NOW WITH
OPTICAL DO & DEPTH

AQUA Read™

GPS AQUAMETER™

Water Quality Testing Made Easy

Pure Quality

The new GPS Aquameter™ from Aquaread™ is the world's most sophisticated, yet easy to use multiparameter water quality test system. No other equipment available today can match the GPS Aquameter™ and associated Aquaprobes™ in either specification or value for money. Check out these features.

Lanyard with quick release safety catch for easy hands-free operation

Integral atmospheric pressure sensor for fully automatic correction of Dissolved Oxygen readings

Tough, high impact, IP67 waterproof case with sure-grip rubber gasket, carefully sculpted to fit the hand

Large rubber keypad for ease of use with cold, wet hands or when wearing gloves

Readings can be logged automatically at a pre-determined rate or instantaneously along with calibration status data (GLP) by pressing the M+ key

Recalling the data is simple too, just press the MR key then browse your readings using the arrow keys

Integral GPS receiver and antenna for position tagging of readings. Position can be exported in Lat/Long, UTM and OSGB coordinates. Non GPS version also available.

Large, high contrast display for perfect sunlight readability, backlit in low light conditions with a soft white light.

For clarity, readings are spread over several easy-to-read screens, each instantly accessible using the left or right arrow keys

Extremely simple multilingual operating system. All setup and calibration functions are accessed via the MENU key and navigated with the four arrow keys. At each level there is a simple choice of OK or ESC

Rugged, waterproof connector for interfacing to a variety of multiparameter Aquaprobes™ or to a PC using the custom USB cable supplied as standard along with AquaLink™ software

Developed by an award-winning team of scientists and engineers whose experience includes the design of moving map satellite navigation systems for high speed military jets, the GPS Aquameter™ is a breakthrough in ergonomic and operating system design. With the GPS Aquameter™ and its associated range of multiparameter probes, it is now possible for anyone to obtain fast, reliable, accurate and dependable water quality readings.

Pinpoint Accuracy

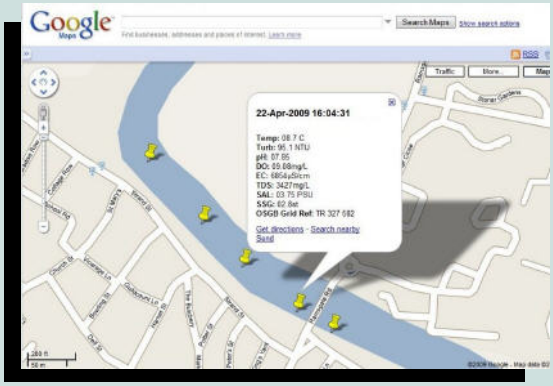
The GPS Aquameter™ is designed to interface to, and display readings from any one of ten Aquaread™ multiparameter probes. When connected to the top-of-the-range Aquaprobe-1000™, the unit can display the following 20 parameters, refreshing the data once per second.

- Temperature
- Turbidity
- Atmospheric Pressure
- mg/L Dissolved Oxygen (DO)
- % Saturation DO
- Electrical Conductivity (EC)
- Absolute EC
- Total Dissolved Solids (TDS)
- Resistivity
- Salinity
- Seawater Specific Gravity
- pH
- pH/mV
- ORP
- Latitude
- Longitude
- Height above MSL
- Depth
- Time
- Date

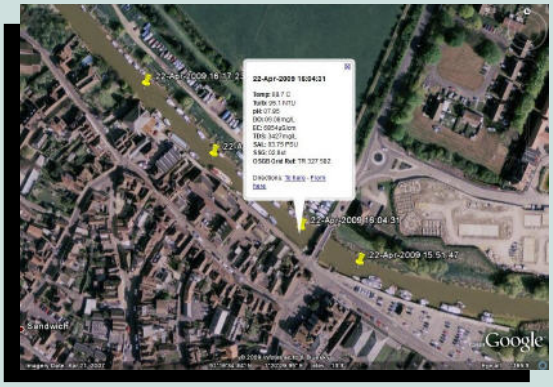
Taking a reading couldn't be easier. Simply connect the selected Aquaprobe™ to the GPS Aquameter™, switch on and lower the probe into water.

The probe's built-in microprocessor immediately goes to work measuring dissolved oxygen, conductivity, turbidity, temperature, pH, ORP and depth, from which all the other water related parameters are calculated. Once per second the probe packages all this data and sends it to the meter, where it is processed for display along with atmospheric pressure, position and altitude information.

