

Sustainable Minerals Institute

Sir James Foots Building
Cnr College and Staff House Road
St Lucia QLD 4072 Australia

Director

Professor Rick Valenta

CRICOS PROVIDER NUMBER 000258

31 March 2026

Mr. Stephen Love
Environment & Community Superintendent – Peabody Energy
Metropolitan Coal
Parkes Street, Helensburgh, NSW 2508

Dear Stephen,

**Subject: Report on Depth Water Sampling at WDFS1 Woronora Reservoir Full Supply Level
23 August 2023, 19 February 2025 and 29 July 2025**

Introduction

Metropolitan Coal conducted preliminary sampling and field measurement of Surface and Depth water on 23 August 2023 at site ETWQ AU, and subsequent sites immediately downstream, located on the Eastern Tributary in the upper Woronora Reservoir. This letter evaluates the field and laboratory results for temperature and water quality data at various depths to address IEAPM's recommendation.

The results from this initial sampling round are presented in Attachment A.

In April 2023, then NSW Department of Planning and Environment (DPE) (now known as the Department of Planning, Housing and Infrastructure), requested the Independent Expert Advisory Panel for Mining (IEAPM) to provide advice on water quality performance measures for Metropolitan Coal Mine.

On 31 October 2023, the DPE provided IEAPM's advice to Metropolitan Coal regarding water quality performance measures for Metropolitan Coal Mine.

This report has been prepared in response the following recommendation from IEAPM (2023):

Temperature and water quality data should be obtained at various depths through the water column in the upper reservoir (at a location such as WDFS1 that is downstream of the entry of both the Waratah Rivulet and Eastern Tributary) to capture both the temperature stratification behaviour and the water quality at this point. Frequency of data collection should increase following significant flow events and following level 3 triggers for water quality reaching the reservoir.

In response to the IEAPM's recommendation, Metropolitan Coal conducted preliminary sampling and field measurements of surface and depth water on 23 August 2023 at site ETWQ-AU, and subsequent sites immediately downstream, located on the Eastern Tributary in the upper Woronora Reservoir. The results of this sampling is evaluated in a separate letter (*Report on Depth Water Sampling at Eastern Tributary Full Supply Level 23 August 2023*).

In response to IEAPM's recommendation, Metropolitan Coal undertook additional depth sampling of the water column in the upper Woronora Reservoir at site WDFS1 located at the confluence of the Waratah Rivulet and Eastern Tributary (Figure 1). Samples were collected on 19 February 2025 and 29 July 2025. This letter evaluates the field and laboratory results for temperature and water quality data at various depths to address IEAPM's recommendation.

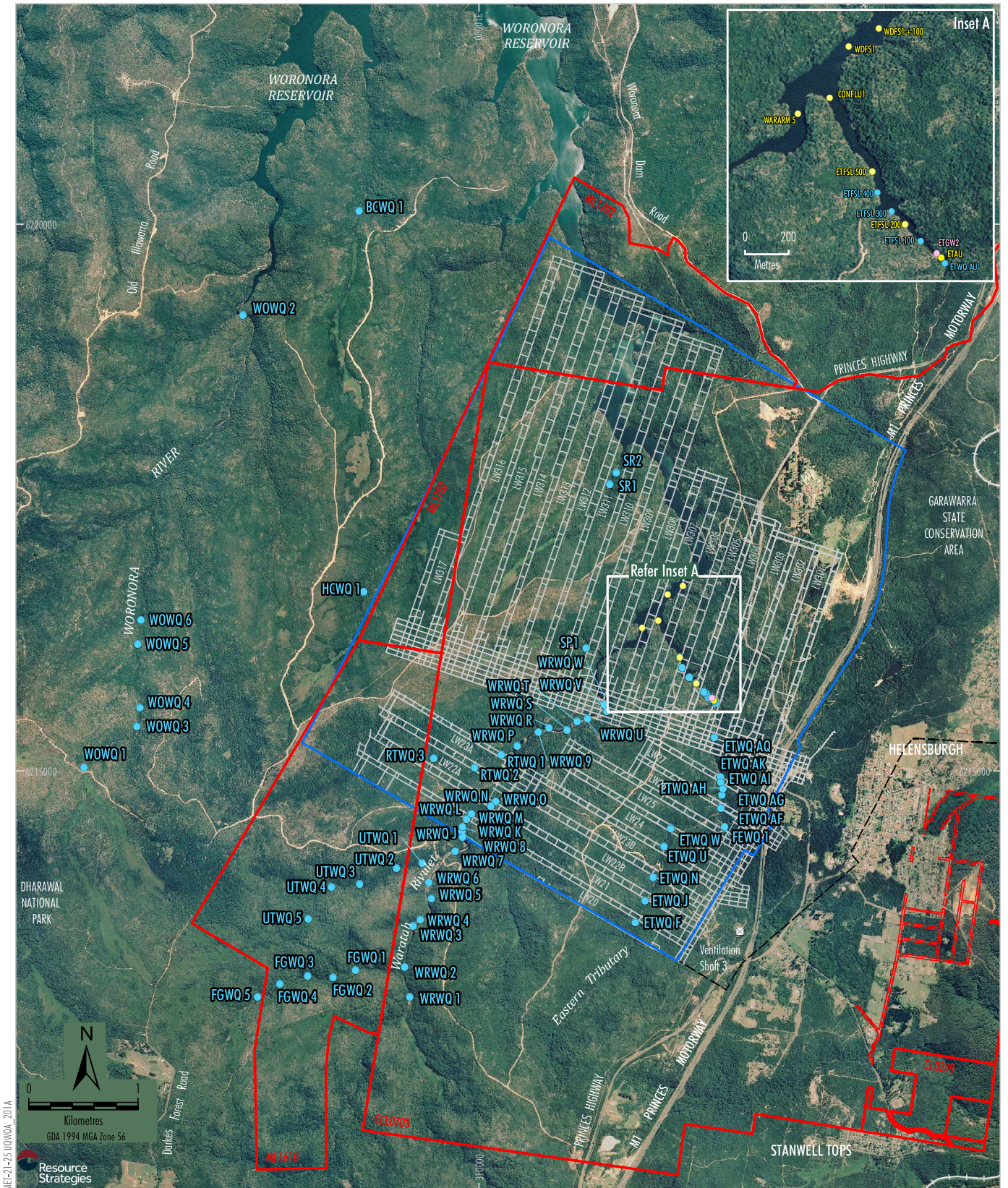
Background

Metropolitan Coal conducts regular water sampling at sites along the Eastern Tributary in accordance with the approved Water Management Plan (Figure 1).

