REPORT

February 2020 Groundwater and Spring Water Monitoring Event

Stockyard Hill Wind Farm Quarry

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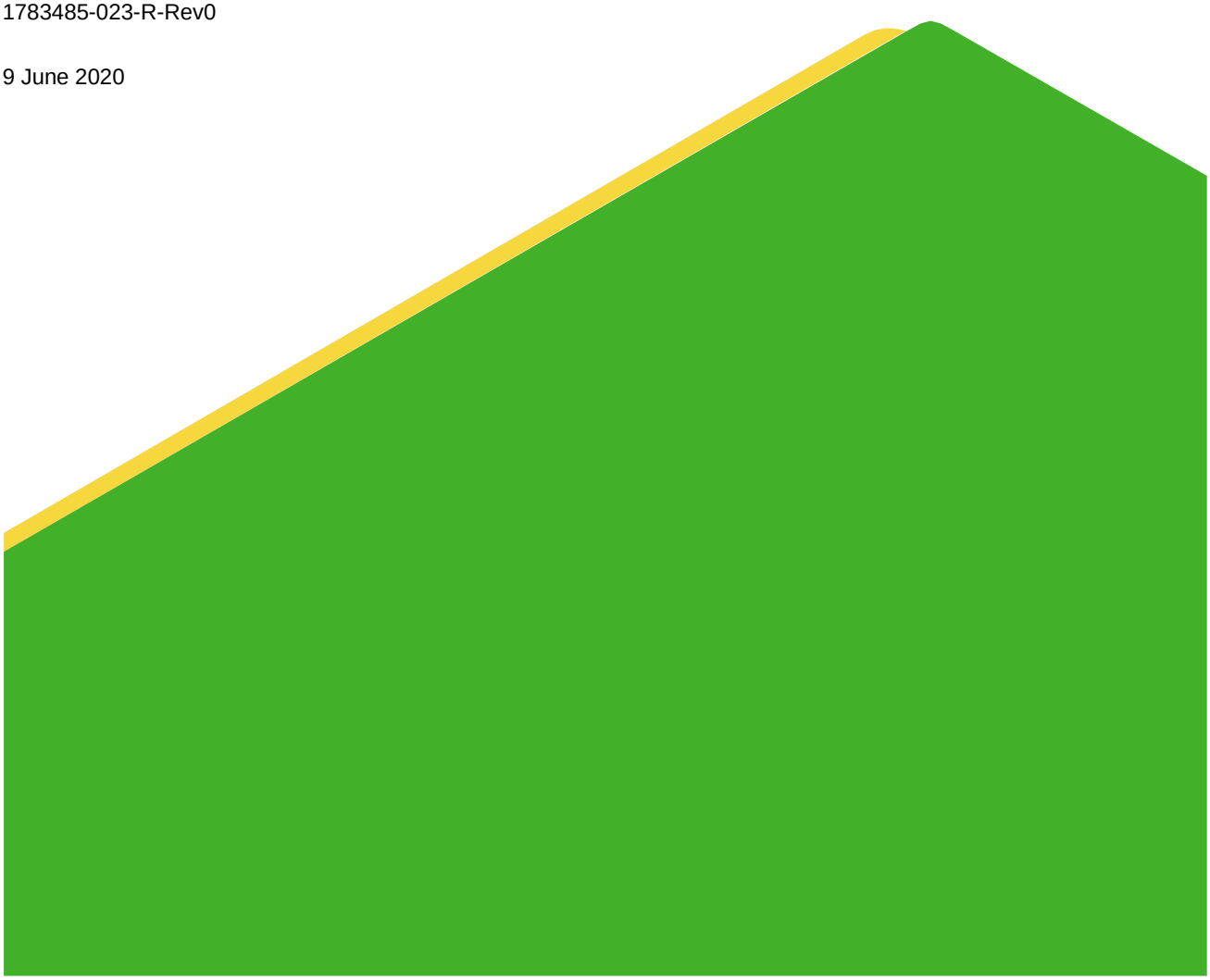

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1.0 INTRODUCTION

1.1 General

Golder Associates Pty Ltd (Golder) was commissioned by Stockyard Hill Wind Farm Pty Ltd (SHWF) to provide bi-annual reporting of groundwater and surface water monitoring for the Stockyard Hill Wind Farm quarry. The quarry is located at Stockyard Hill-Wangatta Road, Stockyard Hill (Lot 2, PS604561R) (the site) as shown in Figure 1.

A Groundwater Monitoring and Management Plan (GMMP; Golder, 2018a) was developed as a requirement of the quarry planning permit (PA2499/16). Under the GMMP, groundwater level monitoring at monitoring wells and on-site groundwater wells with windmills is required on a quarterly basis, and groundwater and spring sampling is required on a biannual (i.e. six monthly) basis. This report relates to the February 2020 sampling and water level monitoring.

The monitoring was conducted by a subcontractor to the quarry operator (SNC Lavalin-WBHO Infrastructure JV: SNCL-WBHO), and results provided to Golder for the purpose of compiling this report.

1.2 Objectives

This report aims to assist SHWF in satisfying the objectives of the GMMP including:

- Assisting in ensuring that the quarry excavation does not intersect groundwater, and
- Providing an indication of impacts on groundwater levels or quality which may be attributable to quarry operations.

1.3 Background

Stockyard Hill Wind Farm Pty Ltd is developing a wind farm with 149 wind turbine generators (WTG) within the Stockyard Hill area, referred to as the Stockyard Hill Wind Farm. The crushed rock required for the construction of the wind farm, including associated infrastructure, is being sourced from a temporary quarry at the site. SNCL-WBHO is operating the temporary quarry on behalf of SHWF. The quarry will be excavated to a depth of up to approximately 13 m below the original ground level Chart 1. The base of the quarry is designed to be above the water table.

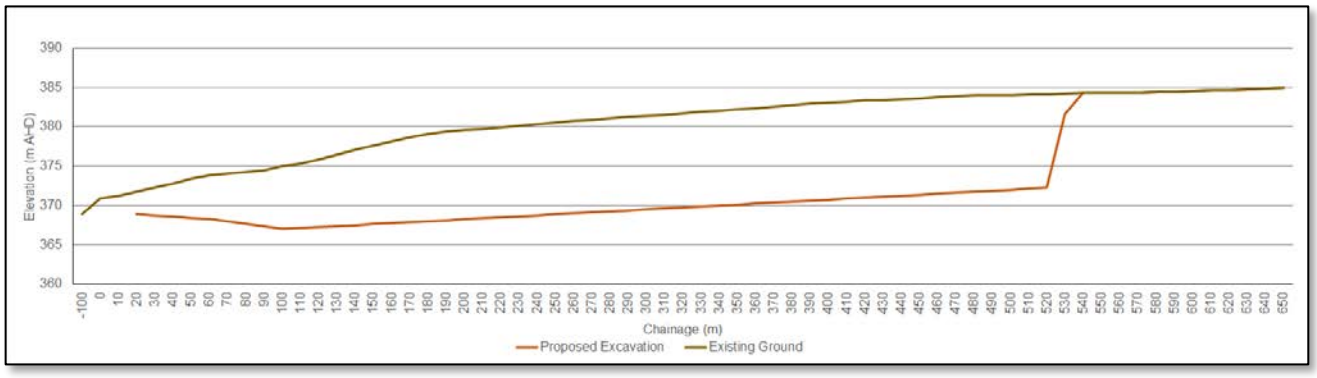

Chart 1: Quarry design schematic longitudinal section

Golder understands the development of the quarry commenced in August 2018 and ceased in late 2019.

1.4 Scope of field program

Field work conducted by SNCL-WBHO's subcontractor Land Kwality in February 2020 included:

- Water level monitoring at six groundwater wells (BH02, BH03, BH04, BH05, BH06, BH94) and two windmill wells (WM01, WM07)
- Groundwater sampling from five monitoring wells (BH94 was not sampled)
- Spring water sampling from Bain's Spring and Meallack Spring.

2.0 DESCRIPTION OF WORKS

2.1 Groundwater level monitoring

On 25 February 2020 the groundwater levels were measured in six groundwater wells and two windmill wells.

The wells were those listed in the GMMP: BH02, BH03, BH04, BH05, BH06, BH94, WM01 and WM07. Depth to water (DTW) was measured in metres below top of casing (mbTOC). The depth to the bottom (DTB) of the wells was also measured for groundwater wells (BH02-BH94). In addition, BH03 was measured three times, at the beginning, middle and end of the gauging round. Results from BH03 were consistent between all measurements. Groundwater depths and corresponding elevations are presented in Table A (attached) and the field gauging sheet included in APPENDIX A.

2.2 Groundwater sampling

On 25 and 26 February 2020, one to two days prior to sampling, purging was undertaken at BH02, BH03 BH04, BH05 and BH06 and the wells left to recover before sampling on 27 February 2020. Groundwater sampling was undertaken using low-flow methods at BH04, BH05 and BH06 and using an inertial lift (foot valve) pump at BH02 and BH03. Sampling flow rates were between 0.32 L/min to 0.67 L/min. Sampling occurred at five of the six groundwater monitoring wells listed in the GMMP. Purging and sampling did not occur at BH94 and the reason was not stated, however, it was likely due to historically insufficient recharge following purging. The depth to groundwater was measured in each well prior to sampling. Groundwater purging records are summarised in Table 1 below.

