

## CERTIFICATE OF ANALYSIS

**Work Order** : **EM2118068**  
**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** : **RB**  
**Site** : **----**  
**Quote number** : **AD/052/20 V2**  
**No. of samples received** : **22**  
**No. of samples analysed** : **22**

**Page** : 1 of 12  
**Laboratory** : Environmental Division Melbourne  
**Contact** : Kieren Burns  
**Address** : 4 Westall Rd Springvale VIC Australia 3171  
**Telephone** : +61881625130  
**Date Samples Received** : 10-Sep-2021 10:35  
**Date Analysis Commenced** : 10-Sep-2021  
**Issue Date** : 21-Sep-2021 17:54



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
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Jarvis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Samantha Smith	Assistant Laboratory Manager	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.

- ED037-P: EM2118227 #2 Poor duplicate precision for Alkalinity due to sample heterogeneity. Confirmed by re-preparation and re-analysis.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EA015H: EM2118068 #8-14, #18-19: 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.
- NRind - Reported in separate COA
- Algal Count (BM010) has been performed by ALS Water Resources Group, 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				09-Sep-2021 10:40	09-Sep-2021 09:45	09-Sep-2021 09:45	09-Sep-2021 09:05	09-Sep-2021 08:05	
Compound	CAS Number	LOR	Unit	EM2118068-001	EM2118068-002	EM2118068-003	EM2118068-004	EM2118068-005	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NRind	NRind	NRind	NRind	NRind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	2580	410	1620	20300	24300	
EA045: Turbidity									
Turbidity	----	0.1	NTU	20.7	56.6	53.6	8.1	4.6	
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	92	73	75	109	121	
Total Alkalinity as CaCO3	----	1	mg/L	92	73	75	109	121	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	1340	175	911	10900	12900	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.87	0.15	0.25	0.60	0.21	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.09	0.07	0.06	0.06	0.09	
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	0.03	0.02	0.02	0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.02	0.02	0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	2.4	2.1	0.9	0.7	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.4	2.4	2.1	0.9	0.7	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.11	0.31	0.17	0.15	0.24	
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	6	7	9	10	
EP005: Total Organic Carbon (TOC)									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Murray Mouth	US Tauwitchere	DS Tauwitchere	Mark Point	Long Point
Sampling date / time					09-Sep-2021 10:40	09-Sep-2021 09:45	09-Sep-2021 09:45	09-Sep-2021 09:05	09-Sep-2021 08:05
Compound	CAS Number	LOR	Unit		EM2118068-001	EM2118068-002	EM2118068-003	EM2118068-004	EM2118068-005
Result					Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued									
Total Organic Carbon	----	1	mg/L		9	6	7	10	10

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa du Yumpa
Sampling date / time				09-Sep-2021 07:40	09-Sep-2021 07:25	08-Sep-2021 17:00	08-Sep-2021 17:00	08-Sep-2021 16:15	
Compound	CAS Number	LOR	Unit	EM2118068-006	EM2118068-007	EM2118068-008	EM2118068-009	EM2118068-010	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NRind	NRind	NRind	NRind	NRind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	42200	60300	76500	73900	80300	
EA045: Turbidity									
Turbidity	----	0.1	NTU	4.3	7.0	10.8	18.5	9.1	
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	159	6	193	200	200	
Total Alkalinity as CaCO3	----	1	mg/L	159	6	193	200	200	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	26000	32600	43400	42500	41300	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.46	0.54	0.28	0.46	0.25	
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	<0.02	
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	0.02	<0.01	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.9	2.2	2.3	2.6	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.6	0.9	2.2	2.3	2.6	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.53	0.63	1.64	1.37	1.73	
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	15	18	23	24	24	
EP005: Total Organic Carbon (TOC)									



## Analytical Results

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

Sample ID

				Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa du Yumpa
Sampling date / time				09-Sep-2021 07:40	09-Sep-2021 07:25	08-Sep-2021 17:00	08-Sep-2021 17:00	08-Sep-2021 16:15
Compound	CAS Number	LOR	Unit	EM2118068-006	EM2118068-007	EM2118068-008	EM2118068-009	EM2118068-010
				Result	Result	Result	Result	Result
<b>EP005: Total Organic Carbon (TOC) - Continued</b>								
Total Organic Carbon	----	1	mg/L	15	20	27	29	29