Monthly water sampling commenced at sites downstream of ETWQ AU in 2017 to better assess surface water quality along the Eastern Tributary up to the confluence of the Waratah Rivulet / Woronora Reservoir. Additional sampling at incremental sites ETFSL 100 to ETFSL 500 commenced in August 2017.

Due to reducing water levels in the Woronora Reservoir from extensive drought in November 2018, additional sampling commenced at sites CONFLU1 to WDFS1+100 (see Figure 1) on 22 November 2018. Sampling at some sites downstream of ETWQ AU was not undertaken between February 2020 to June 2022 due to the re-emergence of high flow conditions present in the Eastern Tributary arm of the Woronora Reservoir. The Woronora Reservoir water level remained constant upstream of site ETFSL 100 in June 2022. Sampling at ETFSL 500 commenced 15 February 2022 when the reservoir water level rose, however, no water quality monitoring was undertaken for the month of June 2022.

Water quality results for filtered and total manganese at sites ETWQ AU, ETFSL 200, ETFSL 500, CONFLU1, WARARM5, WDFS1 and WDFS1+100 were recorded since commencement of monitoring to the end of June 2022. After June 2022, no water quality monitoring was undertaken at site ETFSL 500 until sampling recommenced on 15 February 2022, when the reservoir level rose. These sites provide a monitoring profile along the arm of the Woronora Reservoir.



LEGEND

- Mining Lease Boundary
- Railway
- Project Underground Mining Area
Longwalls 20-27 and 301-317
- Existing Underground Access Drive (Main Drift)
- Surface Water Quality Site
- Groundwater Quality Site of Eastern Tributary
- Water Quality Site on Eastern Tributary and/or in Woronora Reservoir

Source: Land and Property Information (2015); Date of Aerial Photography 1998;
Department of Industry (2015); Metropolitan Coal (2021); MSEC (2021)

Peabody

METROPOLITAN COAL

Surface Water Quality Sampling of
Eastern Tributary Watercourse
and Woronora Reservoir

Figure 1

Sampling at Woronora Reservoir Full Supply Level

Patrick Brien, Principal OHS and Environmental Scientist at Brien Environment & Safety Pty Ltd, conducted sampling for Metropolitan Coal Mine on 19 February 2025 and 29 July 2025 at site ETWQ AU and site WDFS1, located downstream at the confluence of the Waratah Rivulet and the Eastern Tributary into the Full Supply Level (FSL) of the upper Woronora Reservoir.

A cross-section of three points were sampled on each date at three depths: surface, mid-depth and bottom. The bottom depths to water were 3.4 m, 5.0 m and 8.2 m on 19 February 2025, and 4.6 m, 6.2 m and 9.0 m on 29 July 2025. Routine surface sampling is currently conducted at five sites farther upstream at EFTSL 0, 20, 100, 200 and 300. The location coordinates of these sites are consistent with Surface and Depth sampling undertaken in the Eastern Tributary on 23 August 2023.

Table 1 below lists the location of Surface and Depth sites ETWQ AU and the transect at WDFS1 sampled on 19 February 2025 and 29 July 2025.

Table 1 Location of Sampling Sites

Date	Site Name	Easting	Northing	Depth
19 February 2025	ETWQ AU	312154	6215643	Surface
	WDFS1-A	311705	6216552	Surface, 2.5 metres, 5.0 metres deep
	WDFS1-B	311680	6216569	Surface, 4.1 metres, 8.2 metres deep
	WDFS1-C	311660	6216586	Surface, 1.7 metres, 3.4 metres deep
19 July 2025	ETWQ AU	312154	6215643	Surface
	WDFS1-A	311705	6216552	Surface, 3.1 metres, 6.2 metres deep
	WDFS1-B	311680	6216569	Surface, 4.5 metres, 9.0 metres deep
	WDFS1-C	311660	6216586	Surface, 2.3 metres, 4.6 metres deep

Field Measurements from Sampling at Full Supply Level

Field measurements recorded on 19 February 2025 and 29 July 2025 utilised probes commonly used for routine monitoring in the Woronora Reservoir. Recorded field and laboratory results used in this report were provided by the Metropolitan database.

The Deep Full Supply Level sampling cross-section configuration at WDFS1 is described as follows: A is to the western side; B is the middle; and C is to the eastern side. Surface and Depth water samples were taken at all three sampling locations (A, B, and C) along the WDFS1 transect. Depth sampling included three depths: surface, mid-depth and bottom. These Depth locations differed between the February 2025 and July 2025 sampling dates (see Table 1). A Surface only sample was taken at ETWQ AU. Data from depth measurements is expressed as Mean \pm sd (standard error se) where se= sd/ \sqrt{n} (n=3). Data sets can be compared directly for respective variables.

Data from Field Measurements from Sampling at Full Supply Level

Table 2 presents Surface and Depth results for pH, EC ($\mu\text{S}/\text{cm}$), Turbidity (NTU), ORP (mV) and Temperature ($^{\circ}\text{C}$) measured in field samples collected on 19 February 2025 and 29 July 2025 at Surface and Depth sites listed in Table 1.

