W1054WTE

SUPPLY, INSTALLATION AND MAINTENANCE OF ADDITIONAL SMART WATER FLOW METERING TECHNOLOGIES FOR THE DEPARTMENT OF WATER AND SANITATION FOR A TERM CONTRACT PERIOD OF THREE (3) YEARS

GENERAL SPECIFICATIONS

1. GENERAL TECHNICAL SPECIFICATIONS

1.1 MECHANICAL WATER FLOW METER

1.1.1 OPERATION

The turbine type water meter shall be able to measure raw water flowing through the meter. The mechanical drive should be able to convert/translate the rotations into volume totalization displayed on the register dial face. Shall have provision to be read remotely and/or by a suitable drive-by hand held unit.

1.1.2 CONSTRUCTION

Meters shall consist of three basic components: Cast Iron Epoxy Coated main case, measuring element, and sealed register. The measuring element assembly includes the rotor assembly, vertical shaft and a calibration vane which eliminates the need for calibration change gears.

1.1.3 MAINTENANCE

Water meter shall be engineered and manufactured to provide long-term service and operate virtually maintenance free. If necessary the measuring element must be removable from the main body case for maintenance or replacement, without removing the entire body from the line.

1.1.4 STRAINERS

All meters shall contain a removable polypropylene plastic strainer screen. The strainer shall be located near the main case inlet port, before the measuring chamber. The strainer shall also function as the device that holds the measuring chamber in place within the main case. Straps or other types of fasteners shall not be accepted.

1.1.5 CONNECTIONS

The meter shall come with companion flanges for installation of meters on various pipe types and sizes in bronze or cast iron

1.2 BROCHURE

All Bidders should attach product brochure that shows the full technical specifications of the meter being offered.

1.2 UTRASONIC WATER FLOW METER

1.2.1 GENERAL

Type of flow meter required	**ULTRA SONIC**
Mode of operation	**TRANSIT TIME/TIME OF FLIGHT**
Pipe material	**CARBON STEEL, PVC, FIBRE CEMENT, DUCTILE IRON, FRPM, GRP, ETC**
Pipe outer diameter	**25mm to 8000mm**
Pipe wall thickness	**1 TO 100mm**
Pipe internal lining	**PAINTED, BITUMEN, EPOXY, ZINC.**
Average thickness of internal lining	**LESS THAN 1 MM TO 50 MM**
Pipe outer cover	**PAINTED, BITUMEN, EPOXY OR NONE**
Distance between transducers and signal converter	**UP TO 300 m**
Fluid to be measured	**RAW WATER**

1.2.2 FLOW METERS

The flow meter/s and other equipment shall be installed in an instrument panel that complies with the minimum requirements for IP 65 rating as per Part 3, Item 3.3.11. All cable entries shall be fitted with the appropriate size and type of cable gland. All cable glands shall comply with an **IP 68** rating. Only 230 V single phase, AC power is available and any other power requirements are to be provided for by the Bidder.

1.2.2.1 Each complete flow meter shall incorporate and or comply with the following

Dual path instruments shall use **FOUR** sensing units (transducers) per pipeline that are connected via transducer cable to the signal conversion unit. The instantaneous flow for each pipeline shall be continuously displayed by means of a separate and free standing digital indicator. The accumulated flow for each pipeline shall be continuously displayed by means of a non-resettable electro-mechanical counter. The sensing (transducers) units shall be electrically isolated from the pipeline. It shall have a facility to adjust for the various pipe diameters. It shall give a quantifiable indication of a fault condition and/or signal loss occurs.

1.2.3 TRANSDUCERS

Transducers to be used shall be of the non-wetted type and shall be externally mounted on the pipeline. No welding of any kind shall be allowed for the mounting of the transducers. All transducers shall only be attached to the pipeline with stainless SS306 or SS316 steel brackets. TRANSDUCERS SHALL COMPLY WITH AN IP 68 RATING. Transducer cables to be installed in 32 mm galvanized steel conduit. No more than four (4) transducer cables in any 32mm conduit. Secured at intervals of no more than 500 mm. All bends shall have inspection covers or covered draw boxes shall be installed.

1.2.4 FLOW ACCURACY FACTORY

Pipe Diameter 25mm to 8000mm
Velocity: ± **30** to **0,8 m/s**: **0.2 %** of reading.
Velocity: ± **0,8m/s** to **1,0 m/s**: **1.0 %** of reading.
Flow velocity range: **+ and – 30 m/s**
Repeatability: **Less than 0,5** % of full scale

1.2.5 POWER REQUIREMENTS

230 V, Single phase, AC power is available on some site.

1.2.6 OUTPUTS REQUIRED

DIGITAL DISPLAY (incorporated in signal conversion unit)
Liquid crystal display with LED back light.

