

Our Ref: 217317_LET_015

19 July 2023

Parkes Shire Council

2 Cecile Street

Parkes NSW 2870

Attention: Pruthviraj Parmar – Environmental Waste Lead

ENVIRONMENTAL MONITORING OF PARKES WASTE DEPOT, UNDER ENVIRONMENT PROTECTION LICENCE 6016

Premise has completed scheduled groundwater, leachate and landfill gas monitoring at Parkes Waste Depot, located at 104 Brolgan Road, Parkes on 23 February 2023.

Groundwater Levels

Groundwater was gauged at eight (8) groundwater monitoring wells across the site. Groundwater gauging data is included in **Table 1** (attached), and elevations are shown on **Figure 1**.

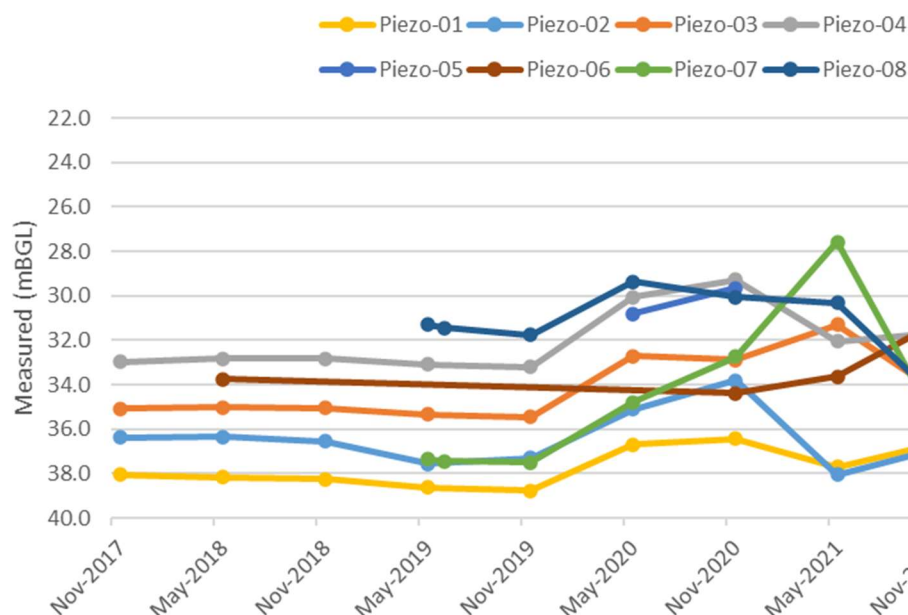


Figure 1 – Parkes Waste Depot – Groundwater Depths

Observations were as follows:

- Groundwater was gauged at monitoring points Piezo-01, Piezo-02, Piezo-03, Piezo-04, Piezo 06, Piezo-07 and Piezo-08 corresponding to EPL points 1, 2, 3, 4, 15, 17 and 18. Gauging of groundwater at Piezo-05 (EPL Point 16) could not be achieved.
- Depths to groundwater ranged from 23.48 metres below ground level (mbgl) at Piezo-06, to 32.84 mbgl at Piezo-01.

Groundwater flow direction cannot be inferred as surveyed elevation data for existing monitoring wells is not available. Surrounding topography of the region suggests a landform slope to the west, indicating a possible westerly preferential flow direction for groundwater.

Groundwater Quality

Groundwater samples were able to be collected from groundwater monitoring points Piezo-01, Piezo-02, Piezo-03, Piezo-04, Piezo-07 and Piezo-08. Samples were couriered to SGS Laboratories in Alexandria, NSW, who are NATA accredited to perform the scheduled analysis. Results of analysis are included in **Table 2** (attached), and laboratory certificates have also been appended to this letter.

Groundwater quality has been assessed by comparison to criteria (where available) adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – Primary Industries: Water quality for irrigation and general water use.

- pH of groundwater ranged from 6.7 at Piezo-01 and Piezo-03, to 7.2 at Piezo-02 and was within the guideline range considered suitable for pumping, irrigation, and stock watering (6.0 to 8.5 pH units).
- Electrical conductivity (EC) ranged from 1200 $\mu\text{S}/\text{cm}$ at Piezo-08 to 12000 $\mu\text{S}/\text{cm}$ at Piezo-01.
- Total dissolved solids (TDS) concentrations were recorded to range from 880 mg/L at Piezo-08 to 9200 mg/L at Piezo-01, and above the livestock watering 'loss of production' tolerance limit for the most susceptible livestock category, poultry (3000 mg/L – ANZECC & ARMCANZ, 2000) at Piezo-01, Piezo-02 and Piezo-04.
- Biochemical oxygen demand (BOD) of groundwater was recorded at concentrations ranging from less than the laboratory limit of reporting (LOR) of 5 mg/L at Piezo-02, Piezo-04 and Piezo-06, to 21 mg/L at Piezo-02.
- Total alkalinity in groundwater ranged from 450 mg/L at Piezo-08 to 1400 mg/L at Piezo-02. All concentrations were higher than the guideline hardness value for potential fouling of waters (350 mg/L).
- Groundwater chloride concentrations ranged from 53 mg/L at Piezo-08 to 3800 mg/L at Piezo-01. All concentrations were higher than the guideline value for protection of moderately sensitive crops (350 mg/L), with the exception of Piezo-08.
- Fluoride concentrations in groundwater were recorded to range from 0.15 mg/L at Piezo-08 to 0.77 mg/L at Piezo-07. All recorded concentrations were below the guideline value of 1 mg/L for long term irrigation use (up to 100 years).
- Sulfate concentrations in groundwater ranged from 43 mg/L at Piezo-08 to 590 mg/L at Piezo-01.
- Calcium concentrations ranged from 59 mg/L at Piezo-08 to 490 mg/L at Piezo-04. Calcium concentrations were below the guideline value for livestock drinking water quality (< 1,000 mg/L).
- Magnesium concentrations ranged from 27 mg/L at Piezo-08 to 680 mg/L at Piezo-01.

- Potassium concentrations ranged from 8.7 mg/L at Piezo-04 to 120 mg/L at Piezo-08.
- Concentrations of sodium ranged from 100 mg/L at Piezo-08, to 1100 mg/L at Piezo-01. Sodium concentrations in groundwater were above the guideline level for irrigation to moderately sensitive crops (< 230 mg/L) at all monitoring locations, with the exception of Piezo-08.
- The concentration of total organic carbon (TOC) ranged from 5.0 mg/L at Piezo-01 to 53 mg/L at Piezo 08.
- Ammonia concentrations in groundwater ranged from the laboratory limit of reporting (LOR) of 0.01 mgN/L at Piezo-08, to 1.8 mgN/L at Piezo-07.
- Nitrate concentrations in groundwater ranged from below the laboratory LOR of 0.025 mgN/L at Piezo 03, to 31 mgN/L at Piezo-07.
- Total phosphorus (TP) concentrations ranged from 0.11 mg/L at Piezo-04 to 1.3 mg/L at Piezo-08. TP concentrations in groundwater were above the guideline value of 0.05 mg/L for long term irrigation use (up to 100 years) at all monitoring locations.
- Iron concentrations ranged from below the laboratory LOR of 0.005 mg/L at Piezo-06 to 0.099 mg/L at Piezo-03. The iron concentration in groundwater did not exceed the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.

Surface Water Quality

Surface water discharge points are inspected for discharge following rain events and on a monthly basis. No discharge events were recorded or observed to have occurred at the facility in the period from June 2022 to February 2023.