The GMMP defines stabilisation as when three consecutive field parameter readings are within the specified ranges (within ±10% for DO, ±3% for EC, ±0.05 for pH and ±10mV for Eh). This was not achieved at any of the wells sampled:

- Previous sampling at BH02 had shown excessive drawdown even at a low flow rate of 0.08 L/min. For this round the foot valve sampling method was used and one set of field parameters recorded.
- The foot valve method was also utilised at BH03 with one set of field parameters recorded. During purging 10 L of water was removed at a flow rate of 0.67 L/min with a drawdown of 0.52 m. It was not stated why a foot valve was used instead of previous low flow methods for the well.
- BH04, BH05 and BH06 were sampled using low flow method at sampling rates of 0.37 L/min, 0.32 L/min and 0.33 L/min respectively. BH04 and BH06 were sampled after three field parameter readings and BH05 after two readings. The field parameters collected at each of these wells were generally close to stabilisation in the final (or only) two readings collected. In each case the total volume of water purged in the two visits to each well exceeded the volume of the water column calculated from the initial water level and depth to well bottom. It is therefore likely that the samples were representative of groundwater that has recharged from the aquifer.

Groundwater field parameters are presented in Table B (attached), the groundwater sampling field records are presented in APPENDIX A and calibration records are included in APPENDIX B.

Table 1: Groundwater purging summary

	BH02	BH03	BH04	BH05	BH06	BH94
Initial DTW (mbTOC)	24.686	22.924	11.919	14.883	14.475	14.057
Purging on 25 or 26 February 2020	15 L at 0.22 L/min	25 L at 0.45 L/min	25 L at 2.27 L/min	20 L at 1.11 L/min	22.5 L at 1.25 L/min	Not purged
Additional pre-sample purging on 27 February 2020	15 L at 0.22 L/min	10 L at 0.45 L/min	14 L at 2.27 L/min	10 L at 1.11 L/min	12 L at 1.25 L/min	Not sampled
Final DTW (mbTOC)	31.214	23.748	11.935	16.425	16.104	Not sampled

During sampling a rinsate blank and primary and secondary duplicate sample were also collected for quality assurance/quality control (QA/QC) purposes. Groundwater and QA/QC samples were analysed for:

- pH
- Total dissolved solids (TDS)
- Major cations and anions: (sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), chloride (Cl), bicarbonate (HCO_3), carbonate (CO_3), total alkalinity, sulphate (SO_4))
- Dissolved metals (iron, manganese)
- Nitrogen compounds (ammonia, nitrate, nitrite, total nitrogen, TKN)
- Total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylene, naphthalene (BTEXN)
- Biological oxygen demand (BOD)
- Microbiological: *E. coli, Enterococci*.

Samples were submitted to NATA accredited laboratories for analysis with:

- Eurofins-MGT Pty Ltd was used as the primary laboratory
- Australian Laboratory Services Pty Ltd (ALS) was engaged as the secondary testing laboratory.

Analytical results obtained from the groundwater monitoring well samples are included in Table C (attached), with the laboratory certificates presented in APPENDIX C.

2.3 Spring sampling

Two springs in the vicinity of the site were sampled on 27 February 2020: Meallack Spring and Bain's Spring. Other springs listed in the GMMP were not sampled, as access was not granted by the landholders. Spring water field parameters are presented in Table B (attached) and the sampling field records are presented in APPENDIX A, with calibration records included in APPENDIX B. As the spring sampling was conducted on the same day as groundwater sampling additional QA/QC samples were not collected.

3.0 ASSESSMENT CRITERIA AND TRIGGER CONDITIONS

3.1 Groundwater elevation triggers

For wells within 500 m of the quarry, the trigger level for groundwater elevation was set at 365 m AHD, which is 2 m below the estimated lowest point of the base of the quarry (Golder, 2018a). If trigger levels are exceeded, response measures as outlined in Section 7.3 of the GMMP will be enacted.

The four monitoring wells within 500 m of the quarry have the corresponding depth to groundwater trigger levels listed in Table 2 below.

Table 2: Groundwater elevation triggers

Well ID	Depth to groundwater at Trigger Level 365 m AHD (m bTOC)
BH02	17.36
BH03	19.97
WM01	3.94
WM07	25.70
Note: m AHD = metres Australian Height Datum	

The trigger level was not applied to BH06 as the ground surface at this well was below the trigger level.

3.2 Groundwater quality triggers

Based on the background groundwater salinity range of between approximately 330 mg/L and 1,100 mg/L total dissolved solids (TDS) the groundwater classification would be either Segment A1 or A2 (defined as up to 1,200 mg/L TDS) under the State Environment Protection Policy "Waters" (SEPP Waters, 2018). Therefore, the beneficial uses of groundwater to be protected at the site, in accordance with the SEPP Waters, are:

- Water dependent ecosystems and species
- Potable Water Supply
- Agriculture and irrigation
- Stock Watering
- Industrial and commercial
- Primary Contact Recreation (e.g. bathing and swimming)
- Traditional Owner cultural values

- Cultural and spiritual values
- Buildings and Structures
- Geothermal properties.

Although the trigger levels set in the GMMP were based on the previous SEPP (Groundwaters of Victoria, 1997), the groundwater segment classification has not changed, and additional protected beneficial uses introduced in the 2018 SEPP do not introduce additional assessment criteria. Assessment criteria for ecosystems and extractive beneficial uses can generally be adopted as being conservative and protective of cultural and spiritual values. The temperature of groundwater at the site has been measured to be below 30°C, so the geothermal beneficial use is not considered to be relevant. Therefore, no additional criteria have been adopted for this beneficial use.

Groundwater quality trigger levels were set in the GMMP as either:

- Guideline levels protective of the beneficial uses listed above, or
- Where existing levels are greater than the guideline levels, approximately 150% of the pre-existing concentrations (being the highest of available analysis results from 2012 to 2017) for monitoring wells and springs.

The presence of non-aqueous phase liquid (NAPL, e.g. hydrocarbon fuel) as either a measurable thickness in the well or a sheen on the surface of the water, is included as a trigger, in addition to trigger levels for dissolved hydrocarbons (as TRH and BTEXN).

Well maintenance and redevelopment occurred in BH94 in July 2018 to rectify suspected ingress of organic materials from the ground surface while the well head was in poor condition. Under the GMMP, trigger levels for TRH, ammonia and iron will not apply at BH94 until it is established that concentrations below trigger levels have been restored.

Water quality trigger levels are listed in Table 3. If trigger levels are exceeded, response measures as outlined in Section 7.3 of the GMMP will be enacted.

Table 3: Groundwater quality trigger levels

Parameter	Units	Trigger Level – Wells	Trigger Level – Springs
TDS	mg/L	**1,700**	600
pH (field)	pH units	**4.9-8.5**	**6.3-8.5**
Sodium	mg/L	**400**	**150**
Calcium	mg/L	1,000	1,000
Magnesium	mg/L	2,000	2,000
Chloride	mg/L	**600**	**150**
Sulphate (as SO_4)	mg/L	250	250
Nitrate (as N)	mg/L	**50**	**50**
Nitrite (as N)	mg/L	0.9	0.9
Ammonia (as N)	mg/L	0.74	0.74

Parameter	Units	Trigger Level – Wells	Trigger Level – Springs
Total nitrogen	mg/L	**50**	**50**
Iron	mg/L	0.2	0.2
Manganese	mg/L	**0.3**	0.1
TRH C_6-C_9	mg/L	0.6	0.6
TRH C_{10}-C_{36}	mg/L	0.6	0.6
Benzene	mg/L	0.001	0.001
Toluene	mg/L	0.025	0.025
Ethylbenzene	mg/L	0.003	0.003
Xylene (total)	mg/L	0.02	0.02
Naphthalene	mg/L	0.016	0.016
E. coli	orgs/100 mL	1	1
Enterococci	orgs/100 mL	1	1
NAPL	-	Hydrocarbon sheen or measurable thickness	

Notes:

Trigger levels in bold are based on pre-existing concentrations, rather than published guidelines.

Trigger levels for pH calculated as $\log_e(e^{(\text{minimum pH})/1.5})$.

Trigger levels for *E. coli* and *Enterococci* were derived from NHMRC (2016) Australian Drinking Water Guidelines 6, 2011 (Version 3.3, Updated November 2016), which state that these bacteria "should not be detected in any 100 mL sample of drinking water". Laboratory limit of reporting of 1 org/100 mL adopted as trigger level.

4.0 RESULTS AND DISCUSSION

4.1 Groundwater levels and flow direction

Groundwater depth and corresponding elevation are presented in Table A (attached). A hydrograph showing trends in water levels is shown in Chart 2 and an inferred groundwater elevation contour map for February 2020 in Figure 2 (attached).