Logging data is simple too. Either set the unit to log at regular intervals, or grab the current readings by hitting the M+ key. To recall logged data on screen, simply hit the MR key then browse using the arrow keys. To copy the logged data to your PC, attach the custom USB cable and run the AquaLink™ software utility (both supplied as standard). Once the data is transferred, AquaLink™ can produce a comprehensive analytical report in a text format, or export the logged data to most popular spreadsheets as well as Google™ Maps and Google™ Earth, where the readings can be overlaid on either maps or satellite photos.



Typical logged data displayed on Google™ Maps*



Same logged data displayed on Google™ Earth*

Rugged Construction

The real star of the Aquaread™ water quality testing system is the multiparameter Aquaprobe™. Available in ten different versions to cover everything from basic pH testing right through to comprehensive water analysis, these probes are built from high quality marine grade aluminium and stainless steel to withstand rough treatment in the harshest environments.

Each Aquaprobe™ has a common 3M (10') cable and waterproof plug assembly, knurled body and removable two-part protective sleeve. The difference between the ten models comes in the individual electrodes which are fitted into the body.

With the exception of the pH, ORP or combined pH/ORP electrodes, which are replaceable, the electrodes are factory fitted and resin sealed into the main body for greater reliability. Fewer submerged plugs and sockets mean fewer problems in the field!

With an outside diameter of just 42mm (1.65") the Aquaprobe™ has been designed to fit comfortably into pipes, 2" wells and bore-holes. The heavy gauge marine grade aluminium protective sleeve and end cap ensure the individual measurement electrodes are kept safe, even in the harshest environments.

Each probe body is completely resin filled (to eliminate the possibility of internal condensation) and fully waterproof for indefinite immersion. A threaded stem is provided at the top of the probe, complete with two nuts, to allow the attachment of a safety cable, or to facilitate bracket or extension pole mounting.

Extension cables are available in lengths of 5M (16'), 10M (32') and 30M (98'). These come complete with waterproof in-line sockets and are stackable to a total length of 100M (330'). Probes with custom cable lengths up to 30M are also available to special order.

Every Aquaprobe™ is delivered fully calibrated and ready to use out of the box. All calibration data is stored on-board the probe, so probes and meters can be mixed and matched without any problems.

Re-calibration is a simple affair. For regular field use, Aquaread™ provide an all-in-one calibration solution, RapidCal™ allowing easy one step calibration. Full calibration of each individual electrode is also straightforward, following simple instructions on the Aquameter™.

AP-800™ with lower sleeve removed for maintenance (left) and fully assembled (right)

Innovative Design

At the heart of each multiparameter Aquaprobe™ is a state-of-the-art, high speed microprocessor coupled to a multi-channel, 16 bit, high precision Analogue to Digital converter. This combination allows fast, accurate control and measurement of the data being provided by the individual electrodes. Up to four electrodes can be mixed and matched during manufacture in order to provide ten different models of the probe. The function of each electrode on the fully-loaded, top-of-the-range Aquaprobe -1000™ is detailed below.

Combined Electrical Conductivity (EC), Temperature and Dissolved Oxygen (DO) electrode. Temperature is measured within this electrode and used throughout the system for correction and display.

EC is measured using a four ring variable frequency technique to ensure stable readings over an extremely wide range. EC measurements are automatically corrected for temperature in the meter to a selectable 20°C or 25°C Standard.

DO is measured using an innovative Optical sensor which requires very little maintenance and infrequent calibration. This sensor does not require any liquid electrolyte.

DO readings are automatically corrected in the meter for temperature, salinity and atmospheric pressure.

Depth is measured by an internal pressure sensor and automatically corrected for temperature and salinity.

Nephelometric turbidity receiver electrode. Pulsed, infrared light, fired from the turbidity transmitter electrode on the other side of the probe and scattered at 90° by solids suspended in the water, is collected by this narrow beam receiver.

Interchangeable resin bodied, gel filled combined pH & ORP electrode. All pH measurements are automatically corrected for temperature.

Nephelometric turbidity transmitter electrode. This electrode emits a high energy, narrow beam of pulsed infrared light across the center of the probe to the turbidity receiver.

Routine cleaning and maintenance of any model Aquaprobe™ is an easy job involving the simple removal of the lower part of the probe sleeve, which unscrews by hand (see photo above and on previous page).