Leachate Quality

Leachate collection points L1 and L2 are inspected during monitoring events, and samples are collected when water is present. Water was present at leachate collection points during the February 2023 monitoring event, and samples were collected and couriered to SGS Laboratories who are NATA accredited to perform the scheduled analysis. Results of analysis are included in **Table 3** (attached), and laboratory certificates have also been appended to this letter.

Leachate quality has been assessed by comparison to criteria (where available) adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – Primary Industries: Water quality for irrigation and general water use.

- pH of the leachate samples was recorded to range from 8.1 at L1 to 8.2 at L2. The pH of leachate samples did not exceed the upper limit of the guideline range considered suitable for pumping, irrigation, and stock watering (6.0 to 8.5 pH units).
- Electrical conductivity (EC) was recorded to range from 1500 μ S/cm at L1 to 1900 μ S/cm at L2.
- Total suspended solids (TSS) concentrations were recorded to range from below the laboratory LOR of 20 mg/L at L1, to 120 mg/L at L2. Leachate TSS results were above the guideline concentration for protection of aquaculture species (40 mg/L) at L2.
- Total alkalinity measured 540 mg/L and 590 mg/L at L1 and L2 respectively; L1 and L2 alkalinity was higher than the guideline hardness value for potential fouling of waters (350 mg/L).

- Leachate chloride concentrations recorded 180 mg/L and 220 mg/L at L1 and L2 respectively; Leachate chloride concentrations were less than the guideline value for protection of moderately sensitive crops (350 mg/L).
- Fluoride concentrations in the leachate samples ranged from 0.35 mg/L at L1 to 0.56 mg/L at L2, and were below the guideline value of 1 mg/L for long term irrigation use (up to 100 years).
- Sulfate concentrations ranged from 13 mg/L at L2 to 64 mg/L at L1.
- Calcium concentrations ranged from 28 mg/L at L2 to 53 mg/L at L1, below the guideline value for livestock drinking water quality (< 1,000 mg/L).
- Magnesium concentrations were recorded at 69 mg/L at L2 and 72 mg/L at L1.
- Potassium concentrations in the leachate samples ranged from 67 mg/L at L1 to 86 mg/L at L2.
- Concentrations of sodium ranged from 170 mg/L at L1 to 240 mg/L at L2. The sodium concentration of leachate at L2 exceeded the guideline level for irrigation to moderately sensitive crops (< 230 mg/L).
- The concentration of total organic carbon (TOC) in leachate ranged from 33 mg/L at L1 to 86 mg/L at L2.
- Ammonia concentrations were recorded at 0.41 mgN/L at L1 and 2.7 mgN/L at L2.
- Nitrate concentrations in leachate ranged from less than the laboratory LOR of 0.025 mgN/L at L2, to 0.029 mgN/L at L1.
- Aluminium concentrations ranged from 0.014 mg/L at L2 to 0.021 mg/L at L1. The long-term (up to 100 years) irrigation guideline concentration was not exceeded.
- Leachate arsenic concentrations ranged from 0.009 mg/L at L2 to 0.016 mg/L at L1. The long-term (up to 100 years) irrigation guideline concentration was not exceeded.
- Barium concentrations ranged from 0.015 mg/L to 0.36 mg/L at L1 and L2, respectively.
- Copper concentrations in leachate were recorded at a concentration of 0.002 mg/L at L1 and L2. The long-term (up to 100 years) irrigation guideline concentration was not exceeded.
- Iron concentrations ranged from 0.036 mg/L to 0.055 mg/L at L1 and L2, respectively. The iron concentration in leachate was less than the long-term (up to 100 years) irrigation guideline concentration of 0.20 mg/L.
- Lead concentrations in leachate were recorded to range from below the laboratory LOR of 0.001 mg/L at L2 to 0.006 mg/L at L1. The long-term (up to 100 years) irrigation guideline concentration was not exceeded.
- Concentrations of manganese in the leachate ranged from 0.005 mg/L at L2 to 0.007 mg/L at L1. The long-term (up to 100 years) irrigation guideline concentration was not exceeded.
- Zinc concentrations in leachate were not recorded above the laboratory LOR of 0.001 mg/L at L1 or L2. The long-term (up to 100 years) irrigation guideline concentration was not exceeded.
- Total phenolics were not recorded at concentrations above the laboratory LOR of 0.05 mg/L at L1 and L2.
- Total petroleum hydrocarbons (TPH) and total recoverable hydrocarbons (TRH) were recorded in leachate as follows:
 - TRH >C₁₀-C₁₆ fraction at L2 (230 µg/L).

- TRH >C₁₆-C₃₄ fraction at L2 (530 µg/L).
- TPH C₁₀-C₁₄ fraction at L2 (150 µg/L).
- TPH C₁₅-C₂₈ fraction at L2 (750 µg/L).

Accumulated Landfill Gas Monitoring

Gas concentrations in buildings and sheds proximal to landfilled areas were all below the detection limits (0.05% v/v) during the biannual monitoring round conducted in February 2023.

Surface Landfill Gas Monitoring

The methane concentration recorded at the surface monitoring point (EPL12) was below the detection threshold concentration of 0.05% (v/v) during the monitoring round conducted in February 2023.

Summary

Results for the environmental monitoring conducted in February 2023 are summarised below:

- Groundwater is recorded to be highly saline, with EC, TDS, chloride, and sodium concentrations recorded to be elevated. Total alkalinity of groundwater (associated with salinity) was also recorded to be elevated.
- Monitoring of groundwater at Piezo-02 has identified elevated concentrations of salinity, alkalinity, total organic carbon, ammonia, iron, BOD and phosphorus, relative to previous monitoring events.
- Monitoring of groundwater at Piezo-04 has identified elevated concentrations of salinity, alkalinity, calcium and magnesium, relative to previous monitoring events.
- Sulfate concentrations in groundwater remain elevated at Piezo-02 (1200 mgN/L), despite decreasing since the previous round of groundwater monitoring conducted in November 2021.
- Total phosphorus concentrations remain elevated, most notably at Piezo-01, Piezo-02, Piezo-03 and Piezo-08.
- An increasing trend of iron in groundwater at Piezo-08 may be apparent.

The next routine monitoring for groundwater, leachate and accumulated landfill gas is scheduled for August 2023. Surface water monitoring is required to take place any calendar month when a surface water discharge is recorded. Please do not hesitate to contact us with any questions or comments you may have regarding this report.

Yours sincerely



BRENDAN STUART

Senior Environmental Scientist

No. of Attachments – 5:

- Environmental Monitoring Point Locations
- Table 1 – Groundwater Gauging Results
- Table 2 – Results of Laboratory Analyses – Groundwater
- Table 3 – Results of Laboratory Analyses – Leachate
- SGS Laboratories Analytical Reports – February 2023



Important Notice!