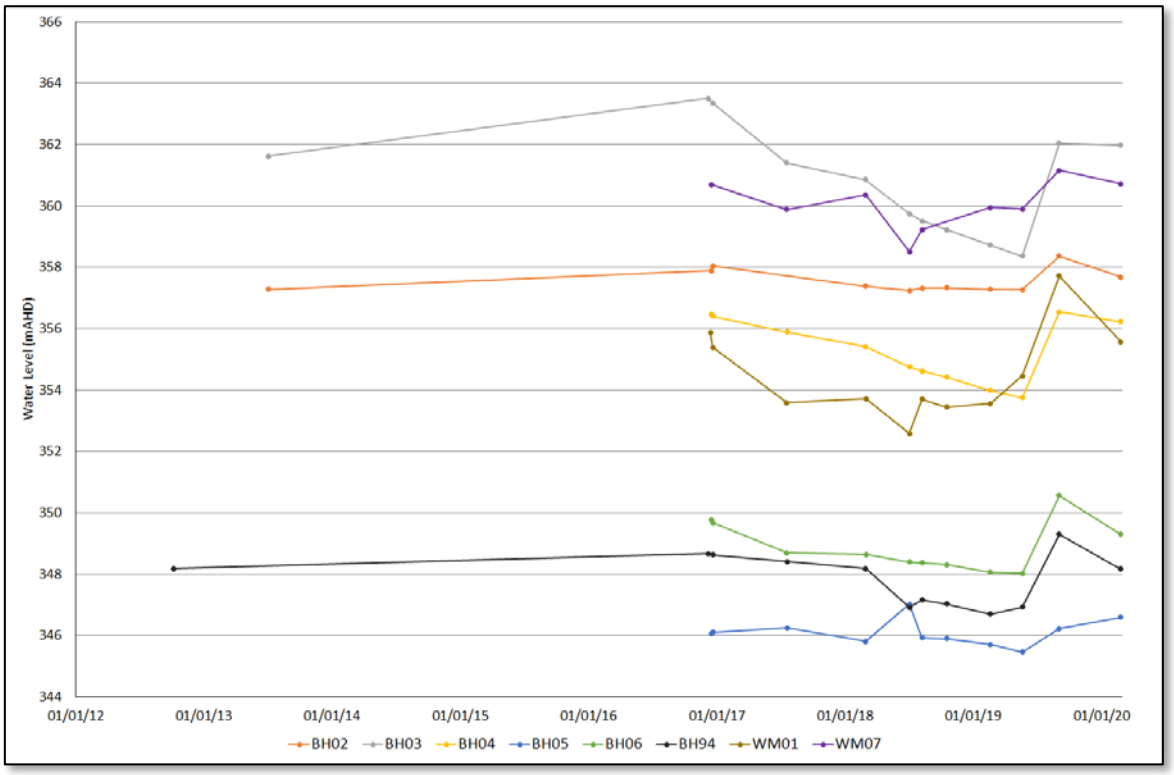

Chart 2: Groundwater elevations vs time

Groundwater beneath the site ranged between a relative level (RL) of RL 346.60 m AHD in the north-west of the site (BH05) to RL 361.97 m AHD in the east of the site (BH03) (Figure 2). Based on the groundwater elevations, the overall direction of groundwater flow is inferred to be in a westerly direction (Figure 2). This is consistent with previous interpretations (Golder, 2019a, b, c).

From Chart 2 the February 2020 monitoring indicates a decrease in water level at most groundwater locations since the previous monitoring round in September 2019. Groundwater levels were between 0.1 m to 2.1 m lower than in September 2020, except for at BH05 where the level was 0.4 m higher. These falls may be due to lower than average rainfall from October 2019 to December 2019 following a wet period before the September 2019 monitoring. Reduced infiltration due to higher evaporation rates over summer would also contribute to lower groundwater levels, even though rainfall in January and February 2020 were above the long-term average[1]. February 2020 groundwater levels were still higher than in the previous summer monitoring of February 2019.

Groundwater levels in the wells with windmills are not static levels due to pumping from the well. Depending on the rate of pumping (controlled by the wind) groundwater levels may have been drawn down more or less at the time of the measurements. Therefore, the change in groundwater levels between monitoring events is not necessarily representative of a genuine change of the groundwater levels within the aquifer, but a dynamic change affected both by the pumping rate and genuine changes in the aquifer.

[1] As recorded at Bureau of Meteorology Beaufort station.

4.1.1 Comparison with groundwater elevation triggers

Comparison of groundwater depths with trigger levels for wells within 500 m of the quarry indicate that groundwater levels in the wells were below the trigger levels established for each well in the GMMP. This comparison is summarised in Table 4.

Table 4: Groundwater elevation trigger levels (February 2020)

Well ID	Depth to groundwater at Trigger Level (365 m AHD) (m BTOC)	Depth to groundwater February 2020 (m BTOC)	Depth to groundwater below trigger level?
BH02	17.36	24.69	Yes
BH03	19.97	23.00	Yes
WM01	3.94	13.37	Yes
WM07	25.70	29.98	Yes

Chart 3 provides a visual representation of the comparison of the RL within each of these wells over time against the RL for the trigger level (365 m AHD).

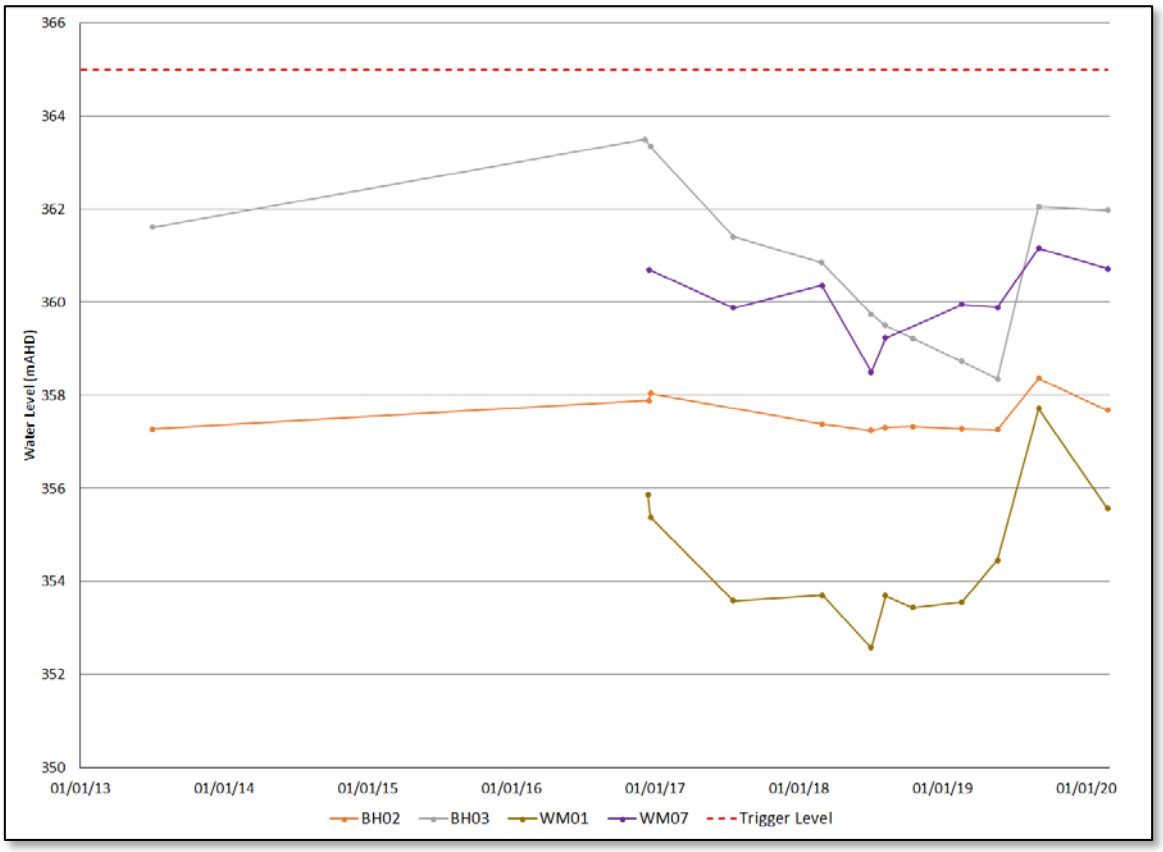

Chart 3: Relative water levels over time compared to trigger level

4.2 Groundwater quality

4.2.1 Assessment of data quality

A total of seven primary samples (combined total of groundwater and spring water samples) were analysed by the primary laboratory. A primary and secondary duplicate were collected, giving one duplicate pair for seven primary samples, above the GMMP required rate of one in twenty samples. Duplicate results are in Table D (attached): duplicates with high relative percentage difference (RPD) are listed and discussed below.

A rinsate blank was collected in the February 2020 round of sampling, complying with the GMMP required rate of one per round. Blank results are in Table E (attached). A field blank was not reported for the February 2020 monitoring round.

Calibration sheets were provided for interface probe and water quality meter (see APPENDIX B). The calibration sheet for the water quality meter is dated 14 November 2019, with no evidence that the calibration was checked closer to the fieldwork date (27 February 2020). It is recommended to calibrate water quality meters daily during use. The interface probe was noted to have been checked on 19 February 2020, sufficiently close to the date of fieldwork.

Chain of custody forms (CoCs) were provided for each report (see APPENDIX C).

Results of the overall compliance with Data Quality Objectives (DQOs) are provided in Table 5 and discussed below.

Table 5: QAQC summary

GMMP minimum requirement/DQO	No. of results (individual analytes) not meeting DQOs	Total number of results (individual analytes)	% Compliant
Primary duplicate RPD[1]s >50%	1	43	98%
Secondary duplicate RPDs >50%	3	40	93%
Field blanks above LOR	-	-	Not reported
Rinsate blanks above LOR[2]	1	38	97%
Internal laboratory duplicates RPDs >30%	0	34	100%
Internal laboratory spikes	0	25	100%
Internal laboratory method blanks	0	34	100%
Overall completeness	**5**	**214**	**98%**

Notes:

[1] RPD = relative percentage difference.

[2] LOR = limit of reporting

Overall, the quality assurance exceeds the adopted 95% completeness target. Further discussion of the results not meeting the DQO is provided under the headings below. Overall, the data is considered representative.