**Table 2 Comparison of Surface and Depth Data at WDFS1 Full Supply Level
on 19 February 2025 and 29 July 2025
(Field Results)**

Site	Collection Depth (m)	pH	EC ($\mu\text{S}/\text{cm}$)	Turbidity (NTU)	ORP (mV)	Temperature ($^{\circ}\text{C}$)
19 February 2025						
ETWQ AU	Surface	7.33	150	11.7	121.2	18.67
WDFS1-A	Surface	6.36	71	0.3	147	24.07
WDFS1-B		6.68	51	1.3	90.7	23.38
WDFS1-C		6.38	67	0.1	140	24.35
Mean\pmsd (se)		6.48 $\pm 0.179(0.13)$	63 $\pm 10.6(6.11)$	0.57 $\pm 0.64(0.37)$	145 $\pm 4.0(2.3)$	24.16 ± 0.09
WDFS1-A	2.5	6.37	70	2	147.8	23.45
WDFS1-B	4.1	6.44	56	0.3	127.3	23.6
WDFS1-C	1.7	6.39	68	0.2	127.3	24.32
Mean\pmsd (se)		6.4 $\pm 0.037(0.021)$	58.3 $\pm 10.7(6.2)$	0.83 $\pm 1.02(0.59)$	134.1 $\pm 11.8(1.7)$	23.79 ± 0.27
WDFS1-A	5.0	6.37	64	0.8	142.2	23.15
WDFS1-B	8.2	6.1	58	1.3	123.6	22.7
WDFS1-C	3.4	6.32	65	0.9	115	24
Mean\pmsd (se)		6.36 $\pm 0.144(0.08)$	62.3 $\pm 3.79(2.7)$	1.0 $\pm 0.0.26(0.15)$)	126.9 $\pm 13.9(1.7)$	23.3 ± 0.38
29 July 2025						
ETWQ AU	Surface	6.54	132	8.9	32.6	11.91
WDFS1-A	Surface	6.5	49	0.8	239.5	13.15
WDFS1-B		6.44	49	0.7	240	13.09
WDFS1-C		6.47	49	1.2	247.9	13
Mean\pmsd (se)		6.47 $\pm 0.03(0.017)$	48.7 $\pm 0.058(0)$	0.9 $\pm 0.26(0.15)$	242.5 $\pm 4.71(2.7)$	13.01 ± 0.04
WDFS1-A	3.1	6.16	48	0.7	253	12.99
WDFS1-B	4.5	6.59	48	1.1	216.8	12.89
WDFS1-C	2.3	6.42	49	1	254.9	13.06
Mean\pmsd (se)		6.39 $\pm 0.217(0.12)$	48.7 ± 0.058	0.93 $\pm 1.33(0.77)$	241.6 $\pm 21.5(12.)$	12.98 ± 0.05
WDFS1-A	6.2	6.48	48	1	244.4	12.93
WDFS1-B	9.0	6.49	61	3.4	230.1	12.63
WDFS1-C	4.6	6.43	49	1.2	252.2	12.9
Mean\pmsd (se)		6.47 $\pm 0.032(0.020)$	48.7 $\pm 7.23(7.23)$	1.87 $\pm 1.33(0.77)$	242.2 $\pm 11.2(6.47)$	12.82 $\pm 0.16(0.095)$

Notes: Field sampling of the Deep Full Supply Level at WDFS1 conducted on 19 February 2025 and 29 July 2025. A is to the western side, B is the middle, and C is to the eastern side. Surface samples were taken at both sites. Mean \pm sd (se), where se= sd/ \sqrt{n} (n=3).

Data from Laboratory Analyses of Field Sampling at Full Supply Level

Table 3 presents Surface and Depth results for pH and EC, conducted in the laboratory from field samples collected on 19 February 2025 and 29 July 2026 at Surface and Depth sites listed in Table 1.

**Table 3 Comparison of Surface and Depth Data at WDFS1 Full Supply Level
(Laboratory Results for pH and EC)**

Site	Collection Depth (m)	pH	EC ($\mu\text{S/cm}$)
19 February 2025			
ETWQ AU	Surface	6.74	178
WDFS1-A	Surface	6.31	82
WDFS1-B		6.33	82
WDFS1-C		6.34	83
Mean\pmsd (se)		6.33\pm0.015(0.9)	82.3\pm0.58(0.33)
WDFS1-A	2.5	6.33	83
WDFS1-B	4.1	6.35	82
WDFS1-C	1.7	6.30	83
Mean\pmsd (se)		6.33\pm0.025(0.014)	82.7\pm0.58(0.33)
WDFS1-A	5.0	6.36	86
WDFS1-B	8.2	6.43	95
WDFS1-C	3.4	6.31	83
Mean\pmsd (se)		6.37\pm0.060(0.035)	88.0\pm6.24(3.60)
29 July 2025			
ETWQ AU	Surface	6.82	163
WDFS1-A	Surface	6.12	82
WDFS1-B		6.21	82
WDFS1-C		6.37	82
Mean\pmsd (se)		6.23\pm0.13(0.073)	82.0\pm0.0(0.0)
WDFS1-A	3.1	6.31	81
WDFS1-B	4.5	6.26	84
WDFS1-C	2.3	6.38	82
Mean\pmsd (se)		6.32\pm0.06(0.035)	82.3\pm1.53(0.88)
WDFS1-A	6.2	6.35	81
WDFS1-B	9.0	6.57	94
WDFS1-C	4.6	6.33	82
Mean\pmsd (se)		6.42\pm0.13(0.08)	85.7\pm7.2(4.2)

Notes: Laboratory testing of field sampling of the Deep Full Supply Level at WDFS1 conducted on 19 February 2025 and 29 July 2025. A is to the western side, B is the middle, and C is to the eastern side. Surface samples were taken at both sites. Mean \pm sd (se), where se= sd/ \sqrt{n} (n=3).