This map is not a precise survey document. Accurate locations can only be determined by a survey on the ground. This information has been prepared for Council's internal purposes and for no other purpose. No statement is made about the accuracy or suitability of the information for use for any purpose (whether the purpose has been notified to Council or not). While every care is taken to ensure the accuracy of this data, neither the Parkes Shire Council nor the LPI makes any representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the data being inaccurate or incomplete in any way and for any reason.
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Projection: GDA94 / MGA zone 55

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**PARKES WASTE FACILITY
ENVIRONMENTAL
MONITORING POINTS**

Map Scale: 1:6310 at A4



Table 1: Parkes Waste Depot - Groundwater Gauging Results

Ground Water Levels: 23-Feb-23

Piezometer Details:

| | Date | Measured (mBGL) | Well Depth (m) | Water Column (m) |
|----------|------------|-----------------|----------------|------------------|
| Piezo-01 | 23/02/2023 | 32.84 | 50.00 | 17.16 |
| Piezo-02 | 23/02/2023 | 29.96 | 40.00 | 10.04 |
| Piezo-03 | 23/02/2023 | 29.69 | 38.00 | 8.31 |
| Piezo-04 | 23/02/2023 | 28.19 | 40.00 | 11.81 |
| Piezo-05 | 23/02/2023 | NMWL | 40.00 | nil |
| Piezo-06 | 23/02/2023 | 23.48 | 50.00 | 26.52 |
| Piezo-07 | 23/02/2023 | 31.29 | 53.00 | 21.71 |
| Piezo-08 | 23/02/2023 | 25.12 | 56.00 | 30.88 |

| | Piezo-01 | Piezo-02 | Piezo-03 | Piezo-04 | Piezo-05 | Piezo-06 | Piezo-07 | Piezo-08 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Date | Measured (mBGL) | Measured (mBGL) | Measured (mBGL) | Measured (mBGL) | Measured (mBGL) | Measured (mBGL) | Measured (mBGL) | Measured (mBGL) |
| 28-Nov-17 | 38.05 | 36.37 | 35.08 | 32.97 | | | | |
| 24-May-18 | 38.16 | 36.35 | 35.01 | 32.82 | | 33.75 | | |
| 29-Nov-18 | 38.25 | 36.56 | 35.06 | 32.82 | | NMWL | | |
| 22-May-19 | 38.61 | 37.57 | 35.33 | 33.10 | NMWL | NMWL | 37.34 | 31.31 |
| 25-Jun-19 | | | | | | | 37.44 | 31.43 |
| 20-Nov-19 | 38.78 | 37.29 | 35.45 | 33.20 | NMWL | NMWL | 37.51 | 31.75 |
| 26-May-20 | 36.68 | 35.1 | 32.7 | 30.05 | 30.8 | NMWL | 34.79 | 29.38 |
| 03-Nov-20 | 36.43 | 33.81 | 32.87 | 29.28 | 29.65 | 34.39 | 32.73 | 30.05 |
| 11-May-21 | 37.70 | 38.04 | 31.3 | 32.06 | NMWL | 33.63 | 27.58 | 30.32 |
| 17-Nov-21 | 36.62 | 36.84 | 34.38 | 31.67 | NMWL | 31.14 | 35.90 | 34.71 |
| 26-May-22 | 35.38 | 32.56 | 32.98 | 30.5 | NMWL | 32.62 | 34.72 | 28.38 |
| 23-Feb-23 | 32.84 | 29.96 | 29.69 | 28.19 | NMWL | 23.48 | 31.29 | 25.12 |

Definitions:

Measured: Depth of groundwater measured from reference point
Blank: Water level not measured
NMWL: No measureable water level

**TABLE 2 PARKES WASTE DEPOT - RESULTS OF LABORATORY ANALYSIS
FEBRUARY 2023**

GROUNDWATER SAMPLING



| Group | Analyte | LOR | Units | Criteria | Sample ID | Piezo-01 | Piezo-02 | Piezo-03 | Piezo-04 | Piezo-07 | Piezo-08 |
|---------------------|----------------------------------|-------|---------|-----------|-------------|------------|------------|------------|------------|------------|------------|
| | | | | | Sample Date | 23/02/2023 | 23/02/2023 | 23/02/2023 | 23/02/2023 | 23/02/2023 | 23/02/2023 |
| Group | Analyte | LOR | Units | Criteria | PS | PS | PS | PS | PS | PS | PS |
| Physical Parameters | pH (Lab) | 0 | No unit | 6.0 - 8.5 | 6.7 | 7.2 | 6.7 | 6.8 | 7 | 7.1 | |
| | Electrical Conductivity (Lab) | 2 | µS/cm | 4478 | 12000 | 7700 | 4500 | 8700 | 4200 | 1200 | |
| | Total Dissolved Solids | 10 | mg/L | 3000 | 9200 | 4900 | 2900 | 6300 | 2600 | 880 | |
| | Biochemical Oxygen Demand (BOD5) | 5 | mg/L | - | < 5 | 21 | < 5 | < 5 | < 5 | < 5 | |
| Alkalinity | Total Alkalinity as CaCO3 | 5 | mg/L | 350 | 700 | 1400 | 590 | 940 | 1100 | 450 | |
| Anions | Chloride | 1 | mg/L | 350 | 3800 | 1900 | 1100 | 2500 | 610 | 53 | |
| | Fluoride | 0.1 | mg/L | 1 | 0.56 | 0.38 | 0.18 | 0.46 | 0.77 | 0.15 | |
| | Sulfate (SO4) | 1 | mg/L | - | 590 | 130 | 230 | 380 | 170 | 43 | |
| Cations | Calcium (Ca) | 0.1 | mg/L | 1000 | 480 | 200 | 250 | 490 | 180 | 59 | |
| | Magnesium (Mg) | 0.1 | mg/L | - | 680 | 370 | 210 | 460 | 170 | 27 | |
| | Potassium (K) | 0.2 | mg/L | - | 9.2 | 22 | 15 | 8.7 | 9.1 | 120 | |
| | Sodium (Na) | 0.1 | mg/L | 230 | 1100 | 960 | 390 | 680 | 480 | 100 | |
| Forms of Carbon | Total Organic Carbon | 0.2 | mg/L | - | 5 | 18 | 23 | 14 | 32 | 53 | |
| Nutrients | Ammonia (NH3) as N | 0.01 | mg/L | - | 0.04 | 0.6 | 0.98 | 0.3 | 1.8 | < 0.01 | |
| | Nitrate (NO3) as N | 0.025 | mg/L | - | - | - | < 0.025 | - | - | - | |
| | Nitrate (NO3) as N | 0.05 | mg/L | - | - | < 0.05 | - | - | - | - | |
| | Nitrate (NO3) as N | 0.005 | mg/L | - | 4.2 | - | - | 0.18 | 31 | 11 | |
| | Total Phosphorus | 0.02 | mg/L | 0.05 | 0.68 | 0.72 | 0.61 | 0.11 | 0.22 | 1.3 | |
| Phenolics | Total Phenols | 0.05 | mg/L | - | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | |
| Trace Metals | Iron (Fe) | 0.005 | mg/L | 0.2 | < 0.005 | 1.7 | 0.08 | < 0.005 | < 0.005 | 0.19 | |

mg/L milligrams per litre
µg/L micrograms per litre
µS/cm microsiemens per centimetre
LOR limit of reporting
PS primary sample
Criteria Criteria adopted from *Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality - 'Primary Industries: Water quality for irrigation and general water use', 2000*
 within criteria
 criteria exceeded

