transducers and reflectors must be mounted in the side walls of the flow tube.

The measuring section shall be secured in a position in the main case in such a manner that slight distortion of the outer meter case will not affect the sensitivity or registration of the meter.

To ensure longevity of service, the performance of the measuring chamber shall be guaranteed to meet required accuracy standards of AWWA C715 for a period of ten years from date of manufacturer's shipment.

## **SIGNAL PROCESSING**

Paired transducers and signal reflectors are to be mounted on side walls of the measuring flow tube to avoid effects of entrained air and sediment in the line. Ultrasonic meters using transducers mounted in the top of the flow tube or that utilize reflectors that block the center of the pipe are not acceptable.

Multiple measurements are sampled at a minimum of 1 second intervals (1 Hz) of these transit time loops that are made to significantly improve accuracy and to achieve low flow rate measuring accuracy. Ultrasonic meters that sample at a 0.5 Hz rate or lower are not accepted.

Meters that use measurement principals based on Faraday's Law are not accepted.

## **AMI/AMR OUTPUT CONFIGURATION**

### **1) Wired Encoder Output**

Meters provided with a wired output for connectivity to an endpoint shall be serial communication collector utilizing U11203 or U11204 communication protocol. The transmission message shall include the 1) Meter ID and 2) Meter Totalizer Reading (up to 8 digits maximum)

The 3 wire cable exiting the meter body cable shall 5 feet in length and available, upon request by the utility, with one of the following: 1) bare colored wires, 2) Nicor compatible connector, 3) Itron compatible connector, or 4) magnetic coupled ReadPad. Encoder output provides the following data through the output cable.

### **2) Integrated RF Endpoint**

The Integrated RF Endpoints must be a fully wireless solution that requires no external wired connection points. The Wireless Endpoints must be integral and permanently sealed within the meter housing.

The Integrated RF Endpoint must utilize RF communications over an FCC-licensed 450-470Mhz frequency to assure reliable, interference free communications over extended ranges.

The Integrated RF Endpoints must be capable of self-activating based on a specified consumption level & automatically registering on the system network. Endpoints must also be capable of activation via magnet at the time of installation.

When operating in fixed network mode the Endpoints must maintain continuous synchronization with the network & timestamp all data transmissions.

The Integrated RF Endpoint shall record and transmit leak, burst pipe, measurement fail, freeze, dry pipe, and low battery alarm to the Meter Data Management (MDM) software.

### **3) Installation Requirements**

Meters shall be designed so that no strainer or straightening vanes are required. There shall be no internal parts blocking the waterway. No straight runs of pipe shall be necessary before or after the meter.

### **4) Accuracy**

Meters shall EXCEED current AWWA C715 test flow, head loss and accuracy standards as follows.

SIZE	SAFE MAXIMUM FLOW RATE	NORMAL FLOW RANGE ACCURACY $\pm 1.5\%$	EXTENDED LOW FLOW RANGE ACCURACY $\pm 5\%$
5/8" x 1/2"	25 GPM	0.1 - 25 GPM	0.03 GPM
5/8" x 3/4"	35 GPM	0.1 - 35 GPM	0.05 GPM
3/4"	35 GPM	0.1 - 35 GPM	0.05 GPM
1"	55 GPM	0.38 - 55 GPM	0.11 GPM

**5) Real Time Clock**

Meters shall have a real time clock and be capable of providing data logging direct from the meter. Each log shall be configurable by the Utility. Data logger shall also log system events, tamper, low battery, and reverse flow measurement.

- 1) Wired Encoder Output meters shall have a minimum of 1,400 data points
- 2) Integrated RF Endpoints and meters shall have a minimum of 5,640 data points

**6) Pressure Capability**

Meters shall operate up to a working pressure of one hundred seventy-five (175) pounds per square inch (PSI) and to a temperature of 122 degrees Fahrenheit, without leakage or damage to any parts. The accuracy shall not be affected when operating at this pressure to possible distortion.

**7) Warranty Requirements**

The manufacturer's meter guarantee will be required with this bid and shall cover the meter main case's pressure integrity for a period not less than twenty (20) years according to the meter serial number.

The manufacturer's accuracy warranty and electronics warranty shall include batteries, transducers, LCD, and communication outputs to be warranted for a period of twenty (20) years. The manufacturer shall repair or replace the meter at no cost for the first ten (10) years and prorated for years eleven – twenty (11-20)

**8) Acceptable Meters**

In the interest of standardization, the following meter lines are acceptable to the Town of Nutter Fort, provided they fully comply with the above specifications and meet all requirements in the bid package:

- 1. MASTER METER SONATA
- 2. APPROVED EQUAL

All meter models above shall be at a minimum ultrasonic type with unobstructed transit time paths. All meters not listed above require prequalification. In order to prequalify, the manufacturer shall send necessary drawings and technical data to the Town of Nutter Fort and complete a minimum of six-months in field testing. Any exceptions to the specifications shall be prequalified by the above method.

## 9) Bidders Responsibility To This Specification

It is the responsibility of each bidder to carefully examine these specifications and the bid documents and become familiar with the requirements set forth herein. In addition, it is the responsibility of each bidder to submit all necessary information concerning their product to the Town of Nutter Fort. Failure to do so could result in your bid being declared as non-responsive.