Ion balance errors

The ionic balance errors (IBEs) for the major anions and cations in the groundwater and spring water samples are listed in Table 6 below. IBEs were outside the acceptable range of +/-10% for all primary samples and the duplicate sample. All IBE were negative by between 19.5% and 39.6%, indicating an excess of anions over cations. The laboratory (Eurofins) was queried, but could not identify any errors. The IBE for the triplicate sample, analysed at a separate laboratory (ALS) was within the acceptable range. It is noted that a chloride (anion) concentration of 49 mg/L was reported for the field rinsate blank, with no other ions above LOR, which would not normally be expected. This may suggest a consistent laboratory bias in over-reporting chloride concentration. Laboratory blank samples did not report chloride above the LOR, so this is not conclusive. Calculated TDS (as sum of ions) was significantly higher than the laboratory reported TDS analysis result, for all Eurofins samples (36% to 121%). This also indicates that one or more of the major ions is likely to have been over-reported. The major ion concentrations, particularly chloride, and water type for these samples may therefore be less accurate. However, water types were generally similar to the previous (September 2019) round, with increased dominance of chloride in some samples (BH02, BH06) and reduced dominance of magnesium in one sample (BH03).

Table 6: Groundwater IBE and water type (February 2020)

Well/Spring ID	Date Sampled	IBE (%)	Water Type
BH02	27/02/2020	**-27.5**	Na-Mg/Cl-HCO_3
BH03	27/02/2020	**-39.6**	Na/Cl-HCO_3
BH04	27/02/2020	**-21.1**	Na-Mg/HCO_3-NO_3-Cl
QC1 (BH04 duplicate)	27/02/2020	**-27.4**	Na-Mg/HCO_3-Cl-NO_3
QC2 (BH04 triplicate)	27/02/2020	-0.6	Na-Mg/HCO_3-NO_3-Cl
BH05	27/02/2020	**-21.9**	Na/HCO_3-Cl
BH06	27/02/2020	**-23.2**	Na-Mg/Cl-HCO_3-NO_3
Bain's Spring	27/02/2020	**-19.5**	Na-Mg/HCO_3-NO_3-Cl
Meallack Spring	27/02/2020	**-22.9**	Na-Mg/HCO_3-Cl-NO_3

Duplicate repeatability

As shown in Table D, one primary laboratory duplicate result, E.coli, reported an RPD above 50% and three secondary laboratory triplicate results, TDS, TKN and organic nitrogen, reported RPDs above 50%.

In the primary duplicate sample, the E.coli RPD exceedance was relatively minor at 55%, and concentrations were both within 10 times the LOR. The secondary duplicate sample was not analysed for microbiological parameters.

In the secondary duplicate sample, the TDS RPD exceedance at 53% is also a minor exceedance. As TDS laboratory results were within the ranges previously reported at each well or spring and all results were below the trigger value, this exceedance does not affect the outcome of the assessment.

TKN is equivalent to organic nitrogen plus ammonia results and therefore results from the organic nitrogen result having an elevated RPD. The secondary laboratory reported a concentration of organic nitrogen of 1.1 mg/L and the primary laboratory reported a concentration of less than the LOR of 0.2 mg/L. Therefore, the primary laboratory potentially under-reports the organic nitrogen concentration. As total nitrogen, which

includes the organic nitrogen result, is below the groundwater trigger values this exceedance would not affect the outcome of the assessment.

Blanks

The rinsate blank, QC3, reported a concentration of chloride (49 mg/L) above the LOR. As discussed under ion balance errors, chloride may have been over-reported generally due to a laboratory issue, rather than this indicating cross-contamination in the field.

Internal laboratory QAQC

The primary laboratory, Eurofins, reported no internal QAQC parameter outliers.

The secondary laboratory, ALS, reported two outliers. No laboratory duplicate or matrix spike was conducted for TRH semi volatile fractions and therefore this did not meet the quality control frequency specification of 1 in 20 samples. As there were no results reported above the LOR for TRH fractions, which was also reported by the primary laboratory, the lack of laboratory duplicate or matrix spike in this case is considered a minor non-conformance.

4.2.2 Water quality results

Table C (attached) summarises the results of groundwater and spring water sample analysis for the February 2020 monitoring.

BH94 was again not sampled in February 2020, as with the previous two sampling events.

TDS, pH and major ions

The concentrations of TDS, pH and major ions in all samples for February 2020 were below or within (for pH) the trigger levels for pH, TDS, sodium, calcium, magnesium and sulphate for both groundwater and surface water. The chloride concentration at BH03 (680 mg/L) was above the trigger level (600 mg/L). However, as discussed in Section 4.2.1, under Ion Balance Errors, the chloride results may be over-reported. Chloride concentrations in previous monitoring at BH03 ranged from 210 mg/L to 270 mg/L. The GMMP states that exceedance of groundwater quality trigger levels at up-gradient wells (including BH03) does not require any further response or action, so long as the groundwater flow system is maintained. Therefore, although the accuracy of the chloride result is uncertain, no further action is recommended in response to the trigger level exceedance at BH03, other than ongoing monitoring in accordance with the GMMP.

TDS concentrations in groundwater samples in February 2020 ranged from 310 mg/L (BH04) to 1,300 mg/L (BH02) and therefore were all below the trigger level for groundwater quality (1,700 mg/L). The TDS concentration for spring water samples in February 2020 was 330 mg/L at Bain's Spring and 400 mg/L at Meallack Spring, below the spring water trigger level (600 mg/L).

The pH results indicate that the groundwater and spring water were neutral to slightly alkaline, with values in February 2020 ranging from 7.4 to 8.3 pH units (laboratory results). These results are within the trigger level range of 4.9-8.5 pH units. Field pH readings (APPENDIX B) were generally recorded at similar levels to the laboratory results and in groundwater ranged from 7.68 to 7.93 pH units and in spring water 7.92 pH units (Meallack Spring) and 8.16 pH units (Bain's Spring). Given the laboratory recommended holding time of 6 hours for pH is exceeded, pH readings in the field are considered to be more representative of site conditions.

Groundwater is indicated generally to have Na and Mg as dominant cations, and HCO_3, with either or both of Cl and NO_3 as co-dominant anions (see Table 6 above). A Piper diagram for the major ion data is shown in Chart 4, with minor change noted from previous monitoring (previous data from September 2019 shown in inset top left). The sample from BH03 is indicated to have a higher proportion of chloride than previously, but there is uncertainty on the accuracy of the chloride results.

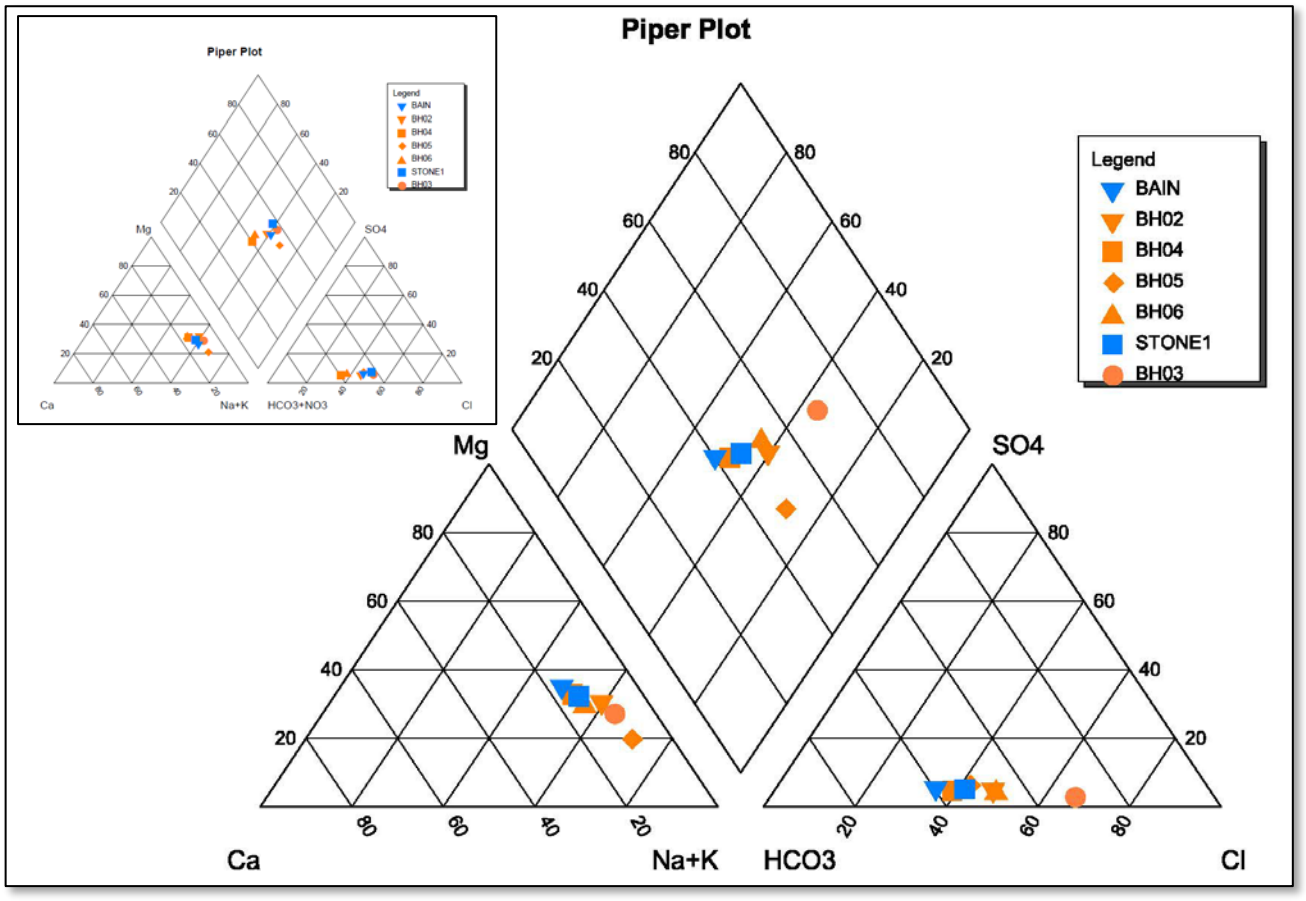

Chart 4: Piper diagram - groundwater and surface water February 2020 (September 2019 shown in inset)

Nutrients

The concentrations for nutrients in all samples for February 2020 were below the trigger levels for nitrate (as N), nitrite (as N), ammonia (as N) and total nitrogen for both groundwater and surface water. Nitrite concentrations at BH03 and Meallack Spring and the ammonia concentration at Meallack Spring could not be assessed against the trigger values as the LOR had been raised above the trigger value due to matrix interference.