For probes where a DO/EC electrode is included, the DO sensor cap (either Galvanic or Optical) can be easily replaced as required. Also on this electrode, the stainless-steel EC rings can be easily inspected and cleaned. In probes where pH/ORP electrodes are included, these may need occasional cleaning or soaking if the sensitivity or response gets low.

All Aquaread™ Meters are guaranteed for three years. Probes, Flow-Through Cells and individual electrodes are guaranteed for one year from date of purchase.

Cutting Edge Technology

Traditionally, DO measurement in portable field equipment has been done using membrane covered detectors known as Clark Cells. This type of cell can suffer from problems including membrane fouling, calibration instability and worst of all, oxygen consumption. During measurement, a Clark Cell will consume oxygen making it necessary to have a constant flow of water over the cell.

Optical technology eliminates all these problems allowing high precision, membrane-free, long-term stability along with infrequent calibration and immunity to fouling by sulphides and other gases.

The Aquaread™ AquaPlus™ Optical DO measurement system (standard fit on Aquaprobe™ models AP-900 & AP-1000) works on the principle of Dynamic Luminescence Quenching. A gas-permeable chemical known as a luminophore is excited with short bursts of blue light, which causes molecules in the luminophore to emit red photons. The presence of oxygen in contact with the luminophore causes the emission of the red photons to be quenched or delayed. By measuring the delay of the returned red photons with respect to the blue excitation, it is possible to determine the level of dissolved oxygen present.

Whilst this sounds very simple in principle, the optical system and the high-speed electronics required to obtain good accuracy are extremely complex. Calling on many years' experience designing military Night Vision Goggle (NVG) compatible optics, Aquaread™ engineers have produced an amazingly small and elegant solution.

Housed in a resin filled, marine grade aluminium body that measures just 8mm (0.3") diameter by 13mm (0.5") long, the fully waterproof AquaPlus™ Sensor Module contains blue excitation and red reference LEDs, optical filters, a photon detector, temperature sensor, driver circuitry and high gain amplification circuitry.

The incredibly small size of the Sensor Module allows it to fit comfortably into the end of a standard 12mm diameter DO electrode in place of a traditional Clark Cell. The addition of a replaceable cap containing a lens coated with the luminophore material completes the DO section of the electrode.

Accessories

All Aquameters™ are supplied with batteries, a USB cable and a CD containing manuals and AquaLink™, a multilingual utility program designed to run under Microsoft® Windows® XP®, Vista® or 7 on a stand-alone PC with a minimum screen resolution of 800 x 600, a CD drive and an available USB 2.0 socket.

All Aquaprobes™ are supplied with a 300mL bottle of RapidCal™ calibration solution, a spare rinse bottle and various spare parts, dependent upon probe model.

Optional accessories include a variety of rugged carrying cases, probe extension cables, calibration solutions, a hanging/mounting bracket and a Heavy duty Flow-Through Cell, which allows any model of Aquaprobe™ to be used with a range of third party pumping devices. For more details and to download an operating manual, visit www.aquaread.co.uk.

Technical Specification

Meters

	AQUAMETER-200™	AQUAMETER-100™
Dimensions (W x H x D)	90mm x 180mm x 39mm (3.5" x 7" x 1.5")	90mm x 180mm x 39mm (3.5" x 7" x 1.5")
Weight (including batteries)	450g (15.9oz)	440g (15.5oz)
Display	80 character FSTN LCD with backlight	80 character FSTN LCD with backlight
Data Memory	1900 full sets including GLP data	1900 full sets including GLP data
GPS Receiver	12 channel with integral antenna	N/A
GPS Accuracy	+/- 10M in all 3 dimensions	N/A
Atmospheric Pressure	150mb – 1150mb Accuracy +/- 1mb	150mb – 1150mb Accuracy +/- 1mb
Languages	English / French / German	English / French / German
PC Interface	USB (cable provided)	USB (cable provided)
Power Supply	5 x AA cells. Alkaline or Ni-MH rechargeable	5 x AA cells. Alkaline or Ni-MH rechargeable
Battery Life	Alkaline > 20 hours. Ni-MH > 40 hours	Alkaline > 40 hours. Ni-MH > 60 hours
Operating Temperature	-20˚C to +70˚C	-20˚C to +70˚C
Protection Class	IP67	IP67