Laboratory Results for Metals

Table 4 provides a comparison of laboratory results (i.e. filtered and total metal concentrations) at Surface and Depth at WDFS1 Full Supply level 19 February 2025 and 29 July 2025.

**Table 4 Comparison of Filtered (F) and Total (T) Metal Concentrations at Surface and Depth at WDFS1 Full Supply Level 19 February 2025 and 29 July 2025
(Laboratory Results)**

Site	Collection Depth (m)	Mn (F) mg/L	Mn (T) mg/L	Fe (F) mg/L	Fe (T) mg/L	Al (F) mg/L	Al (T) mg/L
19 February 2025							
ETWQ AU		0.12	0.161	0.11	1.81	<0.01	0.03
WDFS1-A	Surface	0.019	0.028	0.2	0.7	0.06	0.26
WDFS1-B		0.019	0.028	0.2	0.61	0.06	0.20
WDFS1-C		0.02	0.029	0.2	0.71	0.06	0.25
Mean±sd(se)		0.019±0.019(0.0120)	0.028±0.028(0.016)	0.2±0.001(0.0020)	0.673±0.055(0.032)	0.06±0.06(0.035)	0.237±0.032(0.019)
WDFS1-A	2.5	0.019	0.03	0.17	0.7	0.06	0.24
WDFS1-B	4.1	0.017	0.035	0.15	0.95	0.05	0.32
WDFS1-C	1.7	0.021	0.028	0.24	0.62	0.07	0.2
Mean±sd (se)		0.019±0.019(0.011)	0.031±0.004(0.0021)	0.187±0.047(0.027)	0.757±0.172(0.099)	0.060±0.01(0.006)	0.253±0.061 (0.035)
WDFS1-A	5.0	0.022	0.033	0.21	0.75	0.06	0.22
WDFS1-B	8.2	0.029	0.039	0.25	0.96	0.05	0.22
WDFS1-C	3.4	0.02	0.023	0.22	0.36	0.07	0.12
Mean±sd (se)		0.024±0.024(0.014)	0.032±0.008(0.013)	0.023±0.023(0.131)	0.69±0.304(0.176)	0.07±0.001(0.006)	0.187±0.058(0.033)
29 July 2025							
ETWQ AU		0.123	0.134	0.28	1.56	<0.01	0.03
WDFS1-A	Surface	0.01	0.02	0.24	0.62	0.09	0.27
WDFS1-B		0.01	0.011	0.23	0.28	0.09	0.16
WDFS1-C		0.01	0.017	0.22	0.52	0.09	0.24
Mean±sd (se)		0.01±0.00	0.017±0.003(0.0017)	0.23±0.023(0.013)	0.473±0.175(0.101)	0.09±0.09(0.052)	0.223±0.0056(0.033)
WDFS1-A	3.1	0.01	0.016	0.28	0.52	0.1	0.24
WDFS1-B	4.5	0.01	0.014	0.14	0.36	0.09	0.19
WDFS1-C	2.3	0.01	0.019	0.26	0.59	0.10	0.26
Mean±sd (se)		0.01±0.01(0.0006)	0.016±0.003(0.001)	0.227±0.023(0.113)	0.49±0.118(0.068)	0.097±0.006(0.033)	0.23±0.0026(0.021)
WDFS1-A	6.2	0.01	0.017	0.28	0.55	0.1	0.25
WDFS1-B	9.0	0.017	0.02	0.14	0.30	0.06	0.13
WDFS1-C	4.6	0.011	0.018	0.26	0.59	0.10	0.27
Mean±sd (se)		0.013±0.013(0.007)	0.018±0.0016(0.0009)	0.227±0.223(0.133)	0.48±0.157(0.091)	0.087±0.023(0.023)	0.217±0.076(0.038)

Note: Deep Full Supply Level sampling on 19 February 2025 and 29 July 2025. A is to western side, B is the middle and C is the Eastern Side for each transect at WDFS1. Surface samples were taken at all sites. Mean±sd (se) se= sd/√n (n=3).

Summary of Findings

The data collected at various depths (i.e. Surface, Middle Depth, Bottom Depth) has been evaluated in consideration of the IEAPM's recommendation. These findings are presented below.

pH

The field pH data from 19 February 2025 (Table 2) shows a narrow overall range 6.1 – 6.68 of within 1 pH unit, but ETWQ AU has a higher pH of 7.33. The laboratory measured pH data from 19 February 2025 has a range of 6.1 – 6.59 and shows a narrow overall range between 2 pH units, including a higher pH 7.33 at ETWQ AU with a pH range is minimum 6.1 to maximum 6.49 based on Depth mean±se.

The field pH data from 29 July 2025 also shows a narrow overall range 6.1 – 6.49 of within 1 pH unit, but ETWQ AU has a higher pH of 6.54. The laboratory measured pH data from 29 July 2025 has a range of 6.1 - 6.59 and shows a narrow overall range between 2 pH units, including a higher pH 6.54 at ETWQ AU with a pH range is minimum 6.1 to maximum 6.49 based on Depth mean±se.

Overall, across both sampling periods, there were slight increases in pH in the laboratory sample compared to the field data which is most likely attributed to addition of bicarbonate to the sample from groundwater. There was no observed evidence of more acidic water at Depth with the field samples taken.

Electrical Conductivity

The field EC data from 19 February 2025 shows an overall range of 48 - 71 $\mu\text{S}/\text{cm}$, and EC 150 $\mu\text{S}/\text{cm}$ at ETWQ AU with an EC range of minimum 48 - 49 $\mu\text{S}/\text{cm}$ based on Depth mean±se. The laboratory measured EC also shows a low overall range of 49 - 71 $\mu\text{S}/\text{cm}$, and EC 178 $\mu\text{S}/\text{cm}$ at ETWQ AU.

