

CERTIFICATE OF ANALYSIS

Work Order : **EM2101680**
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 : **JOSHUA CASTLE**
Site : **----**
Quote number : **AD/052/20 V2**
No. of samples received : **19**
No. of samples analysed : **19**

Page : 1 of 10
Laboratory : Environmental Division Melbourne
Contact : Kieren Burns
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61881625130
Date Samples Received : 05-Feb-2021 11:40
Date Analysis Commenced : 05-Feb-2021
Issue Date : 15-Feb-2021 13:51



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
Arenie Vijayaratnam	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic 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.

- ED037-P: EM2101680 #1, 8 & 10. Alkalinity has been confirmed via re-preparation and re-analysis.
- EP002,EP005: EM2101680 It is recognised that total organic carbon is less than dissolved organic carbon for samples #1 and #2 However, the difference is within experimental variation of the methods.
- EK055G: EM2101680 #13 Sample required dilution prior to analysis due to sample matrix. LOR has been raised accordingly.
- EP008, LOR raised for Chlorophyll b and Pheophytin -a due to sample matrix.
- EP008, Chlorophyll-a standard does not contained Pheophytin-a standard.
- EK061G: EM2101680 #1, #4 to #19 have been diluted prior to analysis for TKN due to sample matrix (hyposaline). LOR'S have been raised accordingly.
- EA015H: EM2101680 #10, #13, #18: 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.
- EP005: EM2101685 #1 Poor duplicate precision for TOC due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EP005: EM2101551 #2 Poor matrix spike recovery for TOC due to sample matrix. Confirmed by re-extraction and re-analysis.
- 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				03-Feb-2021 11:30	03-Feb-2021 12:45	03-Feb-2021 12:45	03-Feb-2021 13:40	03-Feb-2021 07:15	
Compound	CAS Number	LOR	Unit	EM2101680-001	EM2101680-002	EM2101680-003	EM2101680-004	EM2101680-005	
				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	26700	578	10100	35500	34800	
EA045: Turbidity									
Turbidity	----	0.1	NTU	3.4	31.6	20.4	7.8	4.8	
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	12	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116	87	101	132	148	
Total Alkalinity as CaCO3	----	1	mg/L	128	87	101	132	148	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	15300	185	6160	16900	19900	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	<0.05	<0.05	<0.05	2.84	0.23	
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	<0.01	<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	<0.01	<0.01	0.02	<0.01	0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<10.0	0.7	0.7	<10.0	<10.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	<10.0	0.7	0.7	<10.0	<10.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	1.98	<0.01	0.05	1.53	1.54	
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	0.02	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	3	6	4	5	9	
EP005: Total Organic Carbon (TOC)									



Analytical Results

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

Sample ID

				Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Sampling date / time				03-Feb-2021 11:30	03-Feb-2021 12:45	03-Feb-2021 12:45	03-Feb-2021 13:40	03-Feb-2021 07:15
Compound	CAS Number	LOR	Unit	EM2101680-001	EM2101680-002	EM2101680-003	EM2101680-004	EM2101680-005
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	2	5	7	5	16
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	1	25	10	2	3
Chlorophyll b	----	1	mg/m ³	<1	<5	<4	<1	2
Pheophytin a	----	1	mg/m ³	1	7	<4	<1	2

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				03-Feb-2021 07:50	03-Feb-2021 08:15	03-Feb-2021 10:25	03-Feb-2021 10:00	03-Feb-2021 09:30	
Compound	CAS Number	LOR	Unit	EM2101680-006	EM2101680-007	EM2101680-008	EM2101680-009	EM2101680-010	
				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	60600	72100	98500	106000	140000	
EA045: Turbidity									
Turbidity	----	0.1	NTU	54.4	51.7	36.6	27.0	28.0	
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	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	188	210	218	225	200	
Total Alkalinity as CaCO3	----	1	mg/L	188	210	218	225	200	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	39600	48600	62200	65800	72900	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.70	0.51	2.91	3.87	3.45	
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	<0.01	<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	<0.01	<0.01	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<10.0	<10.0	<10.0	<10.0	<10.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	<10.0	<10.0	<10.0	<10.0	<10.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	1.76	2.06	2.06	2.47	2.53	
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	24	31	42	42	48	
EP005: Total Organic Carbon (TOC)									