Nitrate (as N) concentrations in groundwater in February 2020 ranged from 0.15 mg/L (BH02) to 38 mg/L (BH06) and were 27 mg/L and 32 mg/L in the spring water samples. All results were below the trigger level of 50 mg/L. The nitrate concentrations in groundwater were generally similar to previous results. Concentrations in spring water were slightly higher than previously reported, with the result from Bain Spring (32 mg/L as N) and Meallack Spring (27 mg/L as N) above the previous highest values (28 mg/L and 25 mg/L as N respectively). Spring water nitrate concentrations (up to 32 mg/L as N) remained within the range reported for groundwater samples (up to 38 mg/L as N). The sample analytical results indicated that nitrate was widespread in the groundwater system prior to any quarry operations, including at the springs, and has not significantly changed during quarry operations to date. Nitrate is known to occur in this aquifer system (Lawrence, 1983) and may be a result of agricultural activities, such as livestock keeping and the application of nitrogen fertilisers.

Ammonia (as N) concentrations in February 2020 ranged from below the LOR of 0.01 mg/L (BH04, BH05, BH06 and Bain Spring) to 0.56 mg/L (BH03), all below the trigger levels. The LOR was elevated for the sample from Meallack Spring (1 mg/L), so trigger level compliance could not be confirmed for that sample.

Most wells were consistent with the ranges seen in previous sampling results except BH03 where the result (0.56 mg/L as N) was higher than previously reported.

BOD was above the LOR (5 mg/L) only at BH02 (13 mg/L) in February 2020. This concentration is equal to the result from September 2020. No trigger level has been established for BOD.

Microbiological

The results for *E. Coli* for February 2020 for BH06 were below the LOR of 1 cfu/100 mL and the results for BH02 and BH03 were reported equal to the LOR and therefore did not exceed the trigger level (1 cfu/100 mL). The results for BH04 and BH05 were reported above the trigger value at 7 cfu/100 mL and 110 cfu/100 mL respectively. The spring water results were also above the trigger value, at 1,000 cfu/100mL at Bain's Spring and 3 cfu/100 mL at Meallack Spring. *E. Coli* had not previously been reported above LOR for samples from BH04. The results from BH04, BH05 and Bain's Spring were higher than previously recorded at those locations. Results from Meallack Spring were higher than in the previous sampling round (1 cfu/100mL), but lower than the result from March 2018 (2,100 cfu/100mL).

The results for *Enterococci* in February 2020 were reported above the LOR and trigger level of 1 cfu/100 mL at Bain's Spring, and in all wells except BH06. Exceedances of the trigger levels in groundwater ranged from 2 cfu/100 mL (BH05) to 77 cfu/100 mL (BH02) and the Bain's Spring sample reported a result of 210 cfu/100 mL. The result for BH04 (9 cfu/100 mL), as for *E. Coli*, was the highest seen at this well, however, other results were within the range of previous results.

E. Coli and *Enterococci* are indicators of faecal contamination from warm-blooded animals including humans and animals bred in agriculture. The areas around the springs and wells are open to grazing animals which are likely to be the source of the *E. Coli* and *Enterococci* as the proposed septic tank for the quarry was not installed. The presence of *E. coli* and/or *Enterococci* in multiple groundwater wells and both Springs sampled suggest concentrations unrelated to the quarry operation. The trigger levels for these parameters were set to Australian Drinking Water Guidelines (ADWG) (NHMRC, 2016) in the absence of information on baseline concentrations. As these bacteria appear to be widespread in groundwater and spring water, it is recommended that no trigger levels be applied for these analytes as indicators of quarry impacts. As per the ADWG (NHMRC, 2016) water containing detectable numbers of *E. coli* and *Enterococci* should not be used for drinking water without appropriate treatment.

Metals

All results for groundwater and surface water for February 2020 for dissolved iron were reported below the LOR of 0.05 mg/L and therefore were below the trigger level of 0.2 mg/L.

Results for manganese in groundwater and surface water in February 2020 were below the trigger value of 0.3 mg/L except for the results for BH02 (0.43 mg/L). The concentration at BH02 was lower than the concentration of 1.3 mg/L reported in February 2019 but remains above the trigger value. The GMMP states that exceedance of groundwater quality trigger levels at up-gradient wells (including BH02) does not require any further response or action, so long as the groundwater flow system is maintained. Therefore, no further action is recommended in response to the manganese exceedance at BH02, other than ongoing monitoring in accordance with the GMMP.

Hydrocarbons

Hydrocarbon compounds (BTEXN, TRH) were reported below the LORs for all samples.

Hydrocarbons had only previously been reported at BH94 (TRH fractions in 2017 and 2018) which was not sampled in February 2020.

4.2.3 Comparison with water quality triggers

Comparison of available groundwater and spring water analytical results with the adopted water quality trigger levels is presented in Table C (attached), with exceedances summarised in Table 7.

Table 7: Water quality trigger level exceedances summary for February 2020

Parameter	Units	Trigger Level – Wells	Trigger Level Exceeded?[1]	Trigger Level – Springs	Trigger Level Exceeded?
TDS	mg/L	1,700	No	600	No
pH (Field)	pH units	4.9-8.5	No	6.3-8.5	No
Sodium	mg/L	400	No	150	No
Calcium	mg/L	1,000	No	1,000	No
Magnesium	mg/L	2,000	No	2,000	No
Chloride	mg/L	600	Yes (BH03)	150	No
Sulphate (as SO_4)	mg/L	250	No	250	No
Nitrate (as N)	mg/L	50	No	50	No
Nitrite (as N)	mg/L	0.9	No[2]	0.9	No[2]
Ammonia (as N)	mg/L	0.74	No	0.74	No[3]
Total nitrogen	mg/L	50	No	50	No
Iron	mg/L	0.2	No	0.2	No
Manganese	mg/L	0.3	Yes (BH02)	0.1	No
TRH C_6-C_9	mg/L	0.6	No	0.6	No
TRH C_{10}-C_{36}	mg/L	0.6	No	0.6	No
Benzene	mg/L	0.001	No	0.001	No
Toluene	mg/L	0.025	No	0.025	No
Ethylbenzene	mg/L	0.003	No	0.003	No
Xylene (total)	mg/L	0.02	No	0.02	No
Naphthalene	mg/L	0.016	No	0.016	No
E. coli	orgs/100mL	1	Yes (BH04, BH05)[2]	1	Yes (Bain's Spring, Meallack Spring)
Enterococci	orgs/100mL	1	Yes (BH02, BH03, BH04, BH05)	1	Yes (Bain's Spring)
Hydrocarbon sheen / NAPL	Presence	Not Present	No	Not present	No

NOTES: [1] BH94 was not sampled and could not be compared to trigger levels
[2] BH03 and Meallack Spring had raised LOR of 1 mg/L and could not be assessed against the trigger level of 0.9 mg/L
[3] Meallack Spring had raised LOR of 1 mg/L and could not be assessed against the trigger level of 0.74 mg/L

In summary:

- All locations recommended for sampling in the GMMP were sampled except for BH94.
- Poor ion balance errors indicate uncertainty in the accuracy of the major ion results, particularly for chloride.
- Groundwater and spring water samples collected in February 2020 did not exceed the water quality trigger levels of the GMMP, except for chloride (at BH03), manganese (at BH02, but lower than the September 2019 result), *E. coli* (at BH04, BH05, Bain's Spring and Meallack Spring) and *Enterococci* (at BH02, BH03, BH04, BH05 and Bain's Spring).
- Chloride concentration at BH03 (680 mg/L) was higher than previously reported (up to 270 mg/L) and exceeded the trigger level (600 mg/L). However, there is some uncertainty in the accuracy of the chloride results due to laboratory issues.
- The nitrate concentrations in groundwater were generally similar to previous sampling results from September 2019, and remained below the trigger level. Nitrate concentrations in spring water (Bain's Spring and Meallack Spring) were slightly higher than previously reported, but remained within the range reported for groundwater samples. The sample analytical results indicated that nitrate was widespread in the groundwater system prior to any quarry operations, including at the springs, and has not significantly changed during quarry operations to date.
- Ammonia concentrations in most wells were consistent with the ranges seen in previous sampling results except BH03 which recorded its highest result 0.56 mg/L as N. Results remained below the trigger level of 0.74 mg/L as N.
- The presence of *E. coli* and/or *Enterococci* in multiple groundwater wells and both Springs sampled suggest concentrations unrelated to the quarry operation. Therefore, it is recommended that no trigger levels be applied for these analytes as indicators of quarry impacts.
- As BH02 and BH03 are up or across hydraulic gradient from the quarry, no further action is recommended in response to the manganese trigger level exceedance at BH02 or chloride exceedance at BH03, other than ongoing monitoring in accordance with the GMMP.