ANALOGUE OUTPUTS
Isolated outputs: 0 to 20 or 4 to 20 milli amp, Load capability of isolated output at least 750 Ohm, 2 off Totaliser/pulse/frequency type of output [3 amp, 100 VDC, 1 Watt, 0.1 to 10 kHz], Totaliser/pulse/frequency output to be optically isolated

DIGITAL OUTPUTS
Output to be galvanically isolated, Protocol to be used on serial port: MODBUS, Variables to be date and time stamped, Access speed allowed on variables max 1 Sec

VOLUMETRIC FLOW DISPLAY [User selectable] Cubic meters/second, Liter/second

TOTALISER [Forward and reverse] selectable from **10000 TO 0,00001** m^3

1.2.7 DIGITAL INDICATOR

One indicator is to be supplied for each flow meter. The digital display shall be a 6-digit, 0.56" (14.2 mm) High Red L E D, giving a maximum display of 999999. The decimal point shall be selectable. A flashing display shall indicate totaliser overflow.

Programmable to display the instantaneous flow and by means of a selector button the accumulated quantity of water. Front bezel shall meet NEMA 4/IP65 requirements. Shall have a lock-out facility to limit operator entry to the programmable settings and totaliser. Time base with a scale factor of 0.001 to 100.0 and a low-end cut-out. Shall be able to reset the integrator on totaliser overflow. The digital indicator to be fitted into IP 66 enclosures in such a way that the reading is clearly visible with space available for the labeling and surge protection as specified.

1.2.8 TOTALISING COUNTER

One totalising counter is to be supplied for each flow meter. Mode of operation: **Electro/ mechanical,** Number of digits at least 8, Height of digits not less than 4mm, Non – resettable, Shock-stability to IEC 068-2-27: 600 M/s^2 ,Vibro-stability to IEC 068-2-6: 50 M/s^2, Minimum Pulse length DC counter: 20 ms
AC counter: 50 ms, The totalising counters to be fitted into IP 66 enclosures in such a way that the reading is clearly visible with space available for the labeling and surge protection as specified.

1.2.9 TYPE TESTING AND CALIBRATION

Type test certificates to be submitted with bid documents. Calibration certificate to be supplied for each instrument as supplied under this contract

1.2.10 INSTRUMENT CABINET

Flow meter, Digital indicator, Totalising Counter, Power supply, Batteries, Electrical surge protection and related equipment to be installed in the instrument panel. Minimum dimensions 800 (H) x 600(W) x 300 (D) Rated minimum degree of ingress protection: **IP 66,** Instrument panel and all doors to be constructed from glass fiber reinforced/impregnated polyester. Shall be wall mountable with 4 stainless steel wall mounting lugs giving a space of at least 10 mm between the enclosure and the wall. Shall be fitted with a painted metal chassis of at least 2,5 mm thick. The instrument panel to be fitted with a glazed door that allows sights of the indicator/s and integrator/s. The window to be at least 50% of the front area. Resistance of the enclosure with the glazed door to comply with IK 08 (5 Joules) to EN 50 102. The external door shall be removable and have concealed hinges and captive, stainless steel hinge pins. The external door shall have an in situ moulded polyurethane sealing gasket fitted to a groove. Only two closure points that are situated outside the sealed area. At least one of the closure points shall be lockable with a cylindrical barrel type lock and two keys shall be supplied for this lock. Fitted with an internal door for mounting of the totalisers and integrators. Each enclosure to be fitted with an M10 brass bolt, two brass nuts and two rubber washers of two mm thick that will act as an equipotential bar. All surge protection in the enclosure to be grounded onto this bolt. The earth mat connection shall terminate on this bolt on the outside of the cabinet.

1.2.11 SURGE PROTECTION

Irrespective of the surge protection as specified the successful Bidder shall fully guarantee all the equipment as supplied under this bid for the full guarantee period of at least 24 months.

APART FROM ANY SURGE PROTECTION AS MAY BE DEEMED NECESSARY BY THE BIDDER THE BIDDER SHALL MAKE PROVISION IN HIS BID FOR THE SUPPLY, INSTALLATION AND COMMISSIONING GUARANTEE OF THE FOLLOWING SURGE PROTECTION:

1.2.11.1 Single pole, Class II arrester in accordance with IEC 60364-7-712:2002-05, fitted with zinc oxide varistor, Dehn Guard, Rated voltage 275V AC, Max Discharge current (8/20): 40 kA, Response time<25 ns, 35 mm Din rail mounting.