TABLE 3 PARKES WASTE DEPOT - RESULTS OF LABORATORY ANALYSIS
FEBRUARY 2023

LEACHATE SAMPLING



| Group | Analyte | LOR | Units | Sample ID Sample Date | L1 | L2 |
|--------------------------------|---------------------------------------|-------|---------|--------------------------|------------|------------|
| | | | | | 23/02/2023 | 23/02/2023 |
| | | | | Criteria | PS | PS |
| Physical Parameters | pH (Lab) | 0 | No unit | 6.0 - 8.5 | 8.1 | 8.2 |
| | Electrical Conductivity (Lab) | 2 | µS/cm | 4478 | 1500 | 1900 |
| | Total Suspended Solids | 5 | mg/L | 40 | - | 120 |
| | Total Suspended Solids | 20 | mg/L | 40 | < 20 | - |
| Alkalinity | Total Alkalinity as CaCO ₃ | 5 | mg/L | 350 | 540 | 590 |
| Anions | Chloride | 1 | mg/L | 350 | 180 | 280 |
| | Fluoride | 0.1 | mg/L | 1 | 0.35 | 0.56 |
| | Sulfate (SO ₄) | 1 | mg/L | - | 64 | 13 |
| Cations | Calcium (Ca) | 0.1 | mg/L | 1000 | 53 | 28 |
| | Magnesium (Mg) | 0.1 | mg/L | - | 72 | 69 |
| | Potassium (K) | 0.2 | mg/L | - | 67 | 86 |
| | Sodium (Na) | 0.1 | mg/L | 230 | 170 | 240 |
| Forms of Carbon | Total Organic Carbon | 0.2 | mg/L | - | 33 | 86 |
| Nutrients | Ammonia (NH ₃) as N | 0.01 | mg/L | - | 0.41 | 2.7 |
| | Nitrate (NO ₃) as N | 0.025 | mg/L | - | - | < 0.025 |
| | Nitrate (NO ₃) as N | 0.005 | mg/L | - | 0.029 | - |
| Phenolics | Total Phenols | 0.05 | mg/L | - | < 0.05 | < 0.05 |
| Trace Metals | Aluminium (Al) | 0.005 | mg/L | 5 | 0.021 | 0.014 |
| | Arsenic (As) | 0.001 | mg/L | 0.1 | 0.016 | 0.009 |
| | Barium (Ba) | 0.001 | mg/L | - | 0.15 | 0.36 |
| | Copper (Cu) | 0.001 | mg/L | 0.2 | 0.002 | 0.002 |
| | Iron (Fe) | 0.005 | mg/L | 0.2 | 0.036 | 0.055 |
| | Lead (Pb) | 0.001 | mg/L | 2 | 0.006 | < 0.001 |
| | Manganese (Mn) | 0.001 | mg/L | 0.2 | 0.007 | 0.005 |
| | Zinc (Zn) | 0.005 | mg/L | 2 | < 0.005 | < 0.005 |
| Total Recoverable Hydrocarbons | TRH C6-C10 | 50 | µg/L | - | - | < 50 |
| | TRH C6-C10 | 100 | µg/L | - | < 100 | - |
| | TRH C6-C10 - BTEX (F1) | 50 | µg/L | - | - | < 50 |
| | TRH C6-C10 - BTEX (F1) | 100 | µg/L | - | < 100 | - |
| | TRH >C10-C16 | 60 | µg/L | - | - | 230 |
| | TRH >C10-C16 | 120 | µg/L | - | < 120 | - |
| | TRH >C10-C16 - naphthalene (F2) | 60 | µg/L | - | - | 220 |
| | TRH >C10-C16 - naphthalene (F2) | 120 | µg/L | - | < 120 | - |
| | TRH >C16-C34 (F3) | 500 | µg/L | - | - | 530 |
| | TRH >C16-C34 (F3) | 1000 | µg/L | - | < 1000 | - |
| | TRH >C34-C40 (F4) | 500 | µg/L | - | - | < 500 |
| | TRH >C34-C40 (F4) | 1000 | µg/L | - | < 1000 | - |
| Total Petroleum Hydrocarbons | TRH C6-C9 | 40 | µg/L | - | - | < 40 |
| | TRH C6-C9 | 80 | µg/L | - | < 80 | - |
| | TRH C10-C14 | 50 | µg/L | - | - | 150 |
| | TRH C10-C14 | 100 | µg/L | - | < 100 | - |
| | TRH C15-C28 | 200 | µg/L | - | - | 500 |
| | TRH C15-C28 | 400 | µg/L | - | < 400 | - |
| | TRH C29-C36 | 200 | µg/L | - | - | < 200 |
| | TRH C29-C36 | 400 | µg/L | - | < 400 | - |
| | TRH C37-C40 | 200 | µg/L | - | - | < 200 |
| | TRH C37-C40 | 400 | µg/L | - | < 400 | - |
| | TRH C10-C40 | 320 | µg/L | - | - | 750 |
| | TRH C10-C40 | 640 | µg/L | - | < 640 | - |
| BTEXN Analytes | Benzene (F0) | 0.5 | µg/L | - | - | < 0.5 |
| | Benzene (F0) | 1 | µg/L | - | < 1 | - |

mg/L milligrams per litre
µg/L micrograms per litre
µS/cm microsiemens per centimetre
LOR limit of reporting
PS primary sample
Criteria Criteria adopted from Australian and New Zealand Environment and Conservation Council (ANZECC)

Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality - 'Primary Industries: Water quality for irrigation and general water use', 2000

within criteria
criteria exceeded

CLIENT DETAILS

Contact **Brendan Stuart**
Client **PREMISE**
Address **LEVEL 1
100 BRUNSWICK STREET
FORTITUDE VALLEY QLD 4006**

Telephone **61 2 6939 5000**
Facsimile **(Not specified)**
Email **Brendan.stuart@premise.com.au**

Project **217317-Parkes WD**
Order Number **217317**
Samples **9**

LABORATORY DETAILS

Manager **Huong Crawford**
Laboratory **SGS Alexandria Environmental**
Address **Unit 16, 33 Maddox St
Alexandria NSW 2015**

Telephone **+61 2 8594 0400**
Facsimile **+61 2 8594 0499**
Email **au.environmental.sydney@sgs.com**

SGS Reference **SE243799 R0**
Date Received **28 Feb 2023**
Date Reported **07 Mar 2023**

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Ion Chromatography - The Limit of Reporting (LOR) has been raised due to high conductivity of the sample requiring dilution.

VPH/TRH - The Limit of Reporting (LOR) has been raised due to the limited sample.

Total Suspended Solids - LOR raised for sample #8 due to insufficient sample provided.

SIGNATORIES



Dong LIANG
Metals/Inorganics Team Leader



Kamrul AHSAN
Senior Chemist



Ly Kim HA
Organic Section Head



Shane MCDERMOTT
Inorganic/Metals Chemist

| Parameter | Units | LOR | Sample Number | SE243799.001 | SE243799.002 | SE243799.003 | SE243799.004 |
|-----------|-------|-----|---------------|--------------|---------------|--------------|--------------|
| | | | Sample Matrix | Water | Water | Water | Water |
| | | | Sample Date | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 |
| | | | Sample Name | Piezo 1 (S1) | Piezo 2 (MP2) | Piezo 3 | Piezo 4 |

Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 7/3/2023

| | | | | | | |
|------------|------|----|---|---|---|---|
| TRH C6-C10 | µg/L | 50 | - | - | - | - |
| TRH C6-C9 | µg/L | 40 | - | - | - | - |

Surrogates

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| d4-1,2-dichloroethane (Surrogate) | % | - | - | - | - | - |
| d8-toluene (Surrogate) | % | - | - | - | - | - |
| Bromofluorobenzene (Surrogate) | % | - | - | - | - | - |

