

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2115770**  
**Client** : **Dept for Environment & Water**  
**Contact** : **Mr FRANK MANGERUCA**  
**Address** : **GPO BOX 2834**  
**ADELAIDE SA, AUSTRALIA 5001**  
**Telephone** : **----**  
**Project** : **HCHB**  
**Order number** : **----**  
**C-O-C number** : **----**  
**Sampler** : **JC**  
**Site** : **----**  
**Quote number** : **AD/052/20 V2**  
**No. of samples received** : **20**  
**No. of samples analysed** : **20**

**Page** : 1 of 10  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Kieren Burns  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61881625130  
**Date Samples Received** : 11-Aug-2021 10:40  
**Date Analysis Commenced** : 11-Aug-2021  
**Issue Date** : 19-Aug-2021 17:01



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Samantha Smith	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- It is recognised that TOC is less than DOC for sample #15. However, the difference is within experimental variation of the methods.
- EK061G: EM2115770 #4 & 5 Sample required dilution prior to analysis due to sample matrix. LOR has been raised accordingly.
- EP008, Chlorophyll-a standard does not contained Pheophytin-a standard.
- EP008, LOR raised for Chlorophyll-a for samples 1 and 2 due to sample matrix.
- EA015H: EM2115770 #11, #14: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Total Algae Count (MB010) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Sampling date / time				10-Aug-2021 10:15	10-Aug-2021 09:15	10-Aug-2021 09:15	10-Aug-2021 08:40	10-Aug-2021 07:50	
Compound	CAS Number	LOR	Unit	EM2115770-001	EM2115770-002	EM2115770-003	EM2115770-004	EM2115770-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	4890	734	7840	22600	29700	
EA045: Turbidity									
Turbidity	----	0.1	NTU	43.4	57.2	51.5	5.2	2.9	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	93	86	97	82	128	
Total Alkalinity as CaCO3	----	1	mg/L	93	86	97	82	128	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2840	363	4840	12500	17700	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.58	0.11	0.80	1.80	0.81	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.12	0.06	0.08	0.06	0.05	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	<0.01	0.02	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	0.02	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	1.3	1.1	<1.0	<1.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.9	1.3	1.1	<1.0	<1.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.11	0.08	0.11	0.24	0.26	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	7	7	6	6	8	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	9	8	7	7	8	
EP008: Chlorophyll									



## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

Sample ID

				Murray Mouth	US Tauwitchere	DS Tauwitchere	Mark Point	Long Point
Sampling date / time				10-Aug-2021 10:15	10-Aug-2021 09:15	10-Aug-2021 09:15	10-Aug-2021 08:40	10-Aug-2021 07:50
Compound	CAS Number	LOR	Unit	EM2115770-001	EM2115770-002	EM2115770-003	EM2115770-004	EM2115770-005
				Result	Result	Result	Result	Result
<b>EP008: Chlorophyll - Continued</b>								
Chlorophyll a	----	1	mg/m <sup>3</sup>	24	23	4	8	5
Chlorophyll b	----	1	mg/m <sup>3</sup>	<5	<5	<1	<1	<1
Pheophytin a	----	1	mg/m <sup>3</sup>	8	8	2	2	2
<b>Subcontracted Analysis</b>								
Dummy Analyte	----	-	-	NRind	NRind	NRind	NRind	NRind

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa du Yumpa
Sampling date / time				09-Aug-2021 18:00	09-Aug-2021 17:45	09-Aug-2021 17:10	09-Aug-2021 16:00	09-Aug-2021 15:20	
Compound	CAS Number	LOR	Unit	EM2115770-006	EM2115770-007	EM2115770-008	EM2115770-009	EM2115770-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	43300	45900	67400	72100	69500	
EA045: Turbidity									
Turbidity	----	0.1	NTU	3.7	5.4	11.2	10.5	9.8	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	151	160	196	178	188	
Total Alkalinity as CaCO3	----	1	mg/L	151	160	196	178	188	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	24200	26700	39800	41600	41800	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.22	0.15	1.53	0.45	0.38	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.04	<0.02	<0.02	<0.02	<0.02	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	0.01	0.02	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	0.01	0.02	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.1	1.7	3.7	3.0	3.5	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.1	1.7	3.7	3.0	3.5	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.32	0.30	0.46	0.28	0.18	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	12	15	24	23	23	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	13	17	28	28	28	
EP008: Chlorophyll									



## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

Sample ID

				Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa du Yumpa
Sampling date / time				09-Aug-2021 18:00	09-Aug-2021 17:45	09-Aug-2021 17:10	09-Aug-2021 16:00	09-Aug-2021 15:20
Compound	CAS Number	LOR	Unit	EM2115770-006	EM2115770-007	EM2115770-008	EM2115770-009	EM2115770-010
				Result	Result	Result	Result	Result
<b>EP008: Chlorophyll - Continued</b>								
Chlorophyll a	----	1	mg/m <sup>3</sup>	1	6	9	9	8
Chlorophyll b	----	1	mg/m <sup>3</sup>	<1	<1	<1	<1	<1
Pheophytin a	----	1	mg/m <sup>3</sup>	1	3	2	3	2
<b>Subcontracted Analysis</b>								
Dummy Analyte	----	-	-	NRind	NRind	NRind	NRind	NRind