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Stony Well		North Jacks Point		Seagull Island		Snipe Point		Morella Basin @ Outlet Regulator	
				Sampling date / time	08-Sep-2021 15:45		08-Sep-2021 15:00		08-Sep-2021 14:30		08-Sep-2021 14:00		08-Sep-2021 13:35	
Compound		CAS Number	LOR	Unit	EM2118068-011		EM2118068-012		EM2118068-013		EM2118068-014		EM2118068-015	
					Result		Result		Result		Result		Result	
BM010: Algal Count														
Algal Count		----	-	-	NRind		NRind		NRind		NRind		NRind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C														
Total Dissolved Solids @180°C		----	10	mg/L	76200		82900		74400		72700		7800	
EA045: Turbidity														
Turbidity		----	0.1	NTU	9.7		13.9		7.5		7.8		3.0	
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		155	
Bicarbonate Alkalinity as CaCO3		71-52-3	1	mg/L	199		203		232		233		212	
Total Alkalinity as CaCO3		----	1	mg/L	199		203		232		233		368	
ED045G: Chloride by Discrete Analyser														
Chloride		16887-00-6	1	mg/L	45500		43300		41600		42200		3790	
EG052G: Silica by Discrete Analyser														
Reactive Silica		----	0.05	mg/L	0.28		0.44		1.95		2.01		9.32	
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		0.04	
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		0.08	
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		0.09	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser														
Total Kjeldahl Nitrogen as N		----	0.1	mg/L	2.3		2.4		2.3		2.1		0.7	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser														
^ Total Nitrogen as N		----	0.1	mg/L	2.3		2.4		2.3		2.1		0.8	
EK067G: Total Phosphorus as P by Discrete Analyser														
Total Phosphorus as P		----	0.01	mg/L	1.57		1.95		1.53		1.76		0.09	
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	25		25		24		24		7	
EP005: Total Organic Carbon (TOC)														



## 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				08-Sep-2021 15:45	08-Sep-2021 15:00	08-Sep-2021 14:30	08-Sep-2021 14:00	08-Sep-2021 13:35
Compound	CAS Number	LOR	Unit	EM2118068-011	EM2118068-012	EM2118068-013	EM2118068-014	EM2118068-015
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	29	30	30	29	9





## 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				08-Sep-2021 13:55	08-Sep-2021 12:50	08-Sep-2021 13:25	08-Sep-2021 13:00	08-Sep-2021 14:40
Compound	CAS Number	LOR	Unit	EM2118068-016	EM2118068-017	EM2118068-018	EM2118068-019	EM2118068-020
				Result	Result	Result	Result	Result
<b>BM010: Algal Count</b>								
Algal Count	----	-	-	NRind	NRind	NRind	NRind	NRind
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>								
Total Dissolved Solids @180°C	----	10	mg/L	6800	36500	67000	67600	8730
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	3.6	6.2	8.6	5.4	2.9
<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	151	33	<1	<1	72
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	216	269	248	259	363
Total Alkalinity as CaCO3	----	1	mg/L	367	302	248	259	434
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	3730	20600	35600	35000	4720
<b>EG052G: Silica by Discrete Analyser</b>								
Reactive Silica	----	0.05	mg/L	9.18	5.68	2.90	3.20	7.35
<b>EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water</b>								
Ammonia as N	7664-41-7	0.02	mg/L	0.40	<0.02	<0.02	<0.02	0.03
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	14797-65-0	0.01	mg/L	0.02	<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	0.07	0.04	<0.01	<0.01	0.39
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	0.09	0.04	<0.01	<0.01	0.42
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.0	0.5	1.6	1.2	0.7
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	1.1	0.5	1.6	1.2	1.1
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	0.05	0.32	0.50	0.42	0.08
<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	<0.01	<0.01	<0.01
<b>EP002: Dissolved Organic Carbon (DOC)</b>								
Dissolved Organic Carbon	----	1	mg/L	9	16	22	22	8



## 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				08-Sep-2021 13:55	08-Sep-2021 12:50	08-Sep-2021 13:25	08-Sep-2021 13:00	08-Sep-2021 14:40
Compound	CAS Number	LOR	Unit	EM2118068-016	EM2118068-017	EM2118068-018	EM2118068-019	EM2118068-020
				Result	Result	Result	Result	Result
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	9	18	26	24	9

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Tilley Swamp Drain D/S Nth Outlet	Tilley Swamp Drain Watercourse Outlet	----	----	----
Sampling date / time				08-Sep-2021 15:25	08-Sep-2021 15:10	----	----	----	
Compound	CAS Number	LOR	Unit	EM2118068-021	EM2118068-022	-----	-----	-----	
				Result	Result	----	----	----	
BM010: Algal Count									
Algal Count	----	-	-	NRind	NRind	----	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	7950	8370	----	----	----	
EA045: Turbidity									
Turbidity	----	0.1	NTU	2.2	1.8	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	56	50	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	377	382	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	433	432	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	4410	4600	----	----	----	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	7.63	6.19	----	----	----	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.03	0.03	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.42	0.41	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.45	0.44	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	1.5	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.0	1.9	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.08	0.08	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	----	----	----	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	<1	7	----	----	----	
EP005: Total Organic Carbon (TOC)									



## Analytical Results

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

Sample ID

				Tilley Swamp Drain D/S Nth Outlet	Tilley Swamp Drain Watercourse Outlet	----	----	----
Sampling date / time				08-Sep-2021 15:25	08-Sep-2021 15:10	----	----	----
Compound	CAS Number	LOR	Unit	EM2118068-021	EM2118068-022	-----	-----	-----
				Result	Result	----	----	----
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	9	7	----	----	----