5.0 CONCLUSIONS

The subcontractor to SNCL-WBHO has undertaken the February 2020 groundwater and spring water sampling generally to the requirements outlined in the GMMP. One well listed in the GMMP (BH94) was not sampled. The available groundwater results delivered the scope required to meet the objectives stated in Section 1.2 with:

- Water levels measured at all wells specified in the GMMP, for comparison with groundwater elevation trigger levels to assess the potential for groundwater to intersect the quarry excavation,
- Although BH94 was not sampled, other wells were present and sampled in the down-gradient direction monitored by BH94. Therefore, impacts on groundwater quality attributable to the quarry can be assessed by the sampled wells,
- Samples may have been collected prior to stabilisation of field parameters during purging, but this may have been limited by slow groundwater recharge rates at some of the wells.

Surface water sampling was restricted to two springs: Bain's spring, approximately 5 km to the south-east of the quarry; and Meallack Spring, approximately 6 km to the west of the quarry. Therefore, limited information is available to monitor the water quality at closer springs. Land-holder access was not granted to sample these closer springs.

The monitoring results indicated that:

- The overall direction of groundwater flow was inferred to be in a westerly direction, consistent with previous assessments.
- Groundwater levels were generally lower than the previous sampling round in September 2019 and remain at least 3 m below the groundwater elevation trigger level, where applicable.
- Overall, the quality assurance data exceeds the adopted 95% completeness target. However, ion balance errors were outside of the acceptable range for all samples from the primary laboratory. As a result, the quality of the data generated from this assessment is considered to provide sufficient basis for conclusions related to the groundwater monitoring at the site, with some uncertainty in the major ion results, particularly chloride.
- Groundwater and surface water samples collected in February 2020 exceeded the water quality trigger levels of the GMMP for chloride (BH03), manganese (BH02), *E. coli* (BH04, BH05, Bain's Spring and Meallack Spring), *Enterococci* (BH02, BH03, BH04, BH05 and Bain's Spring).
    - Limits of reporting were raised above the trigger levels for BH03 for nitrite; and Meallack Spring for nitrite and ammonia, so trigger level compliance could not be assessed for these analyses.
    - The detection of bacteria (*E. coli* and/or *Enterococci*), indicators of faecal contamination, in four of the five groundwater wells sampled and at both springs sampled indicates that the source is likely unrelated to the quarry operation, as a septic tank was not installed the quarry.
    - The concentrations of chloride at BH03 and manganese at BH02 likely represent conditions unrelated to development of the quarry, as these sampling locations are up or across hydraulic gradient from the quarry.

6.0 RECOMMENDATIONS

The following recommendations are provided for future sampling:

- It is recommended to calibrate water quality meters daily during use.
- The GMMP defines stabilisation as when three consecutive field parameter readings are within the specified ranges (within ±10% for DO, ±3% for EC, ±0.05 for pH and ±10mV for Eh). Purging should continue prior to sampling to allow this criterion to be met, as far as practical. Water level measurements should be made during sampling to demonstrate stabilisation of the water level prior to sampling. When water levels do not stabilise, the purging rate should be decreased. If water levels still do not stabilise, a sample should be collected during purging before the well is purged dry.
- Purging of monitoring wells should be undertaken at a similar rate to sampling, particularly for wells known to recharge slowly. If a sample cannot be collected immediately following purging, it is recommended to return for sampling at a later time.
- Samples at BH94 have not been obtained from the last three sampling rounds. If the previous recommendation cannot be complied with, it is recommended that a sample be collected prior to purging from a depth within the screen interval.

In response to trigger level exceedances, the following recommendations are provided:

- It is recommended that no trigger levels be applied for microbiological parameters as indicators of quarry impacts, as they appear to be widespread in groundwater and spring water unrelated to quarry operations.
- As BH02 and BH03 are not considered to be down-gradient from the quarry. In accordance with the GMMP, no further action is required in response to the trigger level exceedances for chloride or manganese other than continued monitoring.

7.0 IMPORTANT INFORMATION

This report is based on fieldwork conducted by SNCL-WBHO or their subcontractor, with field and laboratory results supplied to Golder for reporting. Golder relies on the information as supplied but cannot verify field procedures.

Your attention is drawn to the document titled - “Important Information Relating to this Report”, which is included in Appendix D of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

8.0 REFERENCES

Golder, 2018a. *Groundwater Monitoring and Management Plan, Stockyard Hill Wind Farm Quarry*. Ref. 18106354-005-R-Rev0, dated 22 October 2018.

Golder, 2019a. *August and October 2018 Groundwater and Springwater Monitoring Events Stockyard Hill Wind Farm Quarry*. Report Ref.: 1783485-018-R-Rev0, dated 13 June 2019.

Golder, 2019b. *February and May 2019 Groundwater and Springwater Monitoring Events*, *Stockyard Hill Wind Farm Quarry*. Report Ref.: 1783485-019-R-Rev0, dated 7 August 2019.

Golder, 2019c, *September 2019 Groundwater and Springwater Monitoring Events Stockyard Hill Wind Farm Quarry*. Report ref: 1783485-20-R-Rev0, dated 4 December 2019.

Lawrence, C.R., 1983. *Nitrate-rich groundwaters of Australia*. Australian Water Resources Council, Technical Paper No. 79. Australian Government Publishing Service, Canberra.

NHMRC, 2016. *National Water Quality Management Strategy, Australian Drinking Water Guidelines, 6, 2011*. Version 3.3, Updated November 2016.

State Government of Victoria, December 1997. *State Environment Protection Policy (Groundwaters of Victoria)*, Victoria Government Gazette No S160.

State Government of Victoria, October 2018. *State Environment Protection Policy (Waters)*, Victoria Government Gazette No S499.

Signature Page

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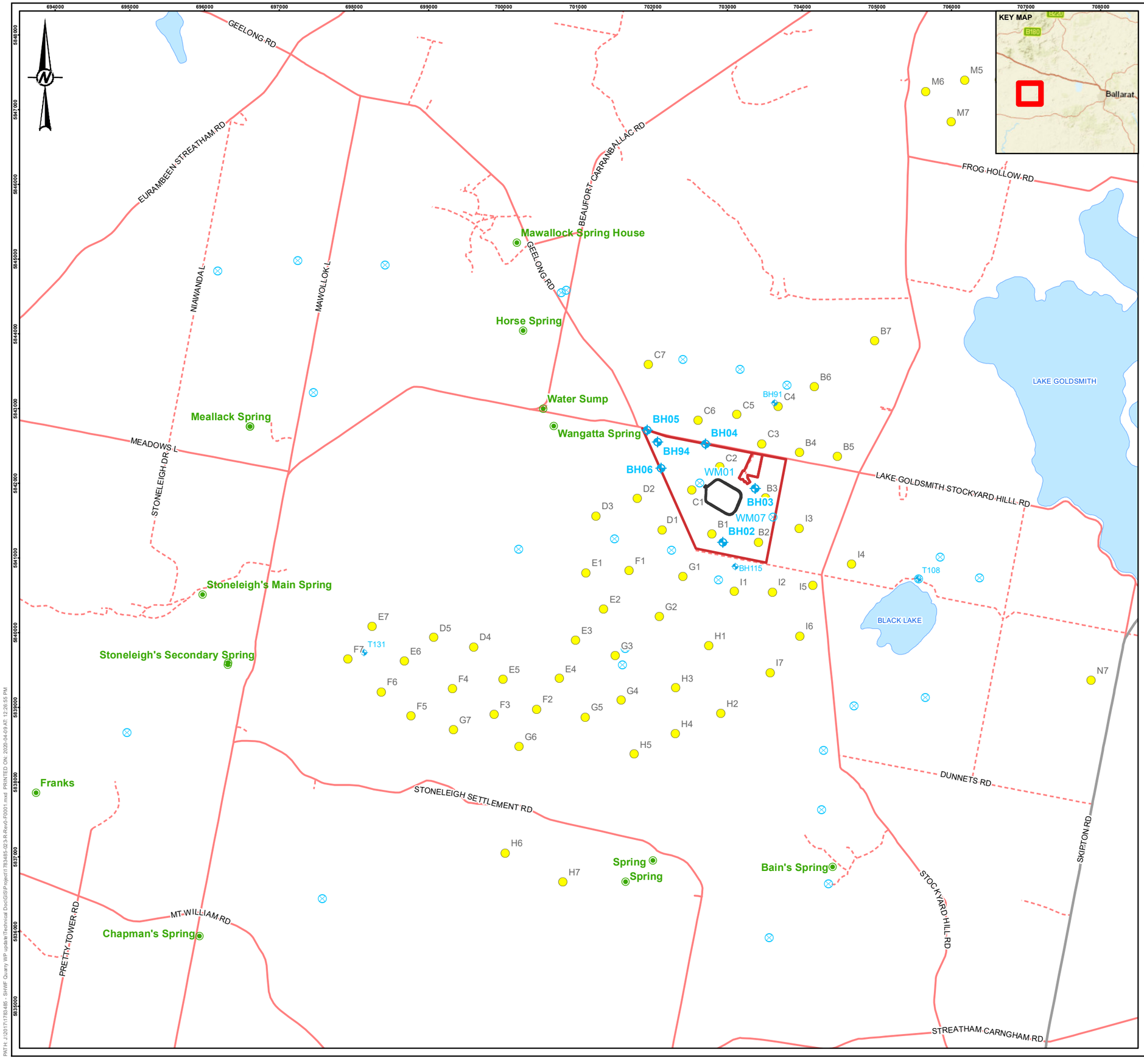
Figures



