

Test Surface Water Drought Permit

2.2_MMP Appendix 2a

Water Quality Monitoring – Data acquisition

19 July 2022

Contents

Contents	2
1 Background	3
2 Equipment and Locations	3
3 Equipment maintenance	4
4 Data assurance	4
Table 1 Water Quality parameters	3
Table 2 Percentage of available data recorded	5

1 Background

This document must be read in conjunction with the Monitoring and Mitigation Plan of the River Test Drought Permit, which provides additional information and context about the water quality monitoring, as well as additional monitoring activities and any mitigation actions that would be required following identification of deterioration in water quality.

The focus of this document is to detail the gathering of water quality data from the permanent installations which have been installed in support of the overall monitoring and mitigation programme.

Initially the sites were installed by Hydro Logic Services (HLS) from 2018, unfortunately there were several performance issues, and they did not capture all the required parameters. Therefore, from 2021, the installations were upgraded by Meteor who continue to maintain the network and deliver the data to a Cloud platform, where it is available in real-time and accessible for both SWS and the EA.

2 Equipment and Locations

Locations and duration of deployment are detailed in the redacted document ref 2.2_MMP App. 2b Redacted Water Quality Monitoring Locations.

Two sondes are deployed at each location, a main sonde (Xylem EXO2) capable of supporting multiple sensors and a secondary sonde (a vented transducer) that will primarily record water level. The parameters monitored at each location are detailed in Table 1. The transducers installed by HLS were not vented so the main sondes were set up to record Barometric pressure. This is no longer required and no longer recorded.

Table 1 Water Quality parameters

Parameter	Source	Units
Water Level	Provided by separate Level Transducer	m
Barometric pressure	No longer required as Level Transducer is vented	NA
Temperature	Provided either on Main Sonde and / or Level Transducer	°C
pH	Main Sonde	NA
Conductivity	Main Sonde	us/cm
Turbidity	Main Sonde	NTU
Dissolved Oxygen	Main Sonde	mg/l and % Saturation
Ammonia	Main Sonde; Ammonium reading from EXO	NH ₄
Unionised Ammonia	Derived calculation	mg/l

Each installation will be powered by a 20W Solar panel kit which is considered sufficient for 30 minute interval data – a 30W panel may be utilised if the installation is situated in a shaded area. Higher frequency data would require a more powerful and thus larger panel which would increase the visibility of the installation and therefore potential vandalism.

At each location, the main and secondary sondes will be connected to a bankside portable station; the ESNET2 Portable Monitoring System. This will be set up within an IP66 Enclosure and be capable of receiving inputs from both sondes as well as additional instrumentation if required.

Real time data will be transmitted from each ESNET2 via 3G/GPRS.

3 Equipment maintenance

The maintenance provided is the standard Meteor Water Quality managed service and will include;

- Monthly site maintenance visit – Sonde changeover, equipment and onsite data check.
- Monthly Laboratory Calibration – At Meteor Water Quality Hub
- Regular updates to SWS team regarding performance of system, issues and potential improvements

During each monthly visit the installed sondes will be rotated to minimise any data downtime and ensure high degrees of reliability and accuracy as no sensor calibration work is conducted in the field. A serviced, calibrated sonde will replace the operating sonde which will then be removed for servicing and calibration. Therefore not all sites will be visited at the same time each month.

Meteor carry out reactive resolution of equipment or data issues within 72 hours, target 48 hours, of an issue being identified where possible; this response time may depend on a number of factors such as but not limited to access, resourcing and local conditions.

Reactive maintenance will be triggered by receipt of data irregularities, including:-

- unexpected data gaps
- unexpected data readings
- failed sensors (flat line data)
- Battery failures (site fails to transmit)

A summary of data losses is provided in Table 2

A monthly report will be produced for each instrument calibration and electronically stored

Sensors will be calibrated in a lab facility in accordance with the manufacturer's recommendations. Meteor operates its' own laboratory accredited to ISO9001 standards

- Sondes are stripped, cleaned and dried in the lab facility to eliminate any bio security risks. This is in excess of manufacturer guidance but ensures a high level of instrument reliability and security
- Calibration standards are made daily. This ensures consistency and accuracy of baseline measurement
- The response time of ion selective probes are checked during calibration to ensure they are performing optimally. This is in excess of the manufacturer's recommendation and delivers a greater degree of accuracy and reliability.
- Consumables are replaced monthly
- Individual probes are tested prior to the sondes being rebuild and then calibrated.