1.2.11.2 Single pole surge arrester for Zone 0_B – 1, arrester in accordance with IEC 61643-1. Dehn gap, Rated voltage 255V/ 50 Hz, Nominal discharge current (8/20) : 20 kA., Response time<100 ns, Voltage protection level, 1200 V, 35 mm Din rail mounting.

1.2.11.3 Two pole surge protection device with supervisory and disconnection with base and plug in module. In accordance with IEC 61643-1, Dehn rail, Nominal voltage 230V AC, Nominal Current 25 A, Nominal Discharge current (8/20): 5 kA, Response time<25 ns, Protection level <1200V, 35 mm Din rail mounting.

1.2.11.4 Two pole surge protection device with plug in module. Device in accordance with IEC 61643-21, Blitzductor, Nominal voltage up to 110V AC, Nominal Current 1A, Nominal Discharge current (8/20) : 20 kA., 35 mm Din rail mounting.

1.2.11.5 Transducer cable surge protection to be installed on all transducer cables, One unit for each transducer

1.2.11.6 Stranded Copper cable for connection of the pipeline spark gap to the earthmat and instrument cabinet equipotential earth point to earth mat. Cross sectional area not less than 35 mm^2. Complete with appropriately sized, crimped lugs. Installed in 25 mm^2 PVC ducting that is secured at intervals of no more than 500 mm apart.

1.2.12 GUARANTEE PERIOD/WARRANTY

ALL EQUIPMENT SUPPLIED UNDER THIS BID SHALL BE UNCONDITIONALLY AND FULLY GUARANTEED FOR A MINIMUM PERIOD OF 24 MONTHS FROM DATE OF COMMISSIONING.

1.2.13 OPERATION AND MAINTENANCE MANUALS

6 Operation and maintenance manuals to be supplied for EACH SITE. 3 Hard copies in suitable Arch-lever files and 3 CD's

1.2.14 CERTIFICATES

During the contract period at least four possibly five types of certificates are to be issued for each flow meter system. The five certificates are:

1.2.15 FACTORY ACCEPTANCE TESTING/INSPECTION

All equipment supplied under this Bid shall be fully factory tested and inspected to ensure its Bid compliance. All factory acceptance tests shall be witnessed by the Engineer on a mutually agreeable date before delivery to site. No equipment shall be accepted on site before a successful factory acceptance test.

It shall be proven with a wet test in a pipe of length at least 20 times the internal diameter and a diameter of not less than 100 mm that the equipment functions at a)

no flow , b)with a flow velocity of at least 0.5m/s and c) at a velocity of more than 1.5 m/s.

1.2.16 PORTABLE UNIT AND TRAINING

All Bidders should provide unit costs for a portable unit that will be used for on-field verification of meters in service, which will be used by our staff. Make provision for training DWS staff on the use of such a unit. Training may be per person and should include certification thereof.

1.2.17 BROCHURE

All Bidders should attach product brochure that shows the full technical specifications of the meter being offered.

1.3 AREA VELOCITY WATER FLOW METER

1.3.1 SCOPE

This specification covers an ultrasonic, area-velocity flow monitor. The instrument shall provide for indicating, transmitting, totalizing of the flow rate through partially filled or surcharged round pipes and rectangular, trapezoidal, egg or irregular shaped open channels.

1.3.2 GENERAL

1.3.2.1 Flow monitor to consist of a submersible ultrasonic sensor, connecting cable and remote enclosure with indicting, transmitting and controlling electronics. Entire systems shall have no moving parts.

1.3.2.2 Level measurement accuracy shall be ±0.25% of Range. Velocity measurement accuracy shall be ±2% of reading.

1.3.3 SENSING ELEMENT

A. Ultrasonic sensor shall be rated IP68 for continuous submersion in raw water.
B. Using the Doppler principle, the sensor shall measure fluid velocities from 0.03 to 6.2 m/sec and reverse flow to -1.5 m/sec.
C. Using ultrasonic echo-ranging principle, the submerged sensor shall measure liquid level from 25mm to 5000mm.
D. Level sensing circuitry shall include a temperature sensor for automatic temperature compensation.
E. Sensor shall be constructed of PVC and epoxy resin or any other material that are resistant to any fouling, corrosion and abrasion.
F. Sensor operating temperature shall be -20°C to 60°C).
G. Shall include manufacturer's recommended stainless steel sensor mounting bracket.