### 3. Integral Universal AMI Endpoint Specification

1. The Endpoints must be a fully wireless solution for interfacing with mechanical meters that requires no externally wired connection points. The Wireless Endpoints must be integral and permanently sealed within the meter register using a stainless steel register base, wrap-around gasket, and tempered glass lens.
2. The factory-sealed register shall be fully solid-state, electronically driven only and furnished with a low flow leak detection symbol and with a reverse flow notification symbol
3. The Wireless Endpoints must be capable of retrofitting existing bayonet-style meter assets that have been previously installed by the utility. Streamlined methods for reprogramming Wireless Endpoints for retrofit compatibility with the utility's meter base must be provided. The utility must be able to stock a single Wireless Endpoint and program it to be installed on any of its existing mechanical meter assets.
4. The Wireless Endpoints within the system should monitor water consumption through the meter and shall specifically indicate possible leaks, as alarm flags to the meter data management application
5. The Wireless Endpoints shall contain tamper detection capabilities, which identifies tamper as alarm flags to the meter data management application whenever the Wireless Endpoint has been tampered with magnetically.
6. The Wireless Endpoints within the system should specifically indicate, as alarm flags to the meter data management application, whenever there is an unusual amount of reverse flow registered.
7. The register shall be identical within a given size or model subject to the programming of appropriate flow factors for compatibility with the attached bayonet-style meter.
8. Register cover box shall be made of engineered plastics attached to main case in a tamper resistant manner. The register cover box shall be equipped with a hinged lid that will overlap the register to protect the reading area.
9. The Wireless Endpoints must offer an integrated LCD that remains on at all times and provides all required information on a single display without toggling between different screens. Field personnel should be able to remove the meter lid and immediately acquire the needed information from the LCD display without having to wait for the display to trigger or toggle between screens. The register shall have an LCD display with the capability of simultaneously displaying the below information:
  - The register shall have a four (4) digit rate of flow indicator with a floating decimal to allow high resolution flow measurement

- The register shall have the ability to display 1/1000<sup>th</sup> of a measurement unit to allow high resolution for low flow meter testing or on-site inspections
  - *The LCD shall indicate reverse flow, rate of flow, low battery indication, leak alert, water temperature, as well as no flow condition.*
  - *The Wireless Endpoint's integrated LCD must show both Flow Rate and Totalized Consumption on a single display. The Wireless Endpoint and LCD display must be capable of simultaneously supporting different Units of Measure for Flow Rate and Totalized Consumption, respectively.*
  - *The register LCD shall clearly distinguish the digits for the encoder output reading by displaying lines below the encoder reading.*
  - *An effective tamper proof meter with a displayed tamper indication symbol is required.*
  - *The register shall be programmable for m3, gallons, or cubic foot registration*
  - *The LCD lens and register faceplate shall be protected by molded heat treated 0.25" glass to ensure against scratching and breakage.*
10. The Wireless Endpoint shall be battery operated using a single Lithium Thionyl Chloride battery that provides for long operational life of approximately 20 years. Batteries must be Lithium Thionyl Chloride and non-replaceable.
  11. Wireless Endpoints must be IP68 rated for protection against water, moisture, & other environmental variables common in a water meter pit installation setting.
  12. Wireless Endpoints must communicate using an FCC-licensed 450-470Mhz frequency and be certified to operate under FCC Title 47, Section 303, Part 90 as a licensed, high power communication system with a minimum transmission output of 1.7W
  13. Wireless Endpoints must utilize design features that protect against signal strength degradation due to environmental conditions common in a meter pit installation setting such as a flooded meter box.
  14. The Endpoints must be capable of self-activating based on a specified consumption level & automatically registering on the system network. Endpoints must also be capable of activation via magnet at the time of installation.
  15. Endpoints must be capable of data logging a minimum of 5760 data points & providing said data log on-demand
  16. The Endpoint must be capable of providing data logs over the AMI network to backend MDM users. Field personnel must also be able to access data logs via RF without having to remove the Endpoint from the meter pit or place the Endpoint in a dedicated data logging mode
  17. When operating in fixed network mode the Endpoints must communicate with the AMI network every 5 (five) minutes to maintain synchronization with the overall system and allow for near real-time execution of OTA commands from back-office MDM users.
  18. The Wireless Endpoints must provide an automated AMR Drive-By fallback mode to allow for drive-by data collection in the event of lost connection with the AMI fixed network.



19. The Endpoints must be fully warranted for a minimum period of ten (10) years, with an additional ten (10) years prorated under default manufacturer defined configurations. Vendors must provide a consolidated warranty outlining their warranty policies.

## **ACCEPTABLE WIRELESS ENDPOINTS**

In the interest of standardization, the following Wireless Endpoints are acceptable for use by the Town of Nutter Fort provided they fully comply with the above specifications and meet all requirements in the bid package:

1. Master Meter Allegro Under-the-Glass Interpreter
2. Approved Equal

## **4. Advanced Meter Infrastructure (AMI) & Meter Data Management (MDM) System Specifications**

### **Fixed Network AMI**

1. The system must comply with all applicable Federal Communication Commission (FCC) Rules & Regulations.
2. The system must provide secure two-way communications from the fixed network host software/head end to the Infrastructure and to the Endpoints, allowing for remote configuration and firmware updates of the Endpoints over the air.
3. While the system must allow for redundant communications (i.e. single endpoint capable of connecting to multiple base stations in the event of primary base station failure) it is the Town of Nutter Fort's preference that the system utilize a lean, point to multi-point network topology to minimize required infrastructure equipment, related maintenance costs, & communication latency.
4. The system must utilize RF communications over an FCC-licensed frequency to assure reliable, interference free communications over extended ranges.
5. The system must be capable of obtaining a minimum of one (1) read within four (4) days of the scheduled reading date from at least 98.5% of all meters installed within the system & to obtain at least 95% of all readings taken at an hourly or more frequent reading interval.
6. The system must include design features that ensure protection from both internal and external RF interference. Please describe design features that protect against internal/external RF interference.
7. The system must offer a robust link budget that exceeds 150 dB for any uplink/downlink connection in the fixed network to ensure adequate system performance is maintained in adverse RF-conditions.