Probes General

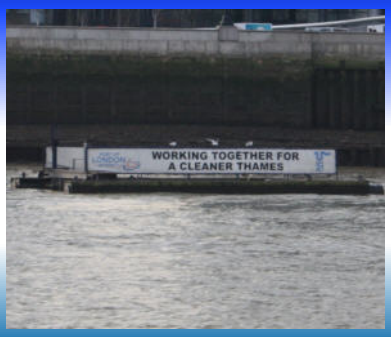
Protection Class	IP68 (permanent immersion)	Dimensions (L x Dia)	290mm x 42mm (11.4" x 1.65")
Immersion Depth	Min 75mm (3"). Max 30M (98')	Weight (including cable)	725g (25.6oz)
Operating Temperature	-5˚C – +50˚C (23˚F – 122˚F)		

Probes Specific

			AP1000	AP900	AP800	AP700	AP600	AP500	AP400	AP300	AP200	AP100
Turbidity	Range	0 – 1000 NTU	●	●	●	–	●	–	●	–	●	–
	Resolution	2 Auto-range scales: 0.0 – 99.9 NTU, 100 – 1000 NTU										
	Repeatability	± 2% of auto-ranged scale										
Galvanic Dissolved Oxygen	Range	0 – 500% / 0 – 50.00mg/L	†	†	●	●	●	●	–	●	–	–
	Resolution	0.1% / 0.01mg/L										
	Accuracy	± 1% of reading										
Optical Dissolved Oxygen	Range	0 – 500% / 0 – 50.00mg/L	●	●	†	†	†	†	–	†	–	–
	Resolution	0.1% / 0.01mg/L										
	Accuracy	0 – 200%± 1% of reading, 200% - 500% ± 10% of reading										
Conductivity	Range	0 – 200mS/cm (200,000µS/cm)	●	●	●	●	●	●	–	●	–	–
	Resolution	3 Auto-range scales: 0 – 9999µS/cm, 10.00 – 99.99mS/cm, 100.0 – 200.0mS/cm										
	Accuracy	± 1% of reading or ± 1µS/cm if greater										
TDS	Range	0 – 100,000 mg/L (ppm)	●	●	●	●	●	●	–	●	–	–
	Resolution	2 Auto-range scales: 0 – 9999mg/L, 10.00 – 100.00g/L										
	Accuracy	± 1% of reading or ± 1mg/L if greater										
Resistivity	Range	5Ω·cm – 1MΩ·cm	●	●	●	●	●	●	–	●	–	–
	Resolution	2 Auto-range scales: 5 – 9999Ω·cm, 10.0 – 1000.0KΩ·cm										
	Accuracy	± 1% of reading or ± 1Ω·cm if greater										
Salinity	Range	0 – 70 PSU / 0 –70 ppt (g/Kg)	●	●	●	●	●	●	–	●	–	–
	Resolution	0.01 PSU / 0.01 ppt										
	Accuracy	± 1% of reading or ± 0.1 unit if greater										
Seawater Specific Gravity	Range	0 – 50 σ_t	●	●	●	●	●	●	–	●	–	–
	Resolution	0.1 σ_t										
	Accuracy	± 1.0 σ_t										
pH	Range	0 – 14 pH / ± 625mV	●	●	●	●	●	●	●	–	–	●
	Resolution	0.01 pH / ± 0.1mV										
	Accuracy	± 0.01 pH / ± 0.5mV										
ORP	Range	± 2000mV	●	●	●	●	O	O	O	–	–	O
	Resolution	0.1mV										
	Accuracy	± 0.5mV										
Depth	Range	0 – 30M (0 – 100F)	●	†	†	†	†	†	†	†	†	†
	Resolution	0.01M (0.01F)										
	Accuracy	+/- 0.1M (+/- 4")										
Temperature	Range	-5˚C – +50˚C (23˚F – 122˚F)	●	●	●	●	●	●	●	●	●	●
	Resolution	0.1˚ C/F										
	Accuracy	± 0.5˚ C										

Key: ● = Standard Function. – = Not available on this probe. O = Optional ORP electrode replaces pH electrode. † = Available to special order

The accuracy figures quoted above represent the equipment's measuring capability at the calibration points at 25°C. These figures do not take into account errors introduced by variations in the accuracy of calibration solutions and errors beyond the control of the manufacturer that may be introduced by extreme environmental conditions in the field.