VPF F Bands

| | | | | | | |
|----------------------------|------|-----|---|---|---|---|
| Benzene (F0) | µg/L | 0.5 | - | - | - | - |
| TRH C6-C10 minus BTEX (F1) | µg/L | 50 | - | - | - | - |

TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 7/3/2023

| | | | | | | |
|-------------|------|-----|---|---|---|---|
| TRH C10-C14 | µg/L | 50 | - | - | - | - |
| TRH C15-C28 | µg/L | 200 | - | - | - | - |
| TRH C29-C36 | µg/L | 200 | - | - | - | - |
| TRH C37-C40 | µg/L | 200 | - | - | - | - |
| TRH C10-C40 | µg/L | 320 | - | - | - | - |

TRH F Bands

| | | | | | | |
|---------------------------------|------|-----|---|---|---|---|
| TRH >C10-C16 | µg/L | 60 | - | - | - | - |
| TRH >C10-C16 - Naphthalene (F2) | µg/L | 60 | - | - | - | - |
| TRH >C16-C34 (F3) | µg/L | 500 | - | - | - | - |
| TRH >C34-C40 (F4) | µg/L | 500 | - | - | - | - |

Total Phenolics in Water Method: AN295 Tested: 2/3/2023

| | | | | | | |
|---------------|------|------|---|-------|-------|-------|
| Total Phenols | mg/L | 0.05 | - | <0.05 | <0.05 | <0.05 |
|---------------|------|------|---|-------|-------|-------|

| Parameter | Units | LOR | Sample Number | SE243799.001 | SE243799.002 | SE243799.003 | SE243799.004 |
|-----------|-------|-----|---------------|--------------|---------------|--------------|--------------|
| | | | Sample Matrix | Water | Water | Water | Water |
| | | | Sample Date | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 |
| | | | Sample Name | Piezo 1 (S1) | Piezo 2 (MP2) | Piezo 3 | Piezo 4 |

Anions by Ion Chromatography in Water Method: AN245 Tested: 6/3/2023

| | | | | | | |
|--------------------------------------|------|-------|---|----------|----------|------|
| Chloride | mg/L | 1 | - | 1900 | 1100 | 2500 |
| Sulfate, SO ₄ | mg/L | 1 | - | 130 | 230 | 380 |
| Fluoride | mg/L | 0.1 | - | 0.38 | 0.18 | 0.46 |
| Nitrate Nitrogen, NO ₃ -N | mg/L | 0.005 | - | <0.050 † | <0.025 † | 0.18 |

Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 2/3/2023

| | | | | | | |
|--|------|------|---|------|------|------|
| Ammonia Nitrogen, NH ₃ as N | mg/L | 0.01 | - | 0.60 | 0.98 | 0.30 |
|--|------|------|---|------|------|------|

Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 2/3/2023

| | | | | | | |
|--|------|------|---|------|------|------|
| Total Phosphorus (Kjeldahl Digestion) as P | mg/L | 0.02 | - | 0.72 | 0.61 | 0.11 |
|--|------|------|---|------|------|------|

pH in water Method: AN101 Tested: 1/3/2023

| | | | | | | |
|------|---------|---|---|-----|-----|-----|
| pH** | No unit | - | - | 7.2 | 6.7 | 6.8 |
|------|---------|---|---|-----|-----|-----|

Conductivity and TDS by Calculation - Water Method: AN106 Tested: 1/3/2023

| | | | | | | |
|---------------------|-------|---|---|------|------|------|
| Conductivity @ 25 C | µS/cm | 2 | - | 7700 | 4500 | 8700 |
|---------------------|-------|---|---|------|------|------|

Total Dissolved Solids (TDS) in water Method: AN113 Tested: 6/3/2023

| | | | | | | |
|---|------|----|---|------|------|------|
| Total Dissolved Solids Dried at 175-185°C | mg/L | 10 | - | 4900 | 2900 | 6300 |
|---|------|----|---|------|------|------|

| Parameter | Units | LOR | Sample Number | SE243799.001 | SE243799.002 | SE243799.003 | SE243799.004 |
|-----------|-------|-----|---------------|--------------|---------------|--------------|--------------|
| | | | Sample Matrix | Water | Water | Water | Water |
| | | | Sample Date | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 |
| | | | Sample Name | Piezo 1 (S1) | Piezo 2 (MP2) | Piezo 3 | Piezo 4 |

Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 2/3/2023

| | | | | | | |
|---|------|---|---|---|---|---|
| Total Suspended Solids Dried at 103-105°C | mg/L | 5 | - | - | - | - |
|---|------|---|---|---|---|---|

Alkalinity Method: AN135 Tested: 7/3/2023

| | | | | | | |
|---------------------------------------|------|---|---|------|-----|-----|
| Total Alkalinity as CaCO ₃ | mg/L | 5 | - | 1400 | 580 | 940 |
|---------------------------------------|------|---|---|------|-----|-----|

BOD5 Method: AN183 Tested: 7/3/2023

| | | | | | | |
|---|------|---|---|----|----|----|
| Biochemical Oxygen Demand (BOD ₅) | mg/L | 5 | - | 21 | <5 | <5 |
|---|------|---|---|----|----|----|

Forms of Carbon Method: AN190 Tested: 3/3/2023

| | | | | | | |
|------------------------------|------|-----|---|----|----|----|
| Total Organic Carbon as NPOC | mg/L | 0.2 | - | 18 | 23 | 14 |
|------------------------------|------|-----|---|----|----|----|

Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 7/3/2023

| | | | | | | |
|---------------|------|-----|---|-----|-----|-----|
| Calcium, Ca | mg/L | 0.1 | - | 200 | 250 | 490 |
| Magnesium, Mg | mg/L | 0.1 | - | 370 | 210 | 460 |
| Potassium, K | mg/L | 0.2 | - | 22 | 15 | 8.7 |
| Sodium, Na | mg/L | 0.1 | - | 960 | 390 | 680 |

Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 3/3/2023

| | | | | | | |
|-----------|------|-------|---|-----|-------|--------|
| Aluminium | mg/L | 0.005 | - | - | - | - |
| Arsenic | mg/L | 0.001 | - | - | - | - |
| Barium | mg/L | 0.001 | - | - | - | - |
| Copper | mg/L | 0.001 | - | - | - | - |
| Iron | mg/L | 0.005 | - | 1.7 | 0.080 | <0.005 |
| Lead | mg/L | 0.001 | - | - | - | - |
| Manganese | mg/L | 0.001 | - | - | - | - |
| Zinc | mg/L | 0.005 | - | - | - | - |

| Parameter | Units | LOR | Sample Number | SE243799.005 | SE243799.006 | SE243799.007 | SE243799.008 |
|-----------|-------|-----|---------------|---------------------|---------------|---------------|--------------|
| | | | Sample Matrix | Water | Water | Water | Water |
| | | | Sample Date | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 |
| | | | Sample Name | Piezo 6 (New Piezo) | Piezo 7 (MP7) | Piezo 8 (MP8) | L-DAM_1 |

Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 7/3/2023

| | | | | | | |
|------------|------|----|---|---|---|-------|
| TRH C6-C10 | µg/L | 50 | - | - | - | <100† |
| TRH C6-C9 | µg/L | 40 | - | - | - | <80† |

Surrogates

| | | | | | | |
|-----------------------------------|---|---|---|---|---|------------|
| d4-1,2-dichloroethane (Surrogate) | % | - | - | - | - | 112 |
| d8-toluene (Surrogate) | % | - | - | - | - | 115 |
| Bromofluorobenzene (Surrogate) | % | - | - | - | - | 95 |