The field EC data from 29 July 2025 shows an overall range of 48-49 $\mu\text{S}/\text{cm}$, and EC 132 $\mu\text{S}/\text{cm}$ at ETWQ AU with an EC range of minimum 48 - 49 $\mu\text{S}/\text{cm}$ based on Depth mean±se. The laboratory measured EC also shows a low overall range of 48 - 49 $\mu\text{S}/\text{cm}$.

The slight difference of EC in laboratory measured EC is most likely due to loss of carbon dioxide from the water sample giving an increase in alkalinity compared with direct measurement of the field EC. There is no evidence of increased salinity in water at depth that would contribute to a significant salinity gradient with the field samples taken 29 July 2023.

Turbidity

The field Turbidity (NTU) data collected on 19 February 2025 had an overall range of 2.5 - 3.5 NTU that is very low and 11.7 NTU at ETWQ AU (Table 2). There is no evidence of increased turbidity in water at Depth that would contribute to a significant turbidity gradient with the field samples taken on 19 February 2025.

The field Turbidity (NTU) data in Table 2 shows for 29 July 2025 an overall range of 2.4 - 5.4 NTU that is very low and 8.9 NTU at ETWQ AU. There is no evidence of increased turbidity in water at Depth that would contribute to a significant turbidity gradient with the field samples taken on 29 July 2025.

ORP

The field ORP (mV) data from 19 February 2025 shows an overall range of 115 - 147 mV in Table 2 and shows an overall range of 136 (mV), including 121.2 (mV) at ETWQ AU with an ORP range of 115 -147.8 mV. The ORP at 115 (mV) at Depth is mildly reducing.

The field ORP (mV) data from 29 July 2025 shows an overall range of 216.8 - 247.9 mV, including 32.6 (mV) at ETWQ AU, which indicates reducing conditions; however, WDFS1 is oxidising.

ORP (mV) is progressively more oxidising at Depth moving downstream from ETFSL 100 to ETFSL 500 (see Table 2 in Attachment A). Thus, ORP (mV) at Surface becomes more oxidising at Depth moving downstream from ETFSL 100 to ETFSL 500 (see Table 2 in Attachment A). The lack of sufficiently reducing conditions at Depth in the Woronora Reservoir measured ORP (mV) indicates that iron precipitates and colloids are unlikely to redissolve with sediment. Manganese will remain in solution.

Temperature

The field Temperature ($^{\circ}\text{C}$) data in Table 2 shows for 19 February 2025 that Bottom Depth mean \pm se was 23.3 ± 0.38 ($^{\circ}\text{C}$). The Temperature range is minimum 22.7 $^{\circ}\text{C}$ to a maximum 24.07 $^{\circ}\text{C}$. The Temperature at Surface ETWQ AU on 19 February 2025 was 18.67 $^{\circ}\text{C}$.

The field Temperature ($^{\circ}\text{C}$) data in Table 2 shows for 29 July 2025 that Bottom Depth mean \pm se was 12.82 ± 0.095 ($^{\circ}\text{C}$). The Temperature at Surface ETWQ AU on 29 July 2025 was 11.91 $^{\circ}\text{C}$.

A summary of data from samples collected at WDFS1 given in Table 4 gives comparison of Surface and Depth Laboratory measured data for manganese (filtered $<0.45\mu\text{m}$ mg/L), manganese (total mg/L), iron (filtered $<0.45\mu\text{m}$ mg/L), iron (total mg/L), and aluminium (filtered $<0.45\mu\text{m}$ mg/L) and aluminium (total mg/L) at Eastern Tributary Full Supply level on 19 February 2025 and 29 July 2025.

Manganese (Filtered)

19 February 2025

Manganese (Filtered $<0.45\mu\text{m}$ mg/L) data shows that for the laboratory measured data based on Surface mean \pm se, the range is minimum 0.019 Mn (F) mg/L to maximum 0.02 Mn (F) mg/L and based on Bottom Depth mean \pm se, the range is minimum 0.02 Mn (F) mg/L to maximum 0.029 Mn (F) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.12 Mn (F) mg/L) is greater than Surface and Depth (Table 4).

29 July 2025

Manganese (Filtered $<0.45\mu\text{m}$ mg/L) data shows that for the laboratory measured data based on Surface mean \pm se, the range is minimum 0.01 Mn (F) mg/L to maximum 0.01 Mn (F) mg/L and based on Bottom Depth mean \pm se, the range is minimum 0.01 Mn (F) mg/L to maximum 0.017 Mn (F) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.123 Mn (F) mg/L) is greater than Surface and Depth.

Thus Manganese (Filtered <0.45µm mg/L) results for 19 February 2025 and 29 July 2025 show no differences.

Manganese (Total)

19 February 2025

Manganese (Total mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.028 Mn (T) mg/L to maximum 0.029 Mn (T) mg/L and based on Bottom Depth mean±se, the range is minimum 0.023 Mn (T) mg/L to maximum 0.039 Mn (T) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.161 Mn (T) mg/L) is greater than Surface and Depth.

29 July 2025

Manganese (Total mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.011 Mn (T) mg/L to maximum 0.017 Mn (T) mg/L and based on Bottom Depth mean±se, the range is minimum 0.017 Mn (T) mg/L to maximum 0.02 Mn (T) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.134 Mn (T) mg/L) is greater than Surface and Depth.

Thus Manganese (Total <0.45µm mg/L) results for 19 February 2025 and 29 July 2025 show no differences.

Iron (Filtered)

19 February 2025

Iron (Filtered <0.45µm mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.2 Fe (F) mg/L to maximum 0.2 Fe (F) mg/L and based on Bottom Depth mean±se, the range is minimum 0.21 Fe (F) mg/L to maximum 0.25 Fe(F) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.11 Fe (F) mg/L) is less than Surface and Depth.