8. To maintain scalability & constant access to data the system must be capable of automatically migrating between data delivery modes and operating in a hybrid AMR/AMI mode to allow for the transition from mobile read system devices to fixed network devices or vice versa.
9. The system must provide overlapping, redundant data storage throughout the various components of the system to ensure against loss of data in the event of isolated network failures.
10. The system must be capable of providing consistent metering readings at daily, hourly, & 15-minute levels of granularity.
11. The system must be capable of being configured to transmit generated alarms immediately upon the event being triggered.
12. The system must be architected in a manner to allow user commands from the MDM to be propagated through the system and completed ready for presentation to the MDM user within 5-minutes or less.
13. The system must allow a maximal time of 30 seconds between when an endpoint alarm is triggered in the field and when that alarm is presented to the user in the MDM.
14. The system must be capable of monitoring consumption & detecting suspected leaks without requiring calculations by a cloud-hosted application.
15. The system must be capable of detecting & reporting backflow conditions & events.
16. The system must be capable of detecting & alerting of tampering events.
17. All infrastructure equipment utilized by the system must be designed to protect from electrical surges.
18. All system components must have a minimum operational temperature tolerance of -20C – 65C & a humidity range of 0%-100% non-condensing.
19. All communication of data throughout the system must utilize AES-256 bit encryption & be of a proprietary format not easily deciphered by outside sources.
20. Backhaul from the system data collection points to the cloud must utilize the existing cellular network to ensure maximum security & communication reliability.

### **AMR Drive-By Mode**

When operating in AMR Drive-By mode, the system must utilize methods for synchronizing drive-by communications with associated RF-endpoints to ensure clear communication channels and transmission success to the maximum extent possible. "Bubble-Up" systems that transmit or "chirp" on a continued basis for AMR Drive-By communications will not be accepted.

## RF-ENDPOINTS

### Wireless Endpoints:

1. The Endpoints must be a fully wireless solution for interfacing with mechanical meters that requires no external wired connection points. It is preferable that no AMI Endpoint components be exposed outside of the immediate installation setting (meter pit, basement, etc.). Wireless Endpoints must be integral and permanently sealed within the meter register using a stainless steel register base, wrap around gasket and tempered glass lens.
2. The factory sealed register shall be electronically driven only and shall be furnished with a low flow leak detection symbol and with a reverse flow notification symbol.
3. The register box shall be made of an engineering plastic with the manufacturer's serial number inside the register lid.
4. Serial number of the meter shall also be permanently programmed in the electronic register.
5. Register cover box shall be attached to main case in a tamper resistant manner. The register cover box shall be equipped with a hinged lid that will overlap the register to protect the reading area.
6. The Wireless Endpoints must offer an integrated LCD that remains on at all times and provides all required information on a single display without toggling between different screens. Field personnel should be able to remove the meter lid and immediately acquire the needed information from the LCD display without having to wait for the display to trigger or toggle between screens.
7. The register shall have a multi-line display with a minimum of 12 digits on the totalizer with a stationary decimal separating single billable units from fractional billing units.
8. The Wireless Endpoint's integrated LCD must show both Flow Rate and Totalized Consumption on a single display. The Wireless Endpoint and LCD display must be capable of simultaneously supporting different Units of Measure for Flow Rate and Totalized Consumption, respectively.
9. The register LCD shall clearly distinguish the digits for the encoder output reading by displaying lines below the encoder reading.
10. The LCD shall indicate reverse flow, rate of flow, low battery indication, leak alert, water temperature, as well as no flow condition.
11. The register shall have the ability to display 1/1000th of a measurement unit to allow high resolution for low flow meter testing or on-site inspections.
12. The register shall have a four (4) digit rate of flow indicator with a floating decimal to allow high resolution flow measurement.

13. The register shall be identical within a given size or model subject to the programming of appropriate flow factors for the particular meter.
14. An effective tamper proof meter with a displayed tamper indication symbol is required.
15. The register shall be programmed initially to read in the designated unit of measure as defined by the utility.
16. The transparent LCD register glass lens shall be made of molded heat treated 0.25" glass to ensure against scratching and breakage.
17. The Wireless Endpoints must be capable of retrofitting the existing meter base that has been previously installed by the utility. Streamlined methods for reprogramming Wireless Endpoints for compatibility with the utility's mechanical meter base must be provided. The utility must be able to stock a single Wireless Endpoint and program it to be installed on any of its existing mechanical meter assets.
18. The Wireless Endpoint shall be battery operated using two 3.6volt Lithium Thionyl Chloride batteries for long operational life of approximately 20 years. Batteries must be Lithium Thionyl Chloride and must be fully potted and non-replaceable.
19. Wireless Endpoints must be IP68 rated for protection against water, moisture, & other environmental variables common in a water meter pit installation setting.
20. Wireless Endpoints must utilize design features that protect against signal strength degradation due to environmental conditions common in a meter pit installation setting such as a flooded meter box.