LEGEND

Monitoring Well
- Monitoring Well (off-site)
- Monitoring Well (on-site)

Groundwater location (Type)
- Bore/windmill
- Spring
- 2017 Proposed Wind Turbine Generator
- Proposed quarry outline
- Site boundary
- Waterbody

Road Classification
- Highway
- Connector
- Road
- Unsealed Road

0 1,000 2,000

1:50,000 METRES

NOTE(S)
1. ALL DATA BUT ROADS, RAILWAYS, GMS, WATER COURSES AND WATER AREAS SOURCED FROM CLIENT, RECEIVED 11/09/2012
2. ROADS, RAILWAYS AND WATER AREAS SOURCED FROM STREETPRO (2004).
3. WATERCOURSE DATA SOURCED FROM THE DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT (2013).
4. LOCATION OF SPRINGS TAKEN FROM HYDROTERRA (2017) AND URS (2010).
5. PROJECTION: GDA 1994 MGA ZONE 54

REFERENCE(S)
1. STREETPRO (C) 2004 MAPINFO AUSTRALIA PTY LTD

CLIENT
STOCKYARD HILL WIND FARM PTY LTD

PROJECT
GROUNDWATER AND SURFACE WATER MONITORING

TITLE
GROUNDWATER INVESTIGATION LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2020-04-09
DESIGNED	PM/SLM
PREPARED	MAH
REVIEWED	BED
APPROVED	BED

PROJECT NO.	CONTROL	REV.	FIGURE
1783485	023-R	0	1

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701000
702000
703000
704000
5843000
5842000
5841000

BEAUFORT CARRANBALLAC RD
GEELONG RD
STOCKYARD HILL WANGATTA RD

Water Sump (~335)
Wangatta Spring (~338)

BH05 346.60
BH94 348.16
BH04 356.22
BH06 349.30
BH01
WM01 355.57
BH03 361.97
BH02 357.68
BH91
BH115
WM07 360.72

350
355
360

C7
C6
C5
C4
C3
C2
C1
B4
B3
B2
B1
D3
D2
D1
E1
F1
G1
I3
I2
I1

KEY MAP
B220
B180
Ballarat

LEGEND

360.90 Groundwater level (m AHD) - February 2020
Monitoring well
Monitoring well (no recent water level available)
Inferred groundwater elevation contours (m AHD)
Windmill bore
Spring with approximate elevation (m AHD)
Proposed Wind Turbine Generator
Proposed quarry outline
Site boundary
Waterbody

Road Classification

Highway
Connector
Road
Unsealed Road

0 250 500
1:12,500 METRES

NOTE(S)
1. ALL DATA BUT ROADS, RAILWAYS, GMS, WATER COURSES AND WATER AREAS SOURCED FROM CLIENT, RECEIVED 11/09/2012.
2. ROADS, RAILWAYS AND WATER AREAS SOURCED FROM STREETPRO (2004).
3. WATERCOURSE DATA SOURCED FROM THE DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT (2013).
4. LOCATION OF SPRINGS TAKEN FROM HYDROTERRA (2017) AND URS (2010).
5. AERIAL PHOTOGRAPH SOURCED FROM ESRI: SOURCE FROM ESRI BASEMAP.
6. WATER LEVELS FROM WINDMILLS (WM PREFIX) MAY BE AFFECTED BY DRAWDOWN DUE TO PUMPING.
7. PROJECTION: GDA 1994 MGA ZONE 54

REFERENCE(S)
1. STREETPRO (C) 2004 MAPINFO AUSTRALIA PTY LTD

CLIENT
STOCKYARD HILL WIND FARM PTY LTD

PROJECT
GROUNDWATER AND SURFACE WATER MONITORING

TITLE
GROUNDWATER ELEVATION - FEBRUARY 2020

CONSULTANT
GOLDER

YYYY-MM-DD	2020-05-25
DESIGNED	CJS
PREPARED	MAH
REVIEWED	BED
APPROVED	BED

PROJECT NO.	CONTROL	REV.	FIGURE
1783485	023-R	0	2

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Tables

Location Code	Date	TOC elevation (m AHD)	Depth to Water (mbTOC)	Water level (m AHD)	Measured Well Depth (mbTOC)	Comments
BH02	4/07/2013	382.361	25.087	357.27	35.41	
BH02	16/12/2016	382.361	24.475	357.89	35.20	
BH02	21/12/2016	382.361	24.320	358.04		
BH02	1/03/2018	382.361	24.980	357.38	35.80	
BH02	4/07/2018	382.361	25.117	357.24	34.85	
BH02	9/08/2018	382.361	25.050	357.31	35.10	
BH02	18/10/2018	382.361	25.030	357.33	35.22	
BH02	19/02/2019	382.361	25.080	357.28	35.38	
BH02	21/05/2019	382.361	25.095	357.27	35.16	
BH02	3/09/2019	382.361	24.000	358.36	35.31	
BH02	25/02/2020	382.361	24.686	357.68	33.66	
BH03	4/07/2013	384.972	23.360	361.61	36.26	
BH03	7/12/2016	384.972	21.480	363.49	35.70	
BH03	21/12/2016	384.972	21.635	363.34		
BH03	19/07/2017	384.972	23.571	361.40		
BH03	28/02/2018	384.972	24.120	360.85	35.80	
BH03	4/07/2018	384.972	25.232	359.74	36.75	
BH03	9/08/2018	384.972	25.470	359.50	35.71	
BH03	18/10/2018	384.972	25.750	359.22	35.88	
BH03	19/02/2019	384.972	26.250	358.72	35.75	
BH03	21/05/2019	384.972	26.618	358.35	33.6	
BH03	3/09/2019	384.972	22.924	362.05	36.39	
BH03	25/02/2020	384.972	23.005	361.97	36	
BH04	16/12/2016	368.136	11.666	356.47		
BH04	21/12/2016	368.136	11.728	356.41		
BH04	20/07/2017	368.136	12.252	355.88		
BH04	28/02/2018	368.136	12.720	355.42	18.90	
BH04	4/07/2018	368.136	13.380	354.76	18.90	
BH04	9/08/2018	368.136	13.520	354.62	18.88	
BH04	18/10/2018	368.136	13.710	354.43	19.00	
BH04	19/02/2019	368.136	14.150	353.99	18.87	
BH04	21/05/2019	368.136	14.386	353.75	19.05	
BH04	3/09/2019	368.136	11.596	356.54	18.988	
BH04	25/02/2020	368.136	11.919	356.22	18.88	
BH05	16/12/2016	361.478	15.419	346.06		
BH05	21/12/2016	361.478	15.378	346.10		
BH05	20/07/2017	361.478	15.234	346.24		
BH05	1/03/2018	361.478	15.670	345.81	20.31	
BH05	4/07/2018	361.478	14.463	347.02	20.56	
BH05	9/08/2018	361.478	15.550	345.93	20.55	
BH05	18/10/2018	361.478	15.580	345.90	20.71	
BH05	19/02/2019	361.478	15.780	345.70	20.65	
BH05	21/05/2019	361.478	16.025	345.45	20.5	
BH05	3/09/2019	361.478	15.254	346.22	20.55	
BH05	25/02/2020	361.478	14.883	346.60	20.59	
BH06	16/12/2016	363.774	14.004	349.77		
BH06	21/12/2016	363.774	14.102	349.67		
BH06	19/07/2017	363.774	15.077	348.70		
BH06	2/03/2018	363.774	15.130	348.64	22.80	
BH06	4/07/2018	363.774	15.374	348.40	23.12	
BH06	9/08/2018	363.774	15.400	348.37	23.23	
BH06	18/10/2018	363.774	15.470	348.30	23.40	
BH06	19/02/2019	363.774	15.720	348.05	23.27	
BH06	21/05/2019	363.774	15.755	348.02	23.1	
BH06	3/09/2019	363.774	13.220	350.55	23.31	
BH06	25/02/2020	363.774	14.475	349.30	23.27	
BH94	8/10/2012	361.250	13.080	348.17		
BH94	7/12/2016	361.250	12.580	348.67	15.10	Well casing broken, no cap
BH94	21/12/2016	362.155	13.530	348.63		Well casing and cap replaced
BH94	20/07/2017	362.155	13.750	348.41		Well casing broken and again replaced
BH94	1/03/2018	362.155	13.980	348.18	14.80	
BH94	4/07/2018	362.155	15.246	346.91	16.01	
BH94	9/08/2018	362.221	15.060	347.16	16.02	Well casing repaired and resurveyed
BH94	18/10/2018	362.221	15.190	347.03	16.05	
BH94	19/02/2019	362.221	15.520	346.70	16.20	
BH94	21/05/2019	362.221	15.292	346.93	16.00	
BH94	3/09/2019	362.221	12.920	349.30	16.03	
BH94	25/02/2020	362.221	14.057	348.16	16.03	