Aquaread Ltd is a privately owned company based in the south-east of England. All AQUAREAD™ products are designed and built in England with full quality control and traceability on all parts to avionics industry standards.

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Authorised Distributor

AQUAREAD™
PURE QUALITY

AquaLink™ PC Utility

Sample Screens and Exports

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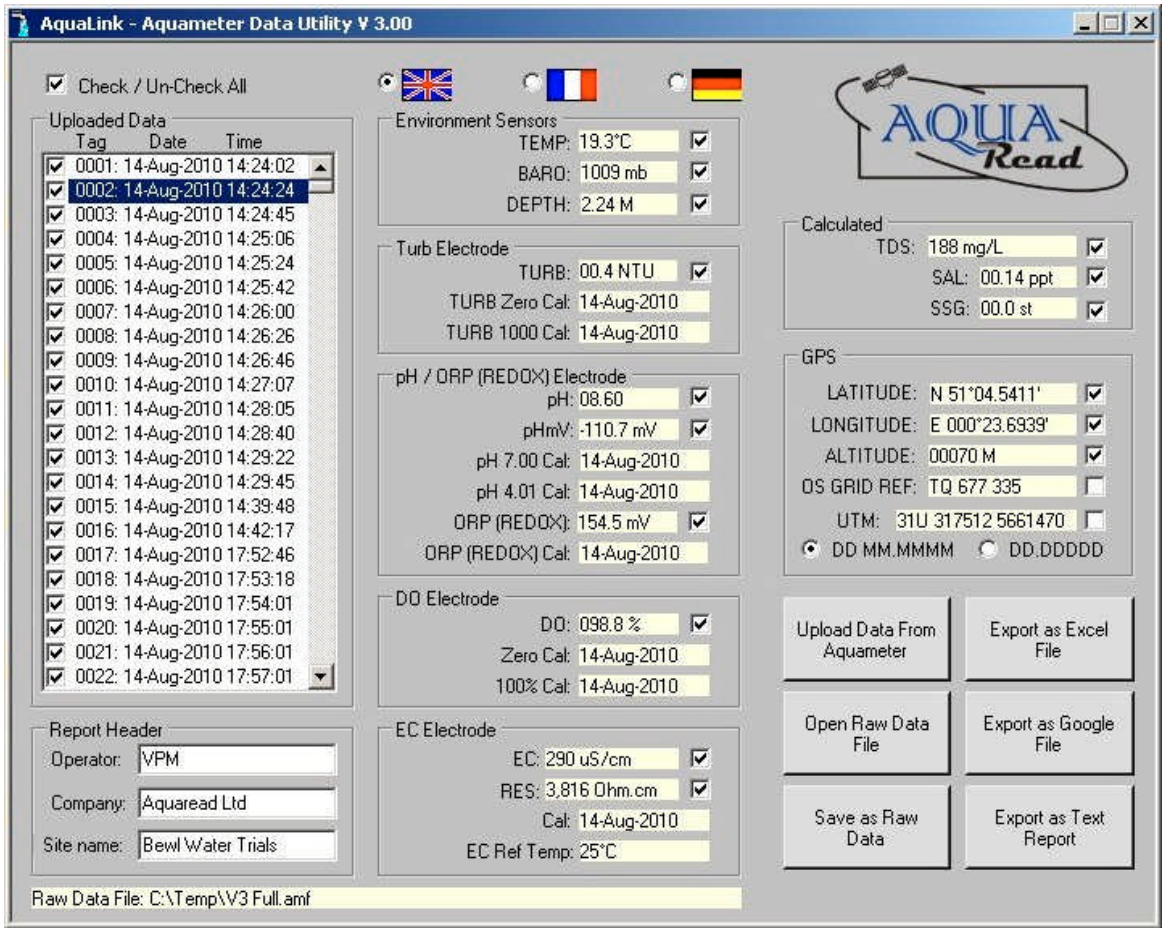
AquaLink™ PC Utility Sample Screens and Exports

Using the AquaLink™ PC utility couldn't be easier. Simply connect your Aquameter™ to your PC with the USB cable provided, then click the 'Upload Data From Aquameter' button.

Aqualink™ will connect to the Aquameter™ then upload all the available logged data from the Meter to your PC. A progress bar and file counter is displayed during this process.

Once upload is complete, the memory Tag, date and time for all the logged data that has been uploaded will be displayed in the 'Uploaded Data' box on the left of the screen.