1.3.4 SENSING ELEMENT

A. Provide minimum length 8m tri-coaxial cable with potted bond to the Sensor head. Sensor cable shall be waterproof and electrically shielded. Exposed material shall be polyurethane only.
B. Extended sensor cable shall be shielded tri-coaxial to a maximum length of 150m. Cable shall be spliced with screw terminal connections in manufacturer's recommended steel Junction Box.

1.3.5 TRANSMITTER

A. The transmitter shall provide for field calibration to round pipes and open channels of any shape.
B. Calibration shall be via built-in 5-key calibration system with menu selection of parameters. Systems requiring calibration by Parameter codes, BCD switches or external calibrators shall not be accepted.

C. Calibration data shall be password protected and permanently stored through power interruptions for a minimum of 12 months.
D. Field calibration shall allow selection and automatic conversion of measurement units, measurement span, high/low flow alarm relay and flow proportional relay pulse rates.
E. Transmitter shall permit field programmable damping to smooth output in turbulent flow conditions.
F. Transmitter operating temperature shall be from -20° to 60°C. Transmitter shall contain a thermostat-controlled enclosure heater for condensation protection below -1°C.
G. Transmitter shall have three isolated 4-20mA outputs rated for 1000 ohm maximum load with menu-selectable 0-5VDC alternative. Outputs shall be configured to transmit level, velocity and flow.
H. Provide two relay contacts rated 5 amp SPDT programmable for flow proportionate pulse to a remote totalizer or sampler, high-low flow, velocity and/or level alarm, echo loss alarm.
I. Provide a white, backlit matrix LCD display indicating flow rate, level, velocity, relay states and 14-digit totalizer in user-selected engineering units.
J. Transmitter display indicating flow rate, units of calibration, totalizer and relay states shall be visible without opening cover.
K. Transmitter shall be housed in a wall-mount, watertight IP66 enclosure with hinged, clear cover. Mounting hardware shall be included.
L. Transmitter electronics shall be surge protected on AC power input, sensor and 4-20mA outputs.
M. Transmitter power input shall be 100-240VAC 50-60Hz with power consumption of 5.28 Watts or less.
N. The transmitter shall permit plug-in field installation and auto-detection of optional accessories including data logger and additional control relays.

1.4 PORTABLE UNIT AND TRAINING

All Bidders should provide unit costs for a portable unit that will be used for on-field verification of meters in service, which will be used by our staff. Make provision for training DWS staff on the use of such a unit. Training may be per person and should include certification thereof.

1.5 BROCHURE

All Bidders should attach product brochure that shows the full technical specifications of the meter being offered.

1.4 DRIVE-BY HANDHELD DATA COLLECTORS

To meet current meter reading requirements, suitable drive-by handheld data collectors must be capable of reading all water flow meters throughout the Department. Data collectors must have the capability to collect and store meter readings at any time or the meter reading route through the use of an alphanumeric keypad and probing of water meters equipped with absolute encoders. The data collectors shall be able to obtain all types of readings on any particular route without requiring reprogramming of the handheld computer, physical change of software in the unit while in the field, or access through special software menus contained within a given route/program. In addition, the data collectors shall include communication cradles for charging and loading the handheld and probes for interrogating Sensor and other absolute encoder meters.

1.4.1 BROCHURE

All Bidders should attach product brochure that shows the full technical specifications of the drive-by handheld data collector being offered.

DWS reserves the right to test, assess and inspect this unit whether by own staff or by a private Consultant/Professional Service Provider.

2. STAFF

List the numbers (quantity) of staff in the following categories presently available within your own organisation:

Civil Engineering	:
Mechanical Engineering	:
Chartered accountant	:
GIS specialists	:
Project Management	:
Technicians	:
Foreman	:
Artisans	:
Skilled	:
Driver (EHMV - Extra Heavy Motor Vehicle)	:
Driver Operator (Extra Heavy Motor Vehicle with crane):	
Semi Skilled	:
General Workers	:
Administrators	:

Other:

_____	:
_____	:
_____	:
_____	:
_____	:

It is an expressed condition that the Contractor shall execute the contract under the supervision of a person appointed under General Machinery Regulations 2(1).

Who is the person appointed under the Act? _____

Is the certified copy of the letter of appointment herewith attached? (Y/N) _____

3. LABOUR COSTS

The following labour costs per appropriate skill level is required (per hour, unless otherwise specified). All prices given must **exclude** VAT. The labour costs herewith will be used during the Contract period to evaluate quotations submitted by the Contractor.