Analytical Results

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

Sample ID

				Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				03-Feb-2021 07:50	03-Feb-2021 08:15	03-Feb-2021 10:25	03-Feb-2021 10:00	03-Feb-2021 09:30
Compound	CAS Number	LOR	Unit	EM2101680-006	EM2101680-007	EM2101680-008	EM2101680-009	EM2101680-010
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	36	31	51	55	65
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	35	23	15	14	10
Chlorophyll b	----	1	mg/m ³	<2	<4	10	<2	<1
Pheophytin a	----	1	mg/m ³	21	12	15	4	7

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Stony Well	North Jacks Point	South Policeman Point/Seagull Island	Snipe Point	Morella Creek @ Gauge
Sampling date / time				03-Feb-2021 09:05	03-Feb-2021 19:05	03-Feb-2021 17:10	03-Feb-2021 16:45	03-Feb-2021 16:55	
Compound	CAS Number	LOR	Unit	EM2101680-011	EM2101680-012	EM2101680-013	EM2101680-014	EM2101680-015	
				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	110000	95200	131000	102000	22200	
EA045: Turbidity									
Turbidity	----	0.1	NTU	25.3	23.6	18.4	18.1	3.7	
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	342	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	206	214	233	230	28	
Total Alkalinity as CaCO3	----	1	mg/L	206	214	233	230	369	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	72500	67200	66500	64300	11400	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	2.06	2.70	3.83	3.92	4.46	
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	<0.05	<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	<0.01	
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	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	12.0	15.8	<10.0	11.2	<10.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	12.0	15.8	<10.0	11.2	<10.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	3.38	7.47	2.25	1.63	1.94	
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	42	41	38	39	26	
EP005: Total Organic Carbon (TOC)									



Analytical Results

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

Sample ID

				Stony Well	North Jacks Point	South Policeman Point/Seagull Island	Snipe Point	Morella Creek @ Gauge
Sampling date / time				03-Feb-2021 09:05	03-Feb-2021 19:05	03-Feb-2021 17:10	03-Feb-2021 16:45	03-Feb-2021 16:55
Compound	CAS Number	LOR	Unit	EM2101680-011	EM2101680-012	EM2101680-013	EM2101680-014	EM2101680-015
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	60	58	54	51	26
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	18	11	30	34	<1
Chlorophyll b	----	1	mg/m ³	<2	<2	2	<2	<1
Pheophytin a	----	1	mg/m ³	7	3	17	23	<1



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				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				03-Feb-2021 16:10	03-Feb-2021 16:25	03-Feb-2021 16:30	03-Feb-2021 17:30	----
Compound	CAS Number	LOR	Unit	EM2101680-016	EM2101680-017	EM2101680-018	EM2101680-019	-----
				Result	Result	Result	Result	----
BM010: Algal Count								
Algal Count	----	-	-	NRind	NRind	NRind	NRind	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	102000	96000	130000	8790	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	19.8	18.2	23.2	3.9	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	161	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	235	236	225	256	----
Total Alkalinity as CaCO3	----	1	mg/L	235	236	225	416	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	64400	65800	78800	4470	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	3.88	3.92	5.36	18.0	----
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	----
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	----
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	----
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	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	12.8	13.4	11.9	<10.0	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	12.8	13.4	11.9	<10.0	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	1.23	1.59	4.90	1.19	----
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	----
EP002: Dissolved Organic Carbon (DOC)								
Dissolved Organic Carbon	----	1	mg/L	39	40	46	8	----



Analytical Results

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

Sample ID

				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				03-Feb-2021 16:10	03-Feb-2021 16:25	03-Feb-2021 16:30	03-Feb-2021 17:30	----
Compound	CAS Number	LOR	Unit	EM2101680-016	EM2101680-017	EM2101680-018	EM2101680-019	-----
				Result	Result	Result	Result	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	52	50	55	8	----
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	28	27	7	4	----
Chlorophyll b	----	1	mg/m ³	<2	<2	<1	<1	----
Pheophytin a	----	1	mg/m ³	10	6	4	<1	----

Inter-Laboratory Testing

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

(WATER) EP008: Chlorophyll