To view any of the logged data records, simply click on the desired Tag, date and time label in the left-hand 'Uploaded Data' box as shown above. The data for the highlighted label will be displayed in the individual data boxes, which are grouped by electrode function. To move up and down the list in the 'Uploaded Data' box, use either your mouse or the cursor up/down keys.

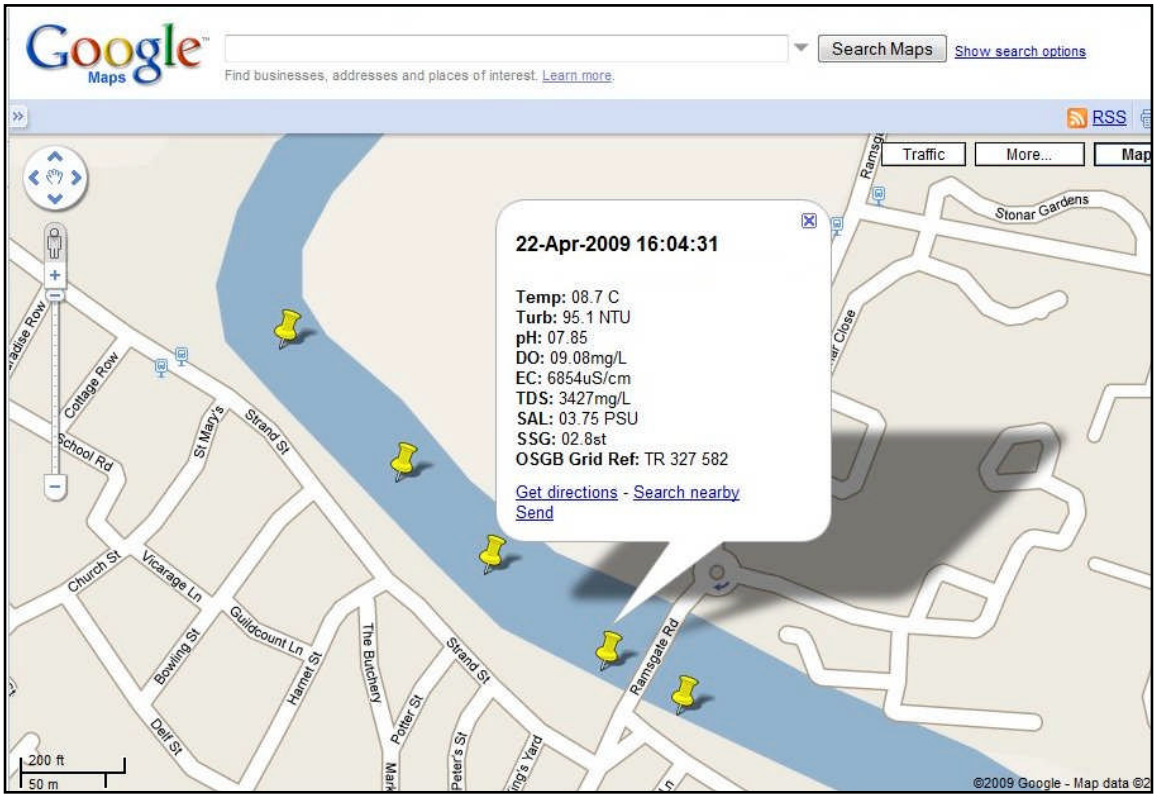
AquaLink™ can export data in three different formats: Microsoft® Excel® (for use in spreadsheets), Google™ (for use in Google™ Maps and Google™ Earth) and as a Text Report (for use in any word processor).

Before exporting data, the actual data to be exported is selected by checking the relevant check-boxes in the 'Uploaded Data' box. Next, individual data classes are selected for export by checking or un-checking the check-boxes next to each individual data box.

Finally, clicking one of the three 'Export' buttons will export the selected data. It's as simple as that!

Sample outputs are shown on the following pages.

AquaLink™ can export data logged on the Aquameter™ to both Google™ Maps and Google™ Earth. The following two images show the same logged data displayed first in Google™ Maps, then in Google™ Earth.



The data displayed on Google™ Maps is useful, but for real detail, Google™ Earth (below) is better.

Zooming in on the satellite photos in Google™ Earth is a great way to spot potential sources of pollution. If the readings you have taken start to show abnormalities, the chances are that you will be able to spot the possible source of the problem (a riverside factory for example) directly on the satellite photo!