Meteor maintain a pool of spare sondes so that they are able to install a replacement sonde while taking the original sonde to the laboratory for calibration. There is no loss of data continuity.

4 Data assurance

Alarms are being set up according to the thresholds detailed in the DP MMP and will be received by both SWS. Alarms will prompt scrutiny of the data within 1 working day to determine if further action is required. SWS maintain an Excel Workbook that tracks data trends and outages. This is typically updated monthly, fortnightly during preparation of a Drought Permit applications and weekly during a Drought Permit. Any identified issues are reported to Meteor for further investigation.

Test Surface Water Drought Permit 2022
2.2_MMP Appendix 2a

Water Quality Monitoring – Data acquisition

Table 2 Percentage of available data recorded

	RT1	Redbridge	BW2	BW1	BFFC1	Testwood	RT2	RT1 Meteor	US Discharge	DS Discharge
Sep 18	53%	Not installed	100%	0%	100%	100%	Not installed	Not yet installed	Not yet installed	Not yet installed
Oct 18	100%		99%	0%	99%	100%				
Nov 18	100%		100%	0%	100%	100%				
Dec 18	100%		100%	0%	99%	100%				
Jan 19	100%		100%	4%	99%	100%				
Feb 19	100%		100%	99%	100%	100%				
Mar 19	97%		100%	100%	100%	100%				
Apr 19	41%		100%	53%	100%	100%				
May 19	88%		100%	100%	100%	100%				
Jun 19	98%		100%	100%	100%	100%				
Jul 19	100%		100%	100%	91%	100%				
Aug 19	100%		100%	100%	53%	100%				
Sep 19	100%	82%	100%	96%	96%	100%				
Oct 19	100%	98%	100%	100%	100%	100%				
Nov 19	100%	100%	34%	100%	100%	100%				
Dec 19	100%	100%	Not in service	100%	100%	100%				
Jan 20	100%	100%		100%	100%	100%				
Feb 20	100%	100%		100%	100%	100%				
Mar 20	62%	100%		60%	100%	100%				
Apr 20	100%	100%		Not in service	100%	100%				
May 20	100%	100%	56%		100%	100%				
Jun 20	100%	100%	100%		100%	100%				
Jul 20	95%	82%	100%	100%	100%					
Aug 20	96%	40%	100%	87%	100%	100%				
Sep 20	88%	100%	100%	100%	100%	100%				
Oct 20	95%	91%	100%	100%	100%	100%				

Test Surface Water Drought Permit 2022
2.2_MMP Appendix 2a

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	RT1	Redbridge	BW2	BW1	BFFC1	Testwood	RT2	RT1 Meteor	US Discharge	DS Discharge			
Nov 20	92%	89%	100%	100%	100%	100%							
Dec 20	100%	100%	78%	100%	100%	100%							
Jan 21	100%	100%	0%	100%	100%	100%							
Feb 21	100%	100%	67%	100%	100%	100%							
Mar 21	100%	100%	100%	100%	92%	100%							
Apr 21	100%	100%	100%	100%	100%	100%							
May 21	100%	100%	100%	100%	100%	100%							
Jun 21	60%	100%	100%	100%	100%	100%							
Jul 21	100%	100%	100%	100%	100%	100%							
Aug 21	100%	100%	99%	100%	94%	100%					95%		
Sep 21	100%	100%	100%	100%	0%	100%	100%						
Oct 21	Replaced by RT1 Meteor	100%	100%	76%	0%	100%	100%						
Nov 21		100%	99%	71%	72%	100%	100%						
Dec 21		100%	93%	82%	76%	100%	98%				100%		
Jan 22		100%	100%	100%	75%	100%	100%				100%		
Feb 22		100%	100%	Out of Service	100%	97%	100%				100%	96%	100%
Mar 22		100%	100%		100%	100%	100%				100%	100%	100%
Apr 22		96%	100%		100%	99%	100%				100%	100%	100%
May 22		99%	100%		100%	100%	99%				100%	100%	100%
Jun 22	100%	100%	100%		48%	100%	100%	100%	100%				