VPF F Bands

| | | | | | | |
|----------------------------|------|-----|---|---|---|-------|
| Benzene (F0) | µg/L | 0.5 | - | - | - | <1.0† |
| TRH C6-C10 minus BTEX (F1) | µg/L | 50 | - | - | - | <100† |

TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 7/3/2023

| | | | | | | |
|-------------|------|-----|---|---|---|-------|
| TRH C10-C14 | µg/L | 50 | - | - | - | <100† |
| TRH C15-C28 | µg/L | 200 | - | - | - | <400† |
| TRH C29-C36 | µg/L | 200 | - | - | - | <400† |
| TRH C37-C40 | µg/L | 200 | - | - | - | <400† |
| TRH C10-C40 | µg/L | 320 | - | - | - | <640† |

TRH F Bands

| | | | | | | |
|---------------------------------|------|-----|---|---|---|--------|
| TRH >C10-C16 | µg/L | 60 | - | - | - | <120† |
| TRH >C10-C16 - Naphthalene (F2) | µg/L | 60 | - | - | - | <120† |
| TRH >C16-C34 (F3) | µg/L | 500 | - | - | - | <1000† |
| TRH >C34-C40 (F4) | µg/L | 500 | - | - | - | <1000† |

Total Phenolics in Water Method: AN295 Tested: 2/3/2023

| | | | | | | |
|---------------|------|------|-------|-------|-------|-------|
| Total Phenols | mg/L | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
|---------------|------|------|-------|-------|-------|-------|

| Parameter | Units | LOR | Sample Number | SE243799.005 | SE243799.006 | SE243799.007 | SE243799.008 |
|-----------|-------|-----|---------------|---------------------|---------------|---------------|--------------|
| | | | Sample Matrix | Water | Water | Water | Water |
| | | | Sample Date | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 |
| | | | Sample Name | Piezo 6 (New Piezo) | Piezo 7 (MP7) | Piezo 8 (MP8) | L-DAM_1 |

Anions by Ion Chromatography in Water Method: AN245 Tested: 3/3/2023

| | | | | | | |
|--------------------------------------|------|-------|------|------|------|-------|
| Chloride | mg/L | 1 | 3800 | 610 | 53 | 180 |
| Sulfate, SO ₄ | mg/L | 1 | 590 | 170 | 43 | 64 |
| Fluoride | mg/L | 0.1 | 0.56 | 0.77 | 0.15 | 0.35 |
| Nitrate Nitrogen, NO ₃ -N | mg/L | 0.005 | 4.2 | 31 | 11 | 0.029 |

Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 2/3/2023

| | | | | | | |
|--|------|------|------|-----|-------|------|
| Ammonia Nitrogen, NH ₃ as N | mg/L | 0.01 | 0.04 | 1.8 | <0.01 | 0.41 |
|--|------|------|------|-----|-------|------|

Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 1/3/2023

| | | | | | | |
|--|------|------|------|------|-----|---|
| Total Phosphorus (Kjeldahl Digestion) as P | mg/L | 0.02 | 0.68 | 0.22 | 1.3 | - |
|--|------|------|------|------|-----|---|

pH in water Method: AN101 Tested: 1/3/2023

| | | | | | | |
|------|---------|---|-----|-----|-----|-----|
| pH** | No unit | - | 6.7 | 7.0 | 7.1 | 8.1 |
|------|---------|---|-----|-----|-----|-----|

Conductivity and TDS by Calculation - Water Method: AN106 Tested: 1/3/2023

| | | | | | | |
|---------------------|-------|---|-------|------|------|------|
| Conductivity @ 25 C | µS/cm | 2 | 12000 | 4200 | 1200 | 1500 |
|---------------------|-------|---|-------|------|------|------|

Total Dissolved Solids (TDS) in water Method: AN113 Tested: 2/3/2023

| | | | | | | |
|---|------|----|------|------|-----|---|
| Total Dissolved Solids Dried at 175-185°C | mg/L | 10 | 9200 | 2600 | 880 | - |
|---|------|----|------|------|-----|---|

| Parameter | Units | LOR | Sample Number | SE243799.005 | SE243799.006 | SE243799.007 | SE243799.008 |
|-----------|-------|-----|---------------|---------------------|---------------|---------------|--------------|
| | | | Sample Matrix | Water | Water | Water | Water |
| | | | Sample Date | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 | 23 Feb 2023 |
| | | | Sample Name | Piezo 6 (New Piezo) | Piezo 7 (MP7) | Piezo 8 (MP8) | L-DAM_1 |

Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 2/3/2023

| | | | | | | |
|---|------|---|---|---|---|-------|
| Total Suspended Solids Dried at 103-105°C | mg/L | 5 | - | - | - | <20 † |
|---|------|---|---|---|---|-------|

Alkalinity Method: AN135 Tested: 6/3/2023

| | | | | | | |
|---------------------------|------|---|-----|------|-----|-----|
| Total Alkalinity as CaCO3 | mg/L | 5 | 700 | 1100 | 450 | 540 |
|---------------------------|------|---|-----|------|-----|-----|

BOD5 Method: AN183 Tested: 2/3/2023

| | | | | | | |
|----------------------------------|------|---|----|----|----|---|
| Biochemical Oxygen Demand (BOD5) | mg/L | 5 | <5 | <5 | <5 | - |
|----------------------------------|------|---|----|----|----|---|

Forms of Carbon Method: AN190 Tested: 2/3/2023

| | | | | | | |
|------------------------------|------|-----|-----|----|----|----|
| Total Organic Carbon as NPOC | mg/L | 0.2 | 5.0 | 32 | 53 | 33 |
|------------------------------|------|-----|-----|----|----|----|

Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 7/3/2023

| | | | | | | |
|---------------|------|-----|------|-----|-----|-----|
| Calcium, Ca | mg/L | 0.1 | 480 | 180 | 59 | 53 |
| Magnesium, Mg | mg/L | 0.1 | 680 | 170 | 27 | 72 |
| Potassium, K | mg/L | 0.2 | 9.2 | 9.1 | 120 | 67 |
| Sodium, Na | mg/L | 0.1 | 1100 | 480 | 100 | 170 |

Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 2/3/2023

| | | | | | | |
|-----------|------|-------|--------|--------|------|--------|
| Aluminium | mg/L | 0.005 | - | - | - | 0.021 |
| Arsenic | mg/L | 0.001 | - | - | - | 0.016 |
| Barium | mg/L | 0.001 | - | - | - | 0.15 |
| Copper | mg/L | 0.001 | - | - | - | 0.002 |
| Iron | mg/L | 0.005 | <0.005 | <0.005 | 0.19 | 0.036 |
| Lead | mg/L | 0.001 | - | - | - | 0.006 |
| Manganese | mg/L | 0.001 | - | - | - | 0.007 |
| Zinc | mg/L | 0.005 | - | - | - | <0.005 |

Sample Number SE243799.009
 Sample Matrix Water
 Sample Date 23 Feb 2023
 Sample Name L-DAM_2

Parameter Units LOR

Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 6/3/2023

| | | | |
|------------|------|----|-----|
| TRH C6-C10 | µg/L | 50 | <50 |
| TRH C6-C9 | µg/L | 40 | <40 |