LEVEL	NORMAL TIME	OVERTIME	TRAVELLING TIME	DAILY LIVING OUT ALLOWANCE
Civil Engineering				
Mechanical Engineering				
Chartered accountant				
GIS specialists				
Project Manager				
Technicians				
Foreman				
Artisans				
Skilled				
Driver (EHMV)				
Driver Operator				
Semi Skilled				
General Worker				
Administration				

Working Hours:
The contractor shall work 8 hours per day. Time shall be in accordance with DWS regulations or as agreed between the Contractor and DWS

Overtime:
The Contractor shall request to the Department in writing approval prior to working overtime. The contractor shall indicate the benefit of the overtime to the Department, before this approval is granted. Emergency repairs will be exempted from the above prior approval process. Overtime shall be in accordance with the Basic Conditions of the Employment Act.

Travelling time:
The travelling time shall be the rates charged for personnel while travelling to and from site in order to execute the required tasks. Only 70% of the labour rate may be claimed for travelling.

Living Out Allowance:
The living out allowance shall include all food costs as well as any other costs that might arise when staying out, excluding accommodation.

Accommodation:
The Cost containment circular as updated from National Treasury shall apply.

1. Contractors Mobile Accommodation *(furnish full rates and/or unit costs for these)*. Failure to do so shall render this option none-available for the duration of contract.
2. Approved Establishments (Hotel, Guesthouses etc.) A maximum of **R1300.00** per person per night including dinner, bed, breakfast and parking shall be claimed.

4. TRANSPORT COSTS

Tariff is in cents per kilometre (exclusive of VAT) as from the dates below: No back charge of tariffs will be made before the under-mentioned dates for invoices already processed.

These rates are updated on a monthly basis by the Department of Transport.

Petrol

Engine swept volume CC	Sedan/station wagon	Light delivery vehicle (LDV) 4x2	Light delivery vehicle (LDV) 4x4	Mini bus/MPV
	A	B	C	D
	From Sept 2015	From Sept 2015	From Sept 2015	From Sept 2015
Up to 1250	243.0	215.0	352.7	328.3
1251 to 1550	304.6	273.9		
1551 to 1750	**334.0**	282.0		**328.3**
1751 to 1950	392.4	336.8		
1951 to 2150	403.6	373.2	**401.2**	410.5
2151 to 2500	478.3	**388.0**		481.3
2501 to 3500	591.8	405.2	461.7	602.2
Over 3500	673.6	472.5	527.2	673.7

Diesel

Engine swept volume CC	Sedan/station wagon	Light delivery vehicle (LDV) 4x2	Light delivery vehicle (LDV) 4x4	Mini bus/MPV
	A	B	C	D
	From Sept 2015	From Sept 2015	From Sept 2015	From Sept 2015
Up to 1250	223.4	238.7	352.3	**433.4**
1251 to 1550	289.4	294.3		
1551 to 1750	**310.9**	299.6		
1751 to 1950	325.5	339.9		
1951 to 2150	370.8	344.0	**421.5**	
2151 to 2500	434.6	**377.8**		542.5
2501 to 3500	559.3	387.2	471.1	578.9
Over 3500		517.9	533.1	660.7

The maximum permissible vehicle rates to be claimed during the execution of this assignment are written in **bolded** above, hence they are:

SEDAN/SUV/MPV : 1600cc (petrol or diesel)
LDV 4×2/4×4 : 2500cc (petrol or diesel)

4.1 GREATER CAPACITY VEHICLES

The utilization of vehicles with greater engine capacity than above shall be requested in writing, where again, the Contractor shall indicate the benefit for to the Department for consideration.

4.2 HEAVY & EXTRA HEAVY MOTOR VEHICLES

Heavy and Extra Heavy Motor Vehicles (Diesel)

Load Capacity in (Tonne)	Rate per Kilometre (Rand/km)
5 to 8 Tonne (drop-side)	
5 to 8 Tonne (with crane)	
10 to 14 Tonne (drop-side)	
10 to 14 Tonne (with crane)	
20 to 30 Tonne (flat-deck)	

RATE PER KILOMETRE (Rand/km) = this rate does not include the driver/operator and is expressed in rand/km.

NOTE:

- Rates for all vehicles not listed above must be supplied by the bidder for approval.
- There is no provision for an additional rate for towing a trailer.
- Bidders are encouraged to furnish hourly rates or kilometre rates of plant applicable to the execution of this contract.

5. MARK-UP

The applicable mark-up for this contract is 10% across the board.

6. COMPULSORY BRIEFING SESSIONS

5.1 Compulsory briefing sessions will be held in only four (4) major Provinces. It is mandatory for all prospective bidders to attend at least one (1) of these sessions in the venues nearest to them and in dates and times provided below. Failure to do so shall invalidate your bid.

5.2 See attached schedule