### **Wired Pit/Wall-mount Endpoints**

1. For installations where a Wireless Endpoint is not feasible, wired Pit/Wall- mount Endpoint configurations must be made as available options for use as needed.
2. Pit-mount RF Endpoint antenna lid must be 4.5" or less in diameter to fit within industry standard pit lid recesses and the antenna neck must fit snugly within a 1.75" hole in the meter lid with a locking mechanism for securing the device underneath.
3. Pit-mount RF Endpoints must be compliant with ADA Trip Hazard 303.3 regulations when not installed beneath the lid or within industry standard pit lid recess.
4. Wired Pit/Wall-mount Endpoint configurations must provide a visual indication to the installer of the Endpoints status during network activation process.
5. Wired Pit/Wall-mount Endpoints must be capable of "smart" encoder detection and should require no additional programming to establish compatibility with the attached encoder.

6. Pit-mount Endpoints must be IP68 rated for protection against water, moisture, & other environmental variables common in a water meter pit installation setting. IP-67, non-submersible rating is acceptable for wired Wall-mount Endpoints.
7. The Endpoints must be capable of self-activating based on a specified consumption level & automatically registering on the system network. Endpoints must also be capable of activation via magnet at the time of installation.
8. Endpoints must be capable of data logging a minimum of 5760 data points (roughly 60 days of 15 minute reads) & providing said data log on- demand.
9. When operating in fixed network mode the Endpoints must maintain continuous synchronization with the network & timestamp all data transmissions.
10. The Endpoints must be fully warranted for a minimum period of ten (10) years, with an additional ten (10) years prorated under default manufacturer defined configurations. Vendors must provide a consolidated warranty outlining their warranty policies.

## **AMI NETWORK INFRASTRUCTURE**

1. The Vendor may Network Infrastructure equipment on public buildings, water reservoirs, and any City owned light poles.
2. Vendor must design Network Infrastructure coverage utilizing existing municipal assets available to the Town of Nutter Fort before proposing alternative installation locations.
3. The Vendor will provide tower structures for Network Infrastructure equipment if a Town of Nutter Fort owned asset is not available at the desired installation location. Tower structure details & specifications will be included in the proposal for all Vendor provided structures required to support the network with design approval to be authorized by the Town of Nutter Fort prior to installation.
4. Vendor will provide necessary equipment, wiring, enclosures, & other associated hardware necessary for installation of Infrastructure Equipment.
5. Vendor shall install all Network Infrastructure equipment, installation mounts, wiring, & other associated hardware.
6. Network Infrastructure equipment will utilize an existing cellular network for data backhaul to ensure maximum security & minimize the (*Utility*) responsibility to maintain network availability.
7. Network Infrastructure equipment must be subject to an extended maintenance program capable of sustaining a system operating life of 20 years. Respondents shall describe quality control, warranty, & maintenance policies that enable the system to meet this life-cycle goal.

8. Vendor will provide an alternative power source, where applicable, should access to the electrical grid not be available at desired installation location.

## SOFTWARE APPLICATIONS

### Fixed or Drive-By Network Host Software Overview

The host software MDM (Meter Data Management), shall have the basic capability of supplying the following features to the end user:

- Employ thin-client (browser-based) architecture wherein the database is centralized, and the host application requires no local install, but is accessed through any Internet browser.
- Utilize a standard file layout format to interface with the utility's CIS for both on-cycle and off-cycle meter reading.
- Interface with third-party applications such as work order systems via a standard interface (e.g., web services).
- Customizable reporting engine which provides key reports on advanced usage analysis included within the application: district metering, consumption reporting, troubleshooting, leak report, tamper report, reverse flow report, and non-billable report. A list of all reports and a brief description of each report included within the application are provided in the Reporting Section.
- Customizable dashboard that provides key performance indicators (KPIs) to allow for proactive monitoring of system health and performance. Provides a wizard-driven priority alarm configuration capable of sending information directly to key utility personnel (via email or SMS) based on predefined triggers and thresholds.
- Able to export data to Microsoft Excel, PDF, .CSV and Word applications.
- Designed to hold two (2) years of history for direct access, with an option for secondary direct access storage and reporting of older usage history.
- Provide an export of key data for third-party meter data management or customer web presentment.
- Provide an embedded mapping tool that enables visual interpretation and analysis of data within the fixed network system to reveal relationship patterns and usage trends. The map-based interface component provides viewing, selecting, managing, and reporting options on all assets that are managed by the system.

### General Mapping Component Features:

The mapping software capabilities shall meet the following specifications:

- Highly interactive (drag-and drop) mapping interface.

