

CERTIFICATE OF ANALYSIS

Work Order : **EW2000743**
Client : **KIAMA COUNCIL**
Contact : **MS JULIE MILEVSKI**
Address : **11 MANNING STREET**
KIAMA NSW, AUSTRALIA 2533

Telephone : **+61 02 4232 0557**
Project : **Gerroa Landfill**
Order number : **126590**
C-O-C number : **----**
Sampler : **Duncan McIntosh**
Site : **Gerroa Landfill**
Quote number : **WO/026/19**
No. of samples received : **17**
No. of samples analysed : **17**

Page : **1 of 6**
Laboratory : **Environmental Division NSW South Coast**
Contact : **Aneta Prosaroski**
Address : **1/19 Ralph Black Dr, North Wollongong 2500**
4/13 Geary Pl, North Nowra 2541
Australia NSW Australia

Telephone : **+61 2 4225 3125**
Date Samples Received : **14-Feb-2020 15:30**
Date Analysis Commenced : **14-Feb-2020**
Issue Date : **24-Feb-2020 16:24**



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. 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.

| <i>Signatories</i> | <i>Position</i> | <i>Accreditation Category</i> |
|--------------------|---------------------------------------|------------------------------------|
| Ankit Joshi | Inorganic Chemist | Sydney Inorganics, Smithfield, NSW |
| Ashesh Patel | Senior Chemist | Sydney Inorganics, Smithfield, NSW |
| Glenn Davies | Environmental Services Representative | Laboratory - Wollongong, NSW |



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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
∅ = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- It has been noted that Ammonia is greater than TKN on various samples, however this difference is within the limits of experimental variation.
- Sampling and sample data supplied by ALS Wollongong.
- Sampling completed as per EN/67.11 Groundwater Sampling.
- Field tests completed on day of sampling/receipt.



Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | MW1D | MW1S | MW3 | MW4 | MW5 |
|---|-------------|------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| Client sampling date / time | | | | 14-Feb-2020 09:00 | 14-Feb-2020 09:05 | 14-Feb-2020 09:30 | 14-Feb-2020 08:00 | 14-Feb-2020 09:45 | |
| Compound | CAS Number | LOR | Unit | EW2000743-001 | EW2000743-002 | EW2000743-003 | EW2000743-004 | EW2000743-005 | |
| | | | | Result | Result | Result | Result | Result | |
| EA005FD: Field pH | | | | | | | | | |
| pH | ---- | 0.1 | pH Unit | 7.2 | ---- | 7.4 | 6.8 | 7.7 | |
| EA010FD: Field Conductivity | | | | | | | | | |
| Electrical Conductivity (Non Compensated) | ---- | 1 | µS/cm | 1680 | ---- | 435 | 785 | 480 | |
| EA015: Total Dissolved Solids dried at 180 ± 5 °C | | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 10 | mg/L | 812 | ---- | 288 | 524 | 304 | |
| 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 | <1 | |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 487 | ---- | 207 | 332 | 226 | |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 487 | ---- | 207 | 332 | 226 | |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | 27.8 | ---- | 0.37 | 0.08 | 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 | |
| EK058G: Nitrate as N by Discrete Analyser | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | <0.01 | ---- | <0.01 | 0.15 | <0.01 | |
| EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | ---- | <0.01 | 0.15 | <0.01 | |
| EK061G: Total Kjeldahl Nitrogen By Discrete Analyser | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 25.0 | ---- | 0.9 | 0.8 | 0.4 | |
| EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | 25.0 | ---- | 0.9 | 1.0 | 0.4 | |
| EK067G: Total Phosphorus as P by Discrete Analyser | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | 0.23 | ---- | 0.17 | 0.91 | 0.12 | |
| EN67 PK: Field Tests | | | | | | | | | |
| Field Observations | ---- | 0.01 | -- | Tide In | dry | Tide In | Tide In | Tide In | |
| EP025FD: Field Dissolved Oxygen | | | | | | | | | |
| Dissolved Oxygen | ---- | 0.01 | mg/L | 0.96 | ---- | 2.61 | 2.94 | 2.84 | |
| QWI-EN 67.11 Sampling of Groundwaters | | | | | | | | | |
| Depth | ---- | 0.01 | m | 3.73 | ---- | 4.08 | 4.60 | 3.86 | |



Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | MW6D | MW6S | MW7D | MW7S | MW9 |
|---|-------------|------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| Client sampling date / time | | | | 14-Feb-2020 08:15 | 14-Feb-2020 08:20 | 14-Feb-2020 10:05 | 14-Feb-2020 10:10 | 14-Feb-2020 12:25 | |
| Compound | CAS Number | LOR | Unit | EW2000743-006 | EW2000743-007 | EW2000743-008 | EW2000743-009 | EW2000743-010 | |
| | | | | Result | Result | Result | Result | Result | |
| EA005FD: Field pH | | | | | | | | | |
| pH | ---- | 0.1 | pH Unit | 6.9 | ---- | 7.1 | 7.5 | 6.2 | |
| EA010FD: Field Conductivity | | | | | | | | | |
| Electrical Conductivity (Non Compensated) | ---- | 1 | µS/cm | 2010 | ---- | 1210 | 893 | 22600 | |
| EA015: Total Dissolved Solids dried at 180 ± 5 °C | | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 10 | mg/L | 764 | ---- | 510 | 525 | 11700 | |
| 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 | <1 | |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 841 | ---- | 486 | 239 | 63 | |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 841 | ---- | 486 | 239 | 63 | |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | 50.0 | ---- | 21.4 | 0.25 | 0.08 | |
| 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 | 0.45 | |
| EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | ---- | <0.01 | <0.01 | 0.45 | |
| EK061G: Total Kjeldahl Nitrogen By Discrete Analyser | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 46.2 | ---- | 21.2 | 0.9 | 2.3 | |
| EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | 46.2 | ---- | 21.2 | 0.9 | 2.8 | |
| EK067G: Total Phosphorus as P by Discrete Analyser | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | 2.90 | ---- | 0.86 | 0.34 | 0.24 | |
| EN67 PK: Field Tests | | | | | | | | | |
| Field Observations | ---- | 0.01 | -- | Tide In | dry | Tide In | Tide In | Tide In | |
| EP025FD: Field Dissolved Oxygen | | | | | | | | | |
| Dissolved Oxygen | ---- | 0.01 | mg/L | 0.94 | ---- | 0.63 | 2.91 | 5.44 | |
| QWI-EN 67.11 Sampling of Groundwaters | | | | | | | | | |
| Depth | ---- | 0.01 | m | 4.90 | ---- | 4.68 | 4.54 | 1.60 | |



Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | MW10 | MW11 | ML-1 | ML-2 | ML-3 |
|---|-------------|------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| Client sampling date / time | | | | 14-Feb-2020 12:30 | 14-Feb-2020 12:15 | 14-Feb-2020 11:15 | 14-Feb-2020 13:10 | 14-Feb-2020 11:30 | |
| Compound | CAS Number | LOR | Unit | EW2000743-011 | EW2000743-012 | EW2000743-013 | EW2000743-014 | EW2000743-015 | |
| | | | | Result | Result | Result | Result | Result | |
| EA005FD: Field pH | | | | | | | | | |
| pH | ---- | 0.1 | pH Unit | 4.8 | 6.1 | 6.1 | 6.3 | 6.1 | |
| EA010FD: Field Conductivity | | | | | | | | | |
| Electrical Conductivity (Non Compensated) | ---- | 1 | µS/cm | 32800 | 15100 | 1280 | 2910 | 882 | |
| EA015: Total Dissolved Solids dried at 180 ± 5 °C | | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 10 | mg/L | 21800 | 7870 | 527 | 1480 | 602 | |
| 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 | 4 | 108 | 21 | 24 | 33 | |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 4 | 108 | 21 | 24 | 33 | |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.12 | 4.01 | 0.15 | 0.27 | 0.17 | |
| 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 | 0.17 | <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 | 0.17 | <0.01 | <0.01 | <0.01 | <0.01 | |
| EK061G: Total Kjeldahl Nitrogen By Discrete Analyser | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 1.9 | 5.9 | 2.3 | 2.0 | 2.3 | |
| EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | 2.1 | 5.9 | 2.3 | 2.0 | 2.3 | |
| EK067G: Total Phosphorus as P by Discrete Analyser | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | 0.28 | 0.15 | 0.26 | 0.24 | 0.36 | |
| EN67 PK: Field Tests | | | | | | | | | |
| Field Observations | ---- | 0.01 | -- | Tide In | Tide In | Tide In | Tide In | Tide In | |
| EP025FD: Field Dissolved Oxygen | | | | | | | | | |
| Dissolved Oxygen | ---- | 0.01 | mg/L | 3.81 | 6.70 | 1.10 | 0.87 | 1.09 | |
| QWI-EN 67.11 Sampling of Groundwaters | | | | | | | | | |
| Depth | ---- | 0.01 | m | 2.02 | 2.00 | ---- | ---- | ---- | |



Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | Client sample ID | | | ML-4 | ML-5 | ---- | ---- | ---- | |
|---|-------------|-------------------|---------|---------------|-------------------|-------|-------|-------|------|------|
| Client sampling date / time | | 14-Feb-2020 11:00 | | | 14-Feb-2020 12:20 | | | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EW2000743-016 | EW2000743-017 | ----- | ----- | ----- | | |
| | | | | Result | Result | ---- | ---- | ---- | | |
| EA005FD: Field pH | | | | | | | | | | |
| pH | ---- | 0.1 | pH Unit | 6.2 | 6.4 | ---- | ---- | ---- | | |
| EA010FD: Field Conductivity | | | | | | | | | | |
| Electrical Conductivity (Non Compensated) | ---- | 1 | µS/cm | 1040 | 1420 | ---- | ---- | ---- | | |
| EA015: Total Dissolved Solids dried at 180 ± 5 °C | | | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 10 | mg/L | 603 | 736 | ---- | ---- | ---- | | |
| 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 | <1 | <1 | ---- | ---- | ---- | | |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 16 | 20 | ---- | ---- | ---- | | |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 16 | 20 | ---- | ---- | ---- | | |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.18 | 0.18 | ---- | ---- | ---- | | |
| EK057G: Nitrite as N by Discrete Analyser | | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | <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 | ---- | ---- | ---- | | |
| EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser | | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | <0.01 | ---- | ---- | ---- | | |
| EK061G: Total Kjeldahl Nitrogen By Discrete Analyser | | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 2.2 | 2.0 | ---- | ---- | ---- | | |
| EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser | | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | 2.2 | 2.0 | ---- | ---- | ---- | | |
| EK067G: Total Phosphorus as P by Discrete Analyser | | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | 0.31 | 0.27 | ---- | ---- | ---- | | |
| EN67 PK: Field Tests | | | | | | | | | | |
| Field Observations | ---- | 0.01 | -- | Tide In | Tide In | ---- | ---- | ---- | | |
| EP025FD: Field Dissolved Oxygen | | | | | | | | | | |
| Dissolved Oxygen | ---- | 0.01 | mg/L | 1.29 | 1.02 | ---- | ---- | ---- | | |