29 July 2025

Iron (Filtered <0.45µm mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.22 Fe (F) mg/L to maximum 0.24 Fe (F) mg/L and based on Bottom Depth mean±se, the range is minimum 0.14 Fe (F) mg/L to maximum 0.28 Fe (F) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.28 Fe(F) mg/L) is greater than Surface and Depth.

Thus Iron (Filtered <0.45µm mg/L) results for 19 February 2025 and 29 July 2025 show no differences.

Iron (Total)

19 February 2025

Iron (Total mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.61 Fe (T) mg/L to maximum 0.71 Fe (T) mg/L and based on Bottom Depth mean±se, the range is minimum 0.36 Fe (T) mg/L to maximum 0.96 Fe (T) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (1.81 Fe (T) mg/L) is greater than Surface and Depth.

29 July 2025

Iron (Total mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.28 Fe (T) mg/L to maximum 0.62 Fe (T) mg/L and based on Bottom Depth mean±se, the range is minimum 0.30 Fe (T) mg/L to maximum 0.59 Fe (T) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (1.56 Fe (T) mg/L) is greater than Surface and Depth.

Thus Iron (Total mg/L) results for 19 February 2025 and 29 July 2025 show no differences.

Aluminium (Filtered)

The Aluminium (Filtered <0.45µm mg/L) at ETWQ AU 19 February 2025 is <0.01 Al (F) mg/L and indicates that filtered Al is not added to Woronora Reservoir as is the case for filtered manganese and iron. This is confirmed by examining the measured Al (mg/L) data in ETGW2 groundwater which is consistently <0.01 mg/L. Aluminium does undergo dissolution from cracked sandstone from longwall mining under reducing conditions as is the case with Mn and Fe.

Aluminium (Total)

19 February 2025

Aluminium (Total mg/L) data shows that for the laboratory measured based data on Surface mean±se, the range is minimum 0.20 Al (T) mg/L to maximum 0.26 Al (T) mg/L and based on Bottom Depth mean±se, the range is minimum 0.12 Al (T) mg/L to maximum 0.22 Al (T) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.03 Al (F) mg/L) is less than Surface and Depth.

29 July 2025

Aluminium (Total mg/L) data shows that for the laboratory measured data based on Surface mean±se, the range is minimum 0.16 Al (T) mg/L to maximum 0.27 Al (T) mg/L and based on Bottom Depth mean±se, the range is minimum 0.13 Al (T) mg/L to maximum 0.27 Al (T) mg/L. There is no difference between Surface and Depth. When compared, ETWQ AU (0.03 Al (T) mg/L) is less than Surface and Depth.

Thus Aluminium (Total mg/L) data for 19 February 2025 and 29 July 2025 show no differences.

Summary of Metal Depth Sampling Observations

The total and filtered metals (manganese, iron and aluminium) concentrations in the water column are presented within this report. The concentrations measured at WDFS and further upstream at ETFSL 500 are generally very low implying they are controlled by dilution. The measurement of total and filtered metals (manganese, iron and aluminium) concentrations in the water column does not measure sediment concentration directly. However, the earlier evidence for sediment concentrations says that manganese, iron and aluminium concentrations in sediment are not very high either (Noller, 2025).

There is no evidence of increased metal concentrations in water at depth that would contribute to a significant gradient.

Conclusions

In consideration of the above, the following recommendations have been identified.

The water quality data for Surface and Depth sampling collected during February and July 2025 indicate:

1. Field EC samples at the Surface versus at Depth show little difference and the field temperature samples at Surface are approximately 1 °C higher than at Depth. Thus, this temperature difference is not resulting in a material difference in EC reading.
2. There is little difference between field and laboratory EC measurements at Surface versus at Depth.
3. No stratification of analytes has been observed at Depths below Surface at the sampled sites.

The continuation of the current sampling at surface under the water management plan is therefore considered to be appropriate.

Yours Sincerely,



Barry N Noller

Principal Research Fellow

Centre For Mined Land Rehabilitation

Email b.noller@uq.edu.au Mobile +61 418793063

Attachment A – Summary of August Monitoring Results

ATTACHMENT A

SUMMARY OF AUGUST 2023 MONITORING RESULTS

Sampling at Eastern Tributary Full Supply Level

Patrick Brienen, Principal OHS and Environmental Scientist at Brienen Environment & Safety Pty Ltd, conducted sampling for Metropolitan Coal Mine on 23 August 2023 at incremental sites along the Eastern Tributary at the Full Supply Level (FSL).

A cross-section of three sampling points at Depth are discussed at ETFSL 100, 200, 300, 400 and 500 markers and one sampling point at Surface is discussed at ETFSL 0, 20, 100, 200, 300, 400 and 500. The depth to water is less than 0.5 metres at sites ETFSL 0 and ETFSL 20. Routine surface sampling is currently conducted at EFTSL 0, 20, 100, 200 and 300.

Sampling locations are provided in Table 1 below.

Table 1 Location of Sampling Sites

Location	Easting	Northing	Depth of Sample (m)	Visibility (m)	Width (m)
ETWQ AU	312154	6215643	0.2	0.7	7
ETFSL 0	312125	6215661	0.3	0.4	5
ETFSL 20	312114	6215662	0.25	0.9	8
ETFSL 40	312094	6215672	*	*	*
ETFSL 60	312081	6215686	*	*	*
ETFSL 80	312067	6215709	*	*	*
ETFSL 100	312061	6215719	0.2	0.5	10
ETFSL 200	311990	6215797	0.3	0.6	22
ETFSL 300	311928	6215855	0.3	0.5	29
ETFSL 400	311862	6215941	0.3	0.3	30
ETFSL 500	311840	6216037	0.3	0.5	31

* Data could not be collected due to access restrictions at these sites.