- Auto-zoom to map display result set.
- Ability to display MIUs, base stations, and other system components on the same map interface.
- Ability to display other maps managed by the utility, such as pipe distribution networks, laterals, etc.
- Polygon selection capabilities for all entities displayed on the map.
- Ability to send selected items from the mapping component directly to the customer service screen for display.
- Ability to create groups from map queries and polygon selections.
- Ability to view all MIUs, base stations, and compatible leak monitoring devices contained within the fixed network software on a map.
- Ability to display MIUs based on unique device attributes such as continuous/intermittent leak, major/minor backflow, no consumption, inactive status, etc.
- Ability to query and display MIUs based on MIU's conditions such as owned, data pending, last heard time, inactive with usage, etc.
- Ability to add date or value ranges and tolerances to specific queries, such as inactive usage, zero consumption, etc.
- Ability to generate queries based on specialized conditions such as soft or virtual disconnects.
- Ability to auto-generate (geocode) map coordinates for above assets (requires complete address information or additional GPS hardware).
- Ability to display all relevant dashboard KPI items on a map.
- Ability to display groups of MIUs on a map, either from a specialized search, by predefined group indicators, or by list upload.
- Ability to generate result queries to display on a map from events and alert lists.
- Ability to create customized queries to display MIUs based on attributes and save them for future use.
- Ability to publish defined map queries for use by other map component users (administrative rights required).
- Ability to layer multiple map queries onto a common base map.
- Ability to print maps, including any attributes and/or MIUs displayed.
- Ability to export any MIUs or attributes displayed on the map to MS Excel (.xls), .csv or .pdf formats.

Additionally, the host software will also have the basic capability of providing the following data to utility on a twice daily basis:

- An hourly time-synchronized meter reading from all water meters for monthly billing purposes.

- 12 hourly usage/consumption readings delivered twice daily for resolution of customer billing disputes and improved customer service.

### **Fixed Network Host Software – High Level Requirements**

The selected MDM shall provide all the control needed in the network and be capable of the essential functions of network management, meter communications, reporting, database configuration, and alarm monitoring. It must comply with prevailing industry standards and shall be hosted within Microsoft Azure and/or Amazon Web Services (AWS) cloud computing services.

The host software shall be able to interface with handheld, touch read, AMR mobile, and fixed network meter reading software to enable a hybrid meter reading approach. The MDM shall also be compatible with any future reading systems that Master Meter will deploy for at least 15 years.

Additionally, the MDM shall interface to utility's CIS/billing software via either file import/export capabilities; the meter reading data communicated to the CIS system will be provided in an ASCII flat file format.

### **Meter Data Management – Detailed Requirements**

Meter data management software shall help manage the key water metering infrastructure including meter inventory, meter reading, and meter reading and consumption history.

Specifically, the selected MDM software shall provide:

- Ability to define, add, change and delete an unlimited number of meters and meter types.
- Ability to identify a meter by type, size, serial number, electronic ID, manufacturer, location, tested date and install date.
- Ability to enter meter reading data through data entry screens or from handheld devices or wireless automated meter reading systems by Master Meter or others.
- Ability to automatically calculate consumption upon entry or import of meter readings; including the ability to edit readings.
- Ability to automatically truncate, round, or add zeroes to meter readings.
- Ability to allow concurrent meter reading data entry of one route while processing billing for another.
- Ability to maintain meter readings and dates independent of customer or account changes.
- Ability to enter a meter change without interruption of the billing cycle or final billing.
- Ability to generate work orders based on meter readings exception reports and/or actions entered along with meter readings.
- Ability to include meter location notes to communicate the location of the meter at the service location to the meter reader.
- Ability to view history of all meters that have been installed at a service location.



- Ability to record unlimited notes for a meter.
- Ability to define meter reading types, such as manual, radio read, etc.; and differentiate between actual reads and estimated readings.
- Ability to automatically identify roll-over readings based on meter setup.
- Flexible high/low feature that allows the user to set a range of parameters that estimates "normal" consumption range for comparison to actual read in order to screen for variables such as high/low consumption, no reading, zero consumption, etc.
- Ability to change out meters at any time. Where meters have been changed out and the ability to show separate individual meter readings and consumption to show total consumption and billing amount on the same bill.
- Ability to change meter reading sequence without changing the customer account number.
- Ability to graphically display consumption history for an account.
- Ability to display average consumption by month for an account or all accounts both graphically and numerically.
- Ability to maintain reading instructions or location notes, prints the instructions/notes on meter reading sheets, and provides this information in the meter reading interface.
- Ability for the user to flag individual accounts for which zero consumption is not considered to be an exception. This would cause the account not to show on a Reading Exception Report.
- Ability to search for meters using the following criteria: Meter Serial Number, Meter Electronic Number, Reading Device, Meter Interface (Booster), Hours Since Last Read, Service Type, Route-Site Name, Meter Interface Status, Only Meters With Alarms, Include Scrapped/Removed Meters.
- Ability to Import and Export Route/Site Data through custom interfaces that are configurable by the user.
- Ability to setup, configure, and review DMA Leak Zones.
- Ability to search for meter testing results using Meter Serial Number, Meter Electronic Number and a Testing Date Range.
- Ability to track mobile devices using GPS and a mapping product.
- Ability to report all meter readings that were uploaded to the system within a given time frame for a specific meter.
- Ability to generate a Manual Reading Worksheet based on the following criteria: Route, Cycle, Service Type, Last Read Date, Location Number, and Location Status.
- Ability to generate a Meter Reading Report showing the most recent reading in the system using the following criteria: Reading Date, Meter Serial Number, Meter Electronic Number, Reading Device, Service Type, Route-Site Name, and Include RF Meters Only.