Surrogates

| | | | |
|-----------------------------------|---|---|------------|
| d4-1,2-dichloroethane (Surrogate) | % | - | 106 |
| d8-toluene (Surrogate) | % | - | 110 |
| Bromofluorobenzene (Surrogate) | % | - | 92 |

VPH F Bands

| | | | |
|----------------------------|------|-----|------|
| Benzene (F0) | µg/L | 0.5 | <0.5 |
| TRH C6-C10 minus BTEX (F1) | µg/L | 50 | <50 |

TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 3/3/2023

| | | | |
|-------------|------|-----|------------|
| TRH C10-C14 | µg/L | 50 | 150 |
| TRH C15-C28 | µg/L | 200 | 500 |
| TRH C29-C36 | µg/L | 200 | <200 |
| TRH C37-C40 | µg/L | 200 | <200 |
| TRH C10-C40 | µg/L | 320 | 750 |

TRH F Bands

| | | | |
|---------------------------------|------|-----|------------|
| TRH >C10-C16 | µg/L | 60 | 230 |
| TRH >C10-C16 - Naphthalene (F2) | µg/L | 60 | 220 |
| TRH >C16-C34 (F3) | µg/L | 500 | 530 |
| TRH >C34-C40 (F4) | µg/L | 500 | <500 |

Total Phenolics in Water Method: AN295 Tested: 2/3/2023

| | | | |
|---------------|------|------|-------|
| Total Phenols | mg/L | 0.05 | <0.05 |
|---------------|------|------|-------|

| | | | |
|-----------|-------|---------------|--------------|
| | | Sample Number | SE243799.009 |
| | | Sample Matrix | Water |
| | | Sample Date | 23 Feb 2023 |
| | | Sample Name | L-DAM_2 |
| Parameter | Units | LOR | |

Anions by Ion Chromatography in Water Method: AN245 Tested: 3/3/2023

| | | | |
|--------------------------------------|------|-------|-------------|
| Chloride | mg/L | 1 | 280 |
| Sulfate, SO ₄ | mg/L | 1 | 13 |
| Fluoride | mg/L | 0.1 | 0.56 |
| Nitrate Nitrogen, NO ₃ -N | mg/L | 0.005 | <0.025 † |

Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 2/3/2023

| | | | |
|--|------|------|------------|
| Ammonia Nitrogen, NH ₃ as N | mg/L | 0.01 | 2.7 |
|--|------|------|------------|

Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 2/3/2023

| | | | |
|--|------|------|---|
| Total Phosphorus (Kjeldahl Digestion) as P | mg/L | 0.02 | - |
|--|------|------|---|

pH in water Method: AN101 Tested: 1/3/2023

| | | | |
|------|---------|---|------------|
| pH** | No unit | - | 8.2 |
|------|---------|---|------------|

Conductivity and TDS by Calculation - Water Method: AN106 Tested: 1/3/2023

| | | | |
|---------------------|-------|---|-------------|
| Conductivity @ 25 C | µS/cm | 2 | 1900 |
|---------------------|-------|---|-------------|

Total Dissolved Solids (TDS) in water Method: AN113 Tested: 6/3/2023

| | | | |
|---|------|----|---|
| Total Dissolved Solids Dried at 175-185°C | mg/L | 10 | - |
|---|------|----|---|

| | | | |
|-----------|-------|---------------|--------------|
| | | Sample Number | SE243799.009 |
| | | Sample Matrix | Water |
| | | Sample Date | 23 Feb 2023 |
| | | Sample Name | L-DAM_2 |
| Parameter | Units | LOR | |

Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 2/3/2023

| | | | |
|---|------|---|-----|
| Total Suspended Solids Dried at 103-105°C | mg/L | 5 | 120 |
|---|------|---|-----|

Alkalinity Method: AN135 Tested: 6/3/2023

| | | | |
|---------------------------------------|------|---|-----|
| Total Alkalinity as CaCO ₃ | mg/L | 5 | 590 |
|---------------------------------------|------|---|-----|

BOD5 Method: AN183 Tested: 7/3/2023

| | | | |
|---|------|---|---|
| Biochemical Oxygen Demand (BOD ₅) | mg/L | 5 | - |
|---|------|---|---|

Forms of Carbon Method: AN190 Tested: 2/3/2023

| | | | |
|------------------------------|------|-----|----|
| Total Organic Carbon as NPOC | mg/L | 0.2 | 86 |
|------------------------------|------|-----|----|

Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 7/3/2023

| | | | |
|---------------|------|-----|-----|
| Calcium, Ca | mg/L | 0.1 | 28 |
| Magnesium, Mg | mg/L | 0.1 | 69 |
| Potassium, K | mg/L | 0.2 | 86 |
| Sodium, Na | mg/L | 0.1 | 240 |

Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 2/3/2023

| | | | |
|-----------|------|-------|--------|
| Aluminium | mg/L | 0.005 | 0.014 |
| Arsenic | mg/L | 0.001 | 0.009 |
| Barium | mg/L | 0.001 | 0.36 |
| Copper | mg/L | 0.001 | 0.002 |
| Iron | mg/L | 0.005 | 0.055 |
| Lead | mg/L | 0.001 | <0.001 |
| Manganese | mg/L | 0.001 | 0.005 |
| Zinc | mg/L | 0.005 | <0.005 |

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery |
|---------------------------------------|-----------------|-------|-----|----|----------|------------------|
| Total Alkalinity as CaCO ₃ | LB273135 | mg/L | 5 | <5 | 1 - 31% | 102% |

Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN291

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|--|-----------------|-------|------|-------|----------|------------------|-----------------|
| Ammonia Nitrogen, NH ₃ as N | LB272856 | mg/L | 0.01 | <0.01 | 1% | 104% | 98% |

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|--------------------------------------|-----------------|-------|-------|--------|----------|------------------|-----------------|
| Chloride | LB272932 | mg/L | 1 | <0.05 | | 97% | |
| Sulfate, SO ₄ | LB272932 | mg/L | 1 | <1.0 | 4% | 98% | |
| Fluoride | LB272932 | mg/L | 0.1 | <0.10 | | 96% | 92% |
| Nitrate Nitrogen, NO ₃ -N | LB272932 | mg/L | 0.005 | <0.005 | 0% | 99% | 99% |

BOD₅ Method: ME-(AU)-[ENV]AN183

| Parameter | QC Reference | Units | LOR | DUP %RPD |
|---|-----------------|-------|-----|----------|
| Biochemical Oxygen Demand (BOD ₅) | LB272851 | mg/L | 5 | 2% |

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery |
|---------------------|-----------------|-------|-----|----|----------|------------------|
| Conductivity @ 25 C | LB272775 | µS/cm | 2 | <2 | 0 - 1% | 93% |

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Forms of Carbon Method: ME-(AU)-[ENV]AN190

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|------------------------------|-----------------|-------|-----|------|----------|------------------|-----------------|
| Total Organic Carbon as NPOC | LB272852 | mg/L | 0.2 | <0.2 | 5% | 99% | 97% |

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|---------------|-----------------|-------|-----|------|----------|------------------|-----------------|
| Calcium, Ca | LB273179 | mg/L | 0.1 | <0.1 | 1% | 103% | 96 - 100% |
| Magnesium, Mg | LB273179 | mg/L | 0.1 | <0.1 | 0 - 1% | 104% | 96% |
| Potassium, K | LB273179 | mg/L | 0.2 | <0.2 | 0 - 1% | 101% | 89% |
| Sodium, Na | LB273179 | mg/L | 0.1 | <0.1 | 0% | 104% | 90% |

pH in water Method: ME-(AU)-[ENV]AN101

| Parameter | QC Reference | Units | LOR | DUP %RPD | LCS %Recovery |
|-----------|-----------------|---------|-----|----------|------------------|
| pH** | LB272775 | No unit | - | 0% | 100% |