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Stony Well	North Jacks Point	Seagull Island	Snipe Point	Morella Basin @ Outlet Regulator
Sampling date / time				09-Aug-2021 14:55	09-Aug-2021 14:20	09-Aug-2021 14:00	09-Aug-2021 13:40	09-Aug-2021 14:05	
Compound	CAS Number	LOR	Unit	EM2115770-011	EM2115770-012	EM2115770-013	EM2115770-014	EM2115770-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	73000	70800	75200	83300	6440	
EA045: Turbidity									
Turbidity	----	0.1	NTU	14.2	10.4	11.4	16.9	6.9	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	99	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	184	179	182	188	291	
Total Alkalinity as CaCO3	----	1	mg/L	184	179	182	188	389	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	46500	44800	44600	45500	3500	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.60	0.79	0.96	1.06	16.0	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	<0.02	<0.02	<0.02	0.06	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.01	<0.01	<0.01	0.03	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	<0.01	<0.01	0.03	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.9	3.4	4.1	8.5	0.8	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	3.9	3.4	4.1	8.5	0.8	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.14	0.68	0.52	0.42	0.05	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	23	24	26	26	8	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	27	29	30	31	6	
EP008: Chlorophyll									



## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

Sample ID

				Stony Well	North Jacks Point	Seagull Island	Snipe Point	Morella Basin @ Outlet Regulator
Sampling date / time				09-Aug-2021 14:55	09-Aug-2021 14:20	09-Aug-2021 14:00	09-Aug-2021 13:40	09-Aug-2021 14:05
Compound	CAS Number	LOR	Unit	EM2115770-011	EM2115770-012	EM2115770-013	EM2115770-014	EM2115770-015
				Result	Result	Result	Result	Result
<b>EP008: Chlorophyll - Continued</b>								
Chlorophyll a	----	1	mg/m <sup>3</sup>	26	9	16	11	3
Chlorophyll b	----	1	mg/m <sup>3</sup>	<1	<1	1	<1	<1
Pheophytin a	----	1	mg/m <sup>3</sup>	7	2	4	1	<1
<b>Subcontracted Analysis</b>								
Dummy Analyte	----	-	-	NRind	NRind	NRind	NRind	NRind





## Analytical Results

Sub-Matrix: WATER  
 (Matrix: WATER)

Sample ID

				Morella Creek @ Guage	Salt Creek Outlet	1.8km West of Salt Creek	3.2km South of Salt Creek (Land)	Tilley Swamp Drain U/S Morella
Sampling date / time				09-Aug-2021 13:50	09-Aug-2021 13:05	09-Aug-2021 13:25	09-Aug-2021 13:20	09-Aug-2021 14:35
Compound	CAS Number	LOR	Unit	EM2115770-016	EM2115770-017	EM2115770-018	EM2115770-019	EM2115770-020
				Result	Result	Result	Result	Result
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>								
Total Dissolved Solids @180°C	----	10	mg/L	6180	72600	73400	80500	7160
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	5.3	22.9	20.4	14.5	5.7
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	102	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	290	197	200	206	416
Total Alkalinity as CaCO3	----	1	mg/L	391	197	200	206	416
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	3570	46600	48000	46700	4100
<b>EG052G: Silica by Discrete Analyser</b>								
Reactive Silica	----	0.05	mg/L	16.0	1.24	1.38	1.23	15.0
<b>EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water</b>								
Ammonia as N	7664-41-7	0.02	mg/L	0.07	<0.02	<0.02	<0.02	0.07
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.03
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
Nitrate as N	14797-55-8	0.01	mg/L	0.03	<0.01	0.01	<0.01	1.40
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	0.03	<0.01	0.01	<0.01	1.43
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	2.9	3.6	4.3	0.8
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	0.8	2.9	3.6	4.3	2.2
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	0.06	0.34	0.27	1.64	0.06
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.03	<0.01	<0.01
<b>EP002: Dissolved Organic Carbon (DOC)</b>								
Dissolved Organic Carbon	----	1	mg/L	6	28	25	29	4
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	6	32	30	33	10



## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

Sample ID

				Morella Creek @ Guage	Salt Creek Outlet	1.8km West of Salt Creek	3.2km South of Salt Creek (Land)	Tilley Swamp Drain U/S Morella
Sampling date / time				09-Aug-2021 13:50	09-Aug-2021 13:05	09-Aug-2021 13:25	09-Aug-2021 13:20	09-Aug-2021 14:35
Compound	CAS Number	LOR	Unit	EM2115770-016	EM2115770-017	EM2115770-018	EM2115770-019	EM2115770-020
				Result	Result	Result	Result	Result
<b>EP008: Chlorophyll</b>								
Chlorophyll a	----	1	mg/m <sup>3</sup>	6	12	12	6	6
Chlorophyll b	----	1	mg/m <sup>3</sup>	<1	<1	1	<1	<1
Pheophytin a	----	1	mg/m <sup>3</sup>	3	2	5	3	<1
<b>Subcontracted Analysis</b>								
Dummy Analyte	----	-	-	NRind	NRind	NRind	NRind	NRind

## Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP008: Chlorophyll