Field Measurements from Sampling at Full Supply Level

Field measurements recorded on 23 August 2023 utilised probes commonly used for routine monitoring in the Woronora Reservoir. Recorded field and laboratory results used in this report were provided by the Metropolitan database.

The Eastern Tributary Deep Full Supply Level sampling cross-section configuration is described as follows: A is to western side; B is the middle; and C is the eastern side for each transect at ETFSL 100, 200, 300, 400 and 500. Surface and Depth water samples were taken at these 5 sites. Data from depth measurements is expressed as Mean \pm sd (standard error se), where $se = sd/\sqrt{n}$ ($n=3$). Data sets can be compared directly for respective variables.

Data from Field Measurements from Sampling at Full Supply Level

Table 2 presents Surface and Depth results for pH, EC ($\mu\text{S}/\text{cm}$), Turbidity (NTU), ORP (mV) and Temperature ($^{\circ}\text{C}$) measured in field samples collected on 23 August 2023 at Surface and Depth sites listed in Table 1.

Table 2

**Comparison of Surface and Depth Data at Eastern Tributary FSL on 23 August 2023:
(Field Results)**

Site	Collection Depth (m)	pH	EC ($\mu\text{S}/\text{cm}$)	Turbidity (NTU)	ORP (mV)	Temperature ($^{\circ}\text{C}$)
ETWQ AU	Surface	6.73	133	8	58.3	13.37
ETFSL 0	Surface	6.73	124	7.9	59.3	12.96
ETFSL 20	Surface	7.08	121	8.8	40.3	12.8
ETFSL 100	Surface	6.67	97	4.5	86.9	15.88
ETFSL 100A	1.2	6.72	23	3.3	113.7	14.5
ETFSL 100B	3.7	6.93	52	4.4	97.6	16.7
ETFSL 100C	2.3	6.73	46	4.7	122.1	14.86
ETFSL 100 Depth Mean\pmsd (se)		6.71\pm0.032 (0.003)	40.3\pm15.3 (8.8)	4.1\pm0.74(0.43)	111.1\pm10.2 (5.9)	15.35\pm1.18(0.68)
ETFSL 200	Surface	6.54	92	4.3	102.5	15.92
ETFSL 200A	2.92	6.51	26	3.7	141.3	14.32
ETFSL 200B	4.78	6.46	26	6.2	134	14.05
ETFSL 200C	5.05	6.41	36	4.6	134.5	14.07
ETFSL 200C Depth Mean\pmsd (se)		6.46\pm0.05(0.03)	29.3\pm5.8 (3.3)	4.8\pm1.3(0.7)	136.6\pm4.1 (2.3)	14.15\pm(0.09)
ETFSL 300	Surface	6.57	77	4.1	115.5	15.67
ETFSL 300A	4.36	6.32	18	2.7	129.2	14.19
ETFSL 300B	9.02	6.34	40	5.2	113.8	14.6
ETFSL 300C	3.62	6.42	33	8.2	136.8	14.28
ETFSL 300 Depth Mean\pmsd (se)		6.36\pm0.05 (0.03)	30.3\pm11.2 (6.5)	5.1\pm3.1(1.8)	126.6\pm11.7 (6.8)	14.36\pm0.22(0.12)
ETFSL 400	Surface	6.39	70	2	172	16.03
ETFSL 400A	1.85	6.16	78	2.7	183.2	14.6
ETFSL 400B	7.0	6.45	49	5.8	203.5	15.45
ETFSL 400C	1.9	6.45	98	7.7	139.7	15.35
ETFSL 400 Depth Mean\pmsd (se)		6.35\pm0.17 (0.10)	75\pm24.6 (14.2)	5.4\pm2.5(1.5)	175.5\pm32.6 (18.8)	15.13\pm0.46(0.27)
ETFSL 500	Surface	6.46	68	1.7	155.6	15.58
ETFSL 500A	2.29	6.51	74	2.1	168.6	15.12
ETFSL 500B	7.2	5.98	87	3.2	182.2	14.5
ETFSL 500C	3.85	6.2	65	2.1	178.3	14.43
ETFSL 500 Depth Mean\pmsd (se)		6.23\pm0.27 (0.15)	73.3\pm11.1 (6.4)	2.5\pm0.64(0.36)	176.4\pm7.0 (4.0)	14.68\pm0.38(0.22)

Notes: Field sampling of the Deep Full Supply Level conducted on 23 August 2023.

A is to western side, B is the middle and C is the eastern side for each transect at 100, 200, 300, 400 and 500.

Surface samples were taken at all sites.

Mean \pm sd (se), where se= sd/ \sqrt{n} (n=3).

Data from Laboratory Analyses of Field Sampling at Full Supply Level

Table 3 presents Surface and Depth results for pH and EC, conducted in the laboratory from field samples collected on 23 August 2023 at Surface and Depth sites listed in Table 1.

Table 3
Comparison of Surface and Depth Data at Eastern Tributary Full Supply level on 23 August 2023:
(Laboratory Results)

Site	Collection Depth (m)	pH	EC (µS/cm)
ETWQ AU	Surface	6.83	173
ETFSL 0	Surface	6.79	175
ETFSL 20	Surface	7	171
ETFSL 100	Surface	6.55	82
ETFSL 100A	1.2	6.45	74
ETFSL 100B	3.7	4.4	97.6
ETFSL 100C	2.3	6.78	111
ETFSL 100 Depth Mean±sd (se)		5.88±1.29(0.74)	94.2±18.7(10.8)
ETFSL 200 Surface	Surface	6.45	76
ETFSL 200A	2.92	6.66	95
ETFSL 200B	4.78	6.6	90
ETFSL 200C	5.05	6.55	100
ETFSL 200C Depth Mean±sd (se)		6.60±0.06(0.03)	95±5(2.9)
ETFSL 300 Surface	Surface	6.42	73
ETFSL 300A	4.36	6.5	83
ETFSL 300B	9.02	5.2	113.8
ETFSL 300C	3.62	6.57	99
ETFSL 300 Depth Mean±sd (se)		6.09±0.77(0.45)	98.6±15.4(8.89)
ETFSL 400	Surface	6.49	73
ETFSL 400A	1.85	6.49	82
ETFSL 400B	7.0	6.72	102
ETFSL 400C	1.9	6.54	82
ETFSL 400 Depth Mean±sd (se)		6.58±0.12(0.070)	88.67±11.4(6.67)
ETFSL 500 Surface	Surface	6.48	72
ETFSL 500A	2.29	6.39	77
ETFSL 500B	7.2	6.52	90
ETFSL 500C	3.85	6.45	74
ETFSL 500 Depth Mean±sd (se)		6.45±0.06(0.04)	80.3±8.5(4.9)