Total and Volatile Suspended Solids (TSS / VSS) Method: ME-(AU)-[ENV]AN114

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery |
|---|-----------------|-------|-----|----|----------|------------------|
| Total Suspended Solids Dried at 103-105°C | LB272855 | mg/L | 5 | <5 | 2% | 94% |

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery |
|---|--------------|-------|-----|-----|----------|---------------|
| Total Dissolved Solids Dried at 175-185°C | LB272847 | mg/L | 10 | <10 | 0% | 100% |

Total Phenolics in Water Method: ME-(AU)-[ENV]AN295

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|---------------|--------------|-------|------|-------|----------|---------------|--------------|
| Total Phenols | LB272824 | mg/L | 0.05 | <0.05 | 0 - 2% | 97% | 94% |

Total Phosphorus by Kjeldahl Digestion DA in Water Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|--|--------------|-------|------|-------|----------|---------------|--------------|
| Total Phosphorus (Kjeldahl Digestion) as P | LB272783 | mg/L | 0.02 | <0.02 | 3 - 8% | 101% | 95% |

Trace Metals (Dissolved) in Water by ICPMS Method: ME-(AU)-[ENV]AN318

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|-----------|--------------|-------|-------|--------|----------|---------------|--------------|
| Aluminium | LB272814 | mg/L | 0.005 | <0.005 | | 102% | |
| Arsenic | LB272814 | mg/L | 0.001 | <0.001 | 0% | 107% | 112% |
| Barium | LB272814 | mg/L | 0.001 | <0.001 | | 106% | |
| Copper | LB272814 | mg/L | 0.001 | <0.001 | 2% | 102% | 105% |
| Iron | LB272814 | mg/L | 0.005 | <0.005 | 9% | 97% | |
| Lead | LB272814 | mg/L | 0.001 | <0.001 | 0% | 97% | 101% |
| Manganese | LB272814 | mg/L | 0.001 | <0.001 | | 101% | |
| Zinc | LB272814 | mg/L | 0.005 | <0.005 | 0% | 95% | 100% |

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

TRH (Total Recoverable Hydrocarbons) in Water Method: ME-(AU)-[ENV]AN403

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery |
|-------------|-----------------|-------|-----|------|----------|------------------|
| TRH C10-C14 | LB272937 | µg/L | 50 | <50 | 0% | 76% |
| TRH C15-C28 | LB272937 | µg/L | 200 | <200 | 0% | 97% |
| TRH C29-C36 | LB272937 | µg/L | 200 | <200 | 0% | 97% |
| TRH C37-C40 | LB272937 | µg/L | 200 | <200 | 0% | NA |
| TRH C10-C40 | LB272937 | µg/L | 320 | <320 | 0% | NA |

TRH F Bands

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery |
|---------------------------------|-----------------|-------|-----|------|----------|------------------|
| TRH >C10-C16 | LB272937 | µg/L | 60 | <60 | 0% | 89% |
| TRH >C10-C16 - Naphthalene (F2) | LB272937 | µg/L | 60 | <60 | 0% | NA |
| TRH >C16-C34 (F3) | LB272937 | µg/L | 500 | <500 | 0% | 99% |
| TRH >C34-C40 (F4) | LB272937 | µg/L | 500 | <500 | 0% | 95% |

Volatile Petroleum Hydrocarbons in Water Method: ME-(AU)-[ENV]AN433

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|------------|-----------------|-------|-----|-----|----------|------------------|-----------------|
| TRH C6-C10 | LB273123 | µg/L | 50 | <50 | 0% | 120% | 119% |
| TRH C6-C9 | LB273123 | µg/L | 40 | <40 | 0% | 118% | 128% |

Surrogates

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|-----------------------------------|-----------------|-------|-----|------|----------|------------------|-----------------|
| d4-1,2-dichloroethane (Surrogate) | LB273123 | % | - | 107% | 33% | 109% | 82% |
| d8-toluene (Surrogate) | LB273123 | % | - | 108% | 26% | 115% | 108% |
| Bromofluorobenzene (Surrogate) | LB273123 | % | - | 97% | 11% | 116% | 100% |

VPH F Bands

| Parameter | QC Reference | Units | LOR | MB | DUP %RPD | LCS %Recovery | MS %Recovery |
|----------------------------|-----------------|-------|-----|-----|----------|------------------|-----------------|
| Benzene (F0) | LB273123 | µg/L | 0.5 | | 0% | NA | NA |
| TRH C6-C10 minus BTEX (F1) | LB273123 | µg/L | 50 | <50 | 0% | 127% | 129% |

METHOD

METHODOLOGY SUMMARY

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| AN020 | Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B. |
| AN101 | pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+. |
| AN106 | Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B. |
| AN106 | Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl. |
| AN113 | Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C. |
| AN113 | The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined. |
| AN114 | Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114 |
| AN135 | Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135 |
| AN183 | BOD: Serial dilutions of the sample are firstly combined with various reagents to aid bacterial growth and the sample is incubated for 5 days at 20°C. The difference between the initial and final oxygen contents of the sample is the amount of oxygen consumed by the bacteria. This is related to the organic loading of the sample therefore cBOD is the measure of the digestibility or bioavailability of organic matter in the sample. Reference APHA 5210 B. Internal Reference AN183 |
| AN190 | TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO ₂ is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B. |
| AN190 | Chemical oxygen demand can be calculated/estimated based on the O ₂ /C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution. |

METHOD

METHODOLOGY SUMMARY

| | |
|---------------------|---|
| AN245 | Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO ₂ , NO ₃ and SO ₄ are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B |
| AN279/AN293(Sydney) | The sample is digested with Sulphuric acid, K ₂ SO ₄ and CuSO ₄ . All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis. |
| AN291 | Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser. |
| AN295 | The water sample or extract of sample is distilled in a phosphoric acid stream. Phenolic compounds in the distillate react with a reagent stream of potassium hexacyanoferrate(III) and 4-Amino-2,3-dimethyl-3-pyrazolin-5-one in an alkaline medium to form a coloured complex which is analysed spectrophotometrically onboard a continuous flow analyser. |
| AN318 | Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4). |
| AN320 | Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components . |
| AN320 | Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B. |
| AN403 | Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used. |
| AN403 | Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents. |
| AN403 | The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B. |
| AN433 | VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260. |

METHOD

METHODOLOGY SUMMARY

Calculation

Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L.
If TDS is >500mg/L free or total carbon dioxide cannot be reported . APHA4500CO2 D.

FOOTNOTES

| | | | |
|-----|--|-----|--|
| IS | Insufficient sample for analysis. | LOR | Limit of Reporting |
| LNR | Sample listed, but not received. | ↑↓ | Raised or Lowered Limit of Reporting |
| * | NATA accreditation does not cover the performance of this service. | QFH | QC result is above the upper tolerance |
| ** | Indicative data, theoretical holding time exceeded. | QFL | QC result is below the lower tolerance |
| *** | Indicates that both * and ** apply. | - | The sample was not analysed for this analyte |
| | | NVL | Not Validated |

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.

Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- 1 Bq is equivalent to 27 pCi
- 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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