The Text Report exported by AquaLink™ includes an analytical cover page as well as all the selected individual readings. A typical Text Report cover page is shown below.

AQUALINK REPORT

File name:	C:\Test\3 daytest 024690136.txt
Operator name:	G.E.M.
Company name:	Aquaread Ltd
Site name:	Test Site 4
Start date and time:	24-Jul-2009 10:09:33
Start position:	Lat: N 51°21.4989' Lon: E 001°24.3232' OSGB: TR 370 677
End date and time:	27-Jul-2009 13:01:00
End position:	Lat: N 51°21.4988' Lon: E 001°24.3233' OSGB: TR 370 677

Total number of readings: 877

Highest readings

Temp:	19.8C	Tag: 0648	Date: 26-Jul-2009	Time: 15:51:00
Baro:	1020mb	Tag: 0315	Date: 25-Jul-2009	Time: 12:19:00
Turb:	05.8 NTU	Tag: 0560	Date: 26-Jul-2009	Time: 08:46:00
pH:	7.63	Tag: 0565	Date: 26-Jul-2009	Time: 09:09:00
pHmV:	-36.3mV	Tag: 0009	Date: 24-Jul-2009	Time: 10:49:01
ORP:	365.7mV	Tag: 0320	Date: 25-Jul-2009	Time: 12:44:00
DO:	79.4% Sat	Tag: 0742	Date: 27-Jul-2009	Time: 01:46:00
EC:	810uS/cm	Tag: 0588	Date: 26-Jul-2009	Time: 10:51:00
RES:	1,445 Ω•cm	Tag: 0285	Date: 25-Jul-2009	Time: 09:49:00
TDS:	526mg/L	Tag: 0588	Date: 26-Jul-2009	Time: 10:51:00
SAL:	0.40ppt	Tag: 0001	Date: 24-Jul-2009	Time: 10:09:33
SSG:	0.0st	Tag: 0001	Date: 24-Jul-2009	Time: 10:09:33

Lowest readings

Temp:	17.9C	Tag: 0254	Date: 25-Jul-2009	Time: 07:14:01
Baro:	1005mb	Tag: 0838	Date: 27-Jul-2009	Time: 09:46:00
Turb:	04.1 NTU	Tag: 0830	Date: 27-Jul-2009	Time: 09:06:00
pH:	7.55	Tag: 0003	Date: 24-Jul-2009	Time: 10:19:01
pHmV:	-40.8mV	Tag: 0556	Date: 26-Jul-2009	Time: 08:24:00
ORP:	354.4mV	Tag: 0820	Date: 27-Jul-2009	Time: 08:16:00
DO:	30.1% Sat	Tag: 0427	Date: 25-Jul-2009	Time: 21:39:00
EC:	782uS/cm	Tag: 0149	Date: 24-Jul-2009	Time: 22:29:01
RES:	1,358 Ω•cm	Tag: 0651	Date: 26-Jul-2009	Time: 18:11:13
TDS:	508mg/L	Tag: 0145	Date: 24-Jul-2009	Time: 22:09:01
SAL:	0.39ppt	Tag: 0017	Date: 24-Jul-2009	Time: 11:29:01
SSG:	0.0st	Tag: 0001	Date: 24-Jul-2009	Time: 10:09:33

	Variance	Average values
Temp:	1.9C	18.81C
Baro:	15mb	1013mb
Turb:	1.7 NTU	4.87 NTU
pH:	0.08	7.60
pHmV:	4.5mV	-39.09mV
ORP:	11.3mV	358.45mV
DO:	49.3% Sat	59.10% Sat
EC:	28uS/cm	792.2uS/cm
Res:	87 Ω•cm	1,415.4 Ω•cm
TDS:	18mg/l	514.4mg/l
SAL:	0.01ppt	0.391ppt
SSG:	0.0st	0.00st

Calibration (GLP) data

Turb Zero:	24-Jul-2009	Turb 1000:	23-Jul-2009
pH 7.00:	24-Jul-2009	pH 4.01:	23-Jul-2009
DO Zero:	23-Jul-2009	DO 100%:	24-Jul-2009
EC:	24-Jul-2009	ORP:	23-Jul-2009

Blocks of individual readings, laid out in chronological order, follow this cover page. The readings picked out on the cover page can be cross-referenced to the blocks of individual readings using the Tag numbers. Great for just dropping into a report as an appendix!