Notes: Laboratory testing of Field sampling of the Deep Full Supply Level conducted on 23 August 2023.
A is to western side, B is the middle and C is the eastern side for each transect at 100, 200, 300, 400 and 500.
Surface samples were taken at all sites.
Mean ± sd (se), where se= sd/√n (n=3).

**Table 4 Comparison of Filtered (F) and Total (T) Metal Concentrations at Surface and Depth at Eastern Tributary Full Supply Level on 23 August 2023:
(Laboratory Results)**

Site	Collection Depth (m)	Mn (F) mg/L	Mn (T) mg/L	Fe (F) mg/L	Fe (T) mg/L	Al (F) mg/L	Al (T) mg/L
ETWQ AU	Surface	0.222	0.239	0.7	2.21	<0.01	0.03
ETFSL 0	Surface	0.232	0.237	2.07	2.07	<0.01	0.03
ETFSL 20	Surface	0.216	0.228	0.6	2.04	<0.01	0.03
ETFSL 100	Surface	0.04	0.054	0.06	1	0.02	0.24
ETFSL 100A	1.2	0.016	0.023	<0.05	0.48	0.02	0.19
ETFSL 100B	3.7	0.086	0.1	0.06	1.27	0.01	0.18
ETFSL 100C	2.3	0.082	0.102	<0.05	1.29	0.01	0.17
ETFSL 100 Depth Mean±sd (se)		0.061±0.039(0.023)	0.075±0.045(0.026)	0.037±0.020(0.012)	1.01±0.46(0.27)	0.013±0.006(0.003)	0.18±0.017(0.006)
ETFSL 200	Surface	0.019	0.038	<0.05	0.85	0.02	0.26
ETFSL 200A	2.92	0.039	0.065	<0.05	1.11	0.01	0.21
ETFSL 200B	4.78	0.041	0.079	<0.05	1.57	0.01	0.26
ETFSL 200C	5.05	0.072	0.098	<0.05	1.43	<0.01	0.21
ETFSL 200C Depth Mean±sd (se)		0.051±0.019(0.011)	0.081±0.017(0.010)	<0.05	1.37±0.24(0.14)	0.01±0.0 (0.0)	0.27±0.029(0.013)
ETFSL 300	Surface	0.014	0.034	0.05	0.84	0.02	0.02
ETFSL 300A	4.36	0.03	0.047	<0.05	1.03	0.01	0.25
ETFSL 300B	9.02	0.107	0.141	<0.05	1.76	<0.01	0.22
ETFSL 300C	3.62	0.052	0.088	<0.05	1.76	<0.01	0.36
ETFSL 300 Depth Mean±sd (se)		0.052±0.020(0.012)	0.092±0.047(0.027)	<0.05	1.52±0.42(0.24)	0.01±0.0(0.0)	0.28±0.074(0.043)
ETFSL 400	Surface	0.017	0.029	0.39	0.79	0.1	0.26
ETFSL 400A	1.85	0.016	0.039	<0.05	0.91	0.01	0.23
ETFSL 400B	7.0	0.058	0.086	<0.05	1.54	<0.01	0.24
ETFSL 400C	1.9	0.033	0.054	<0.05	1.34	0.01	0.43
ETFSL 400 Depth Mean±sd (se)		0.036±0.021(0.012)	0.061±0.026(0.015)	<0.05	1.26±0.32(0.19)	0.01±0.0 (0.)	0.30±0.113(0.065)
ETFSL 500	Surface	0.013	0.026	0.35	0.75	0.1	0.26
ETFSL 500A	2.29	0.015	0.037	<0.05	0.89	0.02	0.26
ETFSL 500B	7.2	0.038	0.059	<0.05	1.1	0.01	0.18
ETFSL 500C	3.85	0.016	0.023	<0.05	0.48	0.02	0.12
ETFSL 500 Depth Mean±sd (se)		0.023±0.013(0.008)	0.021±0.018(0.010)	<0.05	0.68±0.56(0.003)	0.016±0.006(0.04)	0.187±0.070(0.041)

Notes: Laboratory testing of Field sampling of the Deep Full Supply Level conducted on 23 August 2023.

A is to western side, B is the middle and C is the eastern side for each transect at 100, 200, 300, 400 and 500.

Surface samples were taken at all sites. Mean ± sd (se), where se= sd/√n (n=3).

Conclusions

The water quality data for Surface and Depth sampling collected on 23 August 2023 shows the following:

1. Table 1 lists the depth of water column measured on 23 August 2023 from ETFSL 0 (0.3 m) downstream to ETFSL 500 (0.3 m), which remains relatively shallow;
2. Field EC samples at the Surface versus at Depth show little difference and the field temperature samples at Surface are approximately 1 °C higher than at Depth. Thus, this temperature difference is not resulting in a material difference in EC reading.
3. There is little difference between field and laboratory EC measurements at Surface versus at Depth.

Thus, surface water plume modelling (e.g., CORMIX) is unlikely to show any influence of temperature on EC at Surface ETFSL 500 (0.3 m depth), for the sample collected on 23 August 2023.