- Ability to generate a Consumption Report showing individual and combined usage using the following criteria: Reading Date, Meter Serial Number, Meter Electronic Number, Reading Device, Service Type, Route-Site Name, and Include RF Meters Only.
- Ability to generate an Inactive Location with Usage Report using the following criteria: Reading Date, Meter Serial Number, Meter Electronic Number, Reading Device, Service Type, Route-Site Name, and Include RF Meters Only.
- Ability to generate Reading Exception Reports showing anything that is out of the ordinary, such as a reading that has not changed since the last reading cycle (stopped meter), a reading that is missing (unread meter), or a reading that includes a Dialog 3G® AMR alert like "leak" or "tamper" using the following criteria: Reading Date, Reading Device, Service Type, Route-Site Name, Alarm Type, and Include RF Meters Only.
- Ability to generate a meter list from the system using a Meter Query & Report option with the following criteria: Meter Serial, Electronic or Booster Numbers, AMR Type codes, Meter Readings, Purchased Date, First/Last Installed Date, Last Tested Date, Scrapped, Removed Meters, and/or DMA leak zone Service Meters, Service Type, Street Address, Electronic Meter Type, Physical Meter Type, Meter Size, Meter Manufacturer, Check Valves installed, or Meters with No GPS Coordinates on file. Using this criteria the following report formats are available: Meter Listing showing one Meter per line, Meter Detailed Report showing most information on file, and Meter Count Report.
- Ability to generate a Meter Change Report using the following criteria: Change Out Start and End Dates, Service Type and Route.
- Ability to generate System Health Reports showing Meters assigned to multiple Locations, Meters not assigned to a Leak Zone, and Locations with multiple Meters assigned to them, using the following criteria: Service Type, Route, Include Scrapped Meters, Include Subtraction Meters, Included Removed Meters.
- Ability to generate a Meter Test Required Report showing which meters need to be retested and certified, based on age or accumulated usage using the following criteria: Electronic Meter Type
- Ability to generate a Quarterly Meter Test Report showing the information required for your state's public service commission including the number of metered and no metered services by customer class, Test Year, Meter Test Program, Approval Agency, Test Quarter, Sample Method Plan, Date Submitted, Meters to be tested this year, Meters actually tested this year, and Meters remaining to be tested this year.
- Ability to Manage Backflow Devices using a Check Valve Report to show customers that have check valve assemblies installed and will need them inspected soon using the following criteria: Billing Cycle and Check Valve Inspection Required By Date.

- Ability to Manage Backflow Devices by printing form letters informing customers about the upcoming check valve inspections using the following criteria and sorting those letters for proper postal automation: Billing Cycle and Check Valve Inspection Required By Date.
- Ability to Manage Backflow Devices by printing mailing labels for the purpose of informing customers about the upcoming check valve inspections using the following criteria and sorting those labels for proper postal automation: Billing Cycle and Check Valve Inspection Required By Date.
- Ability to Manage Backflow Devices by allowing the utility to add fees to the customer accounts for the purpose of paying for the upcoming check valve inspections using the following criteria: Billing Cycle and Check Valve Inspection Required By Date.
- Ability to Setup and Manage Route Information using the following information: Route or Site Description, Route Number, Current Assigned Device, Current Status, Export Only Meters with Alarms for Route, Change Status on Export, Billing Import and Export File Format (Bridge), Billing File Name, Service Types, Documents Assigned to Route, Meters Assigned to Route, and Mobile Read Age.
- Ability to Audit Route Status Changes using the following information: Changed Date, Changed From, Changed To, Device Assigned, Deleted (Y/N).
- Ability to Specify what Information will show on the Screen of Mobile Meter Reading Devices.
- Ability to Setup and Manage DMA Leak Zone Information using the following information: DMA Leak Zone Name, Monitoring Period in Minutes, Minutes Between Monitoring Periods, Days to Retain DMA History Records, Time and Date to Begin Saving Readings, Deviation For Low Use Warning, Deviation For High Use Warning, Deviation For Possible Leak Warning, Fixed Network Processing Time Allowance and Zone Color.
- Ability to export a file for outsourced (3rd party) bill printing.

## **MDM EMBEDDED WORK ORDER MANAGEMENT**

Creation and maintenance of work orders shall include assigning, printing, managing and closing work orders for any reason. Work order types including (but not limited to) new accounts, closing accounts, disconnections, and meter re-reads. The system shall also allow for entry of follow-up dates on work orders.

The selected MDM will also provide:

- Ability to generate work orders based on meter readings exception reports and/or actions entered along with meter readings.
- Ability to dispatch and receive completed work orders via the internet.
- Ability to track the current location of field workers.
- Ability to define, add, change and delete an unlimited number of work order types.

- Ability to provide automated updates upon completion of a work order.
- A history of all work orders related to a service address remains with the service address record.
- Ability to automatically update customer, location, meter and account information upon completion of work order.
- Ability to print or email work orders based on user-defined selection criteria.

### **Mobile Reading System & Mobile Data Collection Unit (MDCU) Mounting and power**

The MDCU must be a portable interrogator designed to operate from within a vehicle. The unit must be capable of transfer between vehicles without difficulty. The mobile interrogator should be powered from the vehicle battery. There must be a back-up battery to preserve internal memory.

### **System Operation**

The MDCU will provide signals such as audible tones to the driver during the reading of a route so that the driver will not have to take his or her eyes off the road. The reading software shall process all incoming RF data within range of the Receiver. Readings shall be automatically inserted into the correct account records based upon a MIU/Meter ID search. Once started, the reading software shall not require user intervention.

### **System Software**

The reading system software shall be a true Windows 32bit application. Any databases used shall be ODBC compliant meaning the district can access their data without the reading system software (i.e. Microsoft Office, Crystal Report Writer). Route data and incoming reading data shall be optionally displayed in a text format or, graphically displayed on maps showing water utility streets and roads. The reading system software shall provide a function to determine meter latitude & longitude based on meter service address. Read and unread meters shall be displayed at the same time. The reading system software shall flag all problem codes such as tamper detection, no-reads, etc.

### **System Reports**

The reading system software must provide the ability to create and modify system reports with a third party report writer such as Crystal reports. Standard reports shall include but not be limited to the following:

- **Reading Master Report.** Master list showing Customer Name, Service Address, Meter ID, Previous Reading and High Read Limit.
- **Reading Exception Report.** A list showing all readings that failed the high/low limit test, zero usage test or unread meter.
- **Meter Alert Report.** A report designed to list problem meters. Problems reported should include Leak Alarms, Back Flow or Tamper.
- **Orphan Read Report.** A listing of radio readings received but not found in reading route.

### **Control Computer**

The system should operate using a standard laptop computer with an RS-232 serial port. The MDCU shall include the Intel® Core™ Duo Processor, 512MB SDRAM minimum, easily removable and shock mounted hard drive with a minimum capacity of 60GB, integrated 1.44MB floppy drive, CD-ROM and a 3-Year manufactures warranty. Additional interfaces should include a wired and wireless network interface, modem, USB and serial ports. The display shall be a minimum 15" Active Matrix Color LCD and 128MB VRAM.

### **Transceiver**

The MDCU shall utilize a transceiver that must operate in the 902-928 MHZ license free frequency range and shall operate under FCC Part 15 regulations. The transceiver shall connect to the control computer through the use of either a standard serial or USB port. It shall be capable of receiving either single channel or frequency hopping spread spectrum transmissions from the MIU. It shall be powered by the vehicle's 12volt cigarette lighter adapter with a reserve battery life of approximately 3 hours. The transceiver shall be furnished with all cables and suitable magnetic mount antenna.

### **Migration to Fixed System**

The Town of Nutter Fort desires that the mobile AMR radio system be capable of conversion to a fixed network radio system as part of its future enhancement. Any future design or technological radio changes should be compatible with the current radio system being implemented to protect current investments in equipment and training.

### **Field Programming and Testing**

The MDCU should include software for field programming and testing of the MIUs. The system must allow for single unit or batch programming. Please indicate if additional equipment is required for programming and testing MIUs.

### **Manual Entry**

The system must permit manual entry of meter readings and comments.

## **Software Documentation**

Documentation shall be and shall include at a minimum: system overview description, record layouts, description of program function and logic, operating procedures, screen layouts, data entry procedures, report descriptions and descriptions of all user options.

## **Software License & Support**

All software must be supplied with a perpetual license indicating the software's designer, owner and licensor, and detailing the manufacturers terms and conditions, including annual cost of maintenance by the Vendor.

## **DATA REPOSITORY & CONSUMER WEB PORTAL (INTERFACE COMPATIBILITY WITH MY WATER ADVISOR AND WATERSMART)**

The fixed network software suite has a data repository and consumer web portal option available, which is a cloud-based data management and analytics package that provides long-term data storage, web presentment for utilities and consumers, and advanced consumption analysis and reporting.

The application will have the capability of supplying the following features to the end user.

- Provide at a minimum hourly data to both utility users and utility customers.
- Provide a method for utility's customers to view their own consumption information through a customer web portal.
- Provide the ability for utility's customers to view and manage multiple meters and/or multiple accounts.
- Provide a method to ensure complete integration into utility's existing website to establish a consistent look and feel (header, footer, color, etc.).
- Provide a method for utility's customers to set water budgets and a method to alert them in the event they exceed their budget.
- Be able to provide 15-minute interval leak and reverse flow monitoring and alerts via email to utility's customers. These alerts can be generated by the MIUs themselves, or, if an MIU option is not available, by the data repository system.
- Allow utility's customers to configure their system to receive alerts and configure the timeframe at which alerts are sent.
- Provide a method of displaying and utilizing temperature and precipitation data synchronized with the consumption data in the system for data analysis purposes. This information must also be made available to utility's customers.
- Be able to display synthesized data to the customer.
- Enable users to display consumption information in both graphical and tabular formats.

- Provide a method to allow utility's customers to compare their consumption against utility created, predefined groups.
- Allow utility's customers to set multi-level communications for leak, reverse flow, and consumption alerts.
- Provide a method to export data in Adobe PDF and MS Excel formats.
- Provide daily water budget analysis.
- Provide the ability for customer to enroll in or deactivate paperless billing.
- Provide the ability for customer to sign up online bill pay (using credit /debit card or ACH). Utility is sent an email alerting them to this so they may verify accuracy of data entry.
- Provide the ability to allow customer to manage or change their email address for paperless billing.
- Allow customers to access their own account history, including monthly consumption, current month in comparison to previous month, and historical consumption for comparison.
- Allow customers to an electronic copy of their utility bill in full-page format.

### **Remote Utility Data Repository – must utilize Microsoft Azure or Amazon Web Service Cloud Infrastructure**

The MDM system shall:

- Be able to store up to ten (10) years of once daily reads of AMI/AMR data for immediate real-time access and must provide this data within the data repository, reporting, and customer web presentment environments.
- Be able to display data graphically and in tabular form to both utility's users and customers.
- Be able to export data in Adobe PDF and MS Excel formats.
- Allow the data repository and web presentment application to not impact the performance of the operational AMI/AMR data collection system.
- Allow the data repository to provide custom reporting and data analysis.
- Provide a method for the utility to load customized reports without vendor assistance.
- Provide a method of performing District Metered Area (DMA) analysis.
- Be able to support network meters, deduct meters, and compound meters.
- Be able to store additional forms of data other than consumption data for long-term reporting and analysis purposes.
- Allow the vendor to promptly demonstrate all required and offered features of the utility data repository via live onsite or remote use of the actual system if requested.
- Provide consumption analysis of daily, monthly, and yearly data.

- Provide alarm notification for events such as leaks and reverse flow events for water utility customers.
- Provide a consumer web portal for utility customers to view consumption data and configure leak and/or reverse flow alerts.
- Contain a customer self-enrollment process.
- Be able to allow the customer the ability to configure consumption thresholds based on daily water budget values and receive alerts when that consumption has been exceeded.
- Be able to deliver alerts via email.
- Provide a list of standard reports.

## TRAINING AND SUPPORT

1. Vendor shall provide training to the *Town of Nutter Fort* employees (operators and administrators). The price shall include all travel related expenses. Training shall include a minimum of twelve hours, occurring only Monday through Friday, of on-site instruction on the operation procedures for the AMI system. Complying with the minimum period of time specified above will not relieve the Prospective Bidder of providing sufficient service to place the AMI system in satisfactory operation.
2. At a minimum, the training must cover the use of the Network Infrastructure equipment (if applicable), error coding, uploading and downloading data from the reading devices from the AMI system software, and AMI system software interfacing with the existing billing system
3. Vendor's training program shall be described, highlighting how it addresses each of the following components:
  - AMI system operation, including obtaining readings, transferring data between the MDMS and compatible CIS, creating reports, diagnosing issues, definitions and recommendations for resolving alerts/alarms, customer account processes, meter change-out, etc.
  - Meter reading database management
  - Field diagnostics and maintenance
4. Vendor shall train all appropriate Utility staff to enable staff to effectively operate and maintain the system, and proficiency will be determined according to the Customer Acceptance Plan to be defined prior to contract signing.
5. Training must be accompanied by workbooks and training materials, with additional supporting materials composed and provided as requested by Utility staff.
6. The training schedule shall be coordinated with the Town of Nutter Fort. The training on operation of the AMI system shall not occur until after the software has been installed and the billing interface file has been written, tested, and is working successfully to transfer meter reading data to the billing system.



7. Vendor shall include recommendations and requirements for AMI system preventative maintenance, back up, archiving, etc.
8. Respondent must provide telephone, online, and on-site support, as needed from the effective date of the AMI system contract until the date of customer acceptance of the pilot phase of installation, at no additional cost to the Town of Nutter Fort. Until customer acceptance has occurred, no maintenance or support contract/agreement will be made effective.
9. Respondent must provide telephone, online, and on-site support, as needed, for 20 years from the expiration of the initial support period, as shall be set forth in the End User License Agreement

## **PROJECT MANAGEMENT AND SCHEDULE**

1. The selected Bidder shall provide project management for their Scope of Work as detailed herein. The Project Manager shall be required to coordinate activities with the Owner and Owner's representative.
2. The Vendor shall provide their proposed statement of work and project management responsibility documentation, which includes system installation, configuration, and testing.
3. The Vendor shall submit a project schedule that includes: securing a FCC license (if required), network delivery, installation, configuration (including transfer file with billing system), meter and AMI endpoint delivery, system testing, and training.
4. The Vendor shall work cooperatively with the Town of Nutter Fort project managers and project team members and maintain responsiveness to action items and issues resolution tasks assigned through the project management team as part of the implementation plan.

## ACRONYMS AND DEFINITIONS

Term	Definition
<b>AMI</b>	Advanced Metering Infrastructure – fixed base, 2-way read infrastructure
<b>Endpoint</b>	Network component responsible for interfacing with the meter to collect data & transmit via RF to Network Infrastructure
<b>Network Infrastructure</b>	Any piece of RF equipment that is responsible for the collection & transmission of data to & from the Endpoint, the Base Station, the Head End System (HES)
<b>Repeater</b>	Optional piece of Network Infrastructure equipment responsible for relaying data to & from the Endpoint & the Base Station
<b>Base Station</b>	Responsible for serving as the data collection point & communication coordinator between the Endpoints, Repeaters, & the HES
<b>HES (Head End System)</b>	Cloud-hosted data aggregation point responsible for interfacing the user facing Meter Data Management application with the AMI Network
<b>MDM</b>	Meter Data Management software responsible for aggregating & reporting on meter data provided by the AMI

## ACCEPTABLE AMI TECHNOLOGIES

In the interest of standardization, the following AMI system technologies are acceptable to the Town of Nutter Fort, provided they fully comply with the above specifications and meet all requirements in the bid package:

- MASTER METER ALLEGRO AMI
- APPROVED EQUAL