Location Code	Date	TOC elevation (m AHD)	Depth to Water (mbTOC)	Water level (m AHD)	Measured Well Depth (mbTOC)	Comments
WM01	14/12/2016	368.937	13.080	355.86		Windmill not spinning
WM01	21/12/2016	368.937	13.555	355.38		Windmill spinning slowly
WM01	19/07/2017	368.937	15.350	353.59		Windy
WM01	2/03/2018	368.937	15.230	353.71		Light wind
WM01	4/07/2018	368.937	16.360	352.58		
WM01	9/08/2018	368.937	15.240	353.70		Light-moderate wind
WM01	18/10/2018	368.937	15.490	353.45		Moderate-gusty wind
WM01	19/02/2019	368.937	15.380	353.56		
WM01	21/05/2019	368.937	14.475	354.46		Windmill not spinning
WM01	3/09/2019	368.937	11.223	357.71		Mild wind
WM01	25/02/2020	368.937	13.367	355.57		Moderate breeze
WM07	16/12/2016	390.699	30.005	360.69	56.50	Windmill spinning slowly
WM07	19/07/2017	390.699	30.820	359.88		Windy
WM07	1/03/2018	390.699	30.340	360.36		Windy
WM07	4/07/2018	390.699	32.200	358.50		
WM07	9/08/2018	390.699	31.470	359.23		Light-moderate wind
WM07	18/10/2018	390.699	5.620	385.08		Result considered to be unreliable
WM07	19/02/2019	390.699	30.750	359.95		
WM07	21/05/2019	390.699	30.812	359.89		Windmill not spinning
WM07	3/09/2019	390.699	29.541	361.16		Mild wind
WM07	25/02/2020	390.699	29.979	360.72		Moderate breeze

mbTOC - metres below top of casing
m AHD - metres above Australian Height Datum
Water Levels from windmills (WM prefix) may be affected by drawdown due to pumping

			Dissolved Oxygen	Electrolytic Conductivity	pH	Redox Potential	Temperature	Description
			mg/L	uS/cm	pH_Units	mV	°C	
Type	**Location**	**Date**						
GMMP- Groundwater Quality Trigger Levels					4.9-8.5			
Bore	BH01	2013-07-10	7.6	660	7.6	149	14.0	Pale brown, low turbidity, no odour
Bore	BH02	2013-07-04	4.3	1450	7.7	121	11.0	Clear, low turbidity, no odour
Bore	BH02	2018-03-01	0.19	2171	6.49	58	17.4	Clear, low turbidity, no odour
Bore	BH02	2019-02-21	5.56	2302	6.89	-22	16.6	Clear, colourless
Bore	BH02	2019-09-05	12.13	2390	7.24	-116	11.6	-
Bore	BH02	2020-02-27	8.58	1801	7.82	164	13.5	Slightly cloudy, light brown
Bore	BH03	2013-07-04	7.5	1110	7.8	110	11.0	Pale brown, low turbidity, no odour
Bore	BH03	2017-07-19	6.07	972	5.36	217	14.6	Pale brown, low turbidity, no odour
Bore	BH03	2018-02-28	2.07	1539	7.41	179	17.4	Clear, low turbidity, no odour
Bore	BH03	2018-08-10	10.02	1096	7.85	102	16.2	Pale brown/clear, low turbidity
Bore	BH03	2019-09-05	10.19	1120	8.14	-198	13.8	Slightly cloudy, light brown
Bore	BH03	2020-02-27	9.33	1281	7.93	159	15.7	Slightly cloudy, light brown
Bore	BH04	2017-07-20	4.74	467	7.06	108	14.1	Clear, low turbidity, no odour
Bore	BH04	2018-02-28	3.94	754	7.2	163	17.5	Clear, low turbidity, no odour
Bore	BH04	2018-08-10	8.85	493	7.26	113	15.7	Clear
Bore	BH04	2019-02-21	6.88	618	7.21	96	17.3	Clear, colourless
Bore	BH04	2019-09-05	9.8	720	7.41	36	16.1	Clear, colourless
Bore	BH04	2020-02-27	6.93	571	7.8	1424	15.9	Clear, coloured
Bore	BH05	2017-07-20	5.74	727	6.14	203	11.7	Clear, low turbidity, no odour
Bore	BH05	2018-03-01	4.92	747	6.58	149	16.2	Clear, low turbidity, no odour
Bore	BH05	2018-08-10	5.51	870	7.54	95	16.3	Cloudy, pale brown
Bore	BH05	2019-02-21	8.53	1114	7.42	107	15.6	Clear, colourless
Bore	BH05	2019-09-05	4.74	1240	7.22	52	14.7	Clear, colourless
Bore	BH05	2020-02-27	6.18	915	7.8	146	14.7	Clear, colourless

			Dissolved Oxygen	Electrolytic Conductivity	pH	Redox Potential	Temperature	Description
			mg/L	uS/cm	pH_Units	mV	°C	
Type	**Location**	**Date**						
GMMP- Groundwater Quality Trigger Levels					4.9-8.5			
Bore	BH06	2017-07-19	3.1	349	5.42	212	12.0	Clear, low turbidity, no odour
Bore	BH06	2018-03-02	8.17	602	7.67	128	16.9	Clear, low turbidity, no odour
Bore	BH06	2018-08-10	10.17	427	7.34	102	15.4	Clear
Bore	BH06	2019-02-21	12.13	534	6.82	113	16.4	Clear, colourless
Bore	BH06	2019-09-05	8.6	620	7.47	45	16.5	Clear, colourless
Bore	BH06	2020-02-27	7.67	499	7.68	139	15.2	Clear, colourless
Bore	BH94	2017-07-20	3.38	409	6.27	-73	9.9	Pale grey, low turbidity, no odour
Bore	BH94	2018-03-01	8.78	1174	6.73	142	15.2	Grey, medium tubidity, no odour
GMMP- Spring Water Quality Trigger Levels					6.3-8.5			
Spring	Bain's Spring	2017-07-19	5.41	346	7.19	60	11.2	Clear, low turbidity, no odour
Spring	Bain's Spring	2018-02-28	12.17	563	8.72	184	18.5	Clear, low turbidity, no odour
Spring	Bain's Spring	2018-10-19	21.34	505	7.67	67	16.4	Algal content, slightly cloudy
Spring	Bain's Spring	2019-02-21	10.56	498	5.82	99	18.5	Yellow/green, suspended algal, turbid
Spring	Bain's Spring	2019-09-05	10.55	511	6.37	43	16.0	Clear with surface algae
Spring	Bain's Spring	2020-02-27	12.13	469	8.16	141	16.7	Slightly cloudy
Spring	Mawallock Home Spring	2017-07-19	6.12	470	7.02	115	15.1	Clear, low turbidity, no odour
Spring	Mawallock Home Spring	2018-03-01	5.66	775	7.07	102	15.6	Clear, low turbidity, no odour
Spring	Meallack Spring	2017-07-20	5.22	495	6.83	126	13.5	Clear, low turbidity, no odour
Spring	Meallack Spring	2018-03-01	11.36	103	7.54	176	19.5	Clear, low turbidity, no odour
Spring	Meallack Spring	2018-10-19	8.9	648	6.54	84	13.5	Clear, flowing, colourless
Spring	Meallack Spring	2019-02-21	6.13	703	7.29	110	17.6	Clear, colourless
Spring	Meallack Spring	2019-09-05	6.03	660	5.42	-11	15.5	Clear, flowing
Spring	Meallack Spring	2020-02-27	7.13	694	7.92	141	15.4	Clear, colourless
Spring	Stoneleigh's Main Spring	2017-07-20	5.66	396	6.77	144	14.0	Clear, low turbidity, no odour
Spring	Stoneleigh's Main Spring	2018-03-01	8.59	703	7.62	135	17.0	Cloudy, slightly green, low turbidity, no odour
Spring	Wangatta Spring	2017-07-19	7.8	496	7.33	156	14.5	Clear, low turbidity, no odour
Spring	Wangatta Spring	2018-02-28	10.42	139	8.04	558	22.1	Clear, low turbidity, no odour

					pH	Major Ions											Nutrients							Biological		
					pH (Lab)	Total Dissolved Solids @180°C	Sodium	Potassium	Calcium	Magnesium	Chloride	Sulphate (as SO4)	Bicarbonate Alkalinity (as CaCO3)	Carbonate Alkalinity (as CaCO3)	Hydroxide Alkalinity (as CaCO3)	Total Alkalinity (as CaCO3)	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total Oxidised)	Ammonia (as N)	Total Kjeldahl Nitrogen (as N)	Nitrogen (Organic)	Nitrogen (Total)	E. coli	Enterococci	Biological Oxygen Demand
					pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	cfu/100 ml	cfu/100 m	mg/L
EQL					0.01	10	0.5	0.5	0.5	0.5	1	5	1	1	1	1	0.01	0.01	0.01	0.01	0.1	0.2	0.2	1	1	5
GMMP- Groundwater Quality Trigger Levels					4.9-8.5	1700	400		1000	2000	600	250					50	0.9		0.74			50	1	1	
Type	**Location Co**	**Location Description**	**Date**	**Field ID**																						
Bore	BH01	On-site	2013-07-10	BH1/50100713	7.77	520	112	3	13	29	73	-	180	<1	<1	180	29.3	0.02	29.3	0.04	<0.1	-	-	-	-	-
Bore	BH02	On-site	2013-07-04	BH2/50040713	7.82	1100	273	7	37	64	395	-	400	<1	<1	400	0.36	<0.01	0.36	0.04	<0.1	-	-	-	-	-
Bore	BH02	On-site	2018-03-01	BH02/5001031	6.2	1200	310	13	57	83	340	34	550	<10	<10	550	4.5	<0.02	4.5	<0.01	3.1	-	7.6	-	-	<5
Bore	BH02	On-site	2018-03-02	BH02/5002031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	1	-
Bore	BH02	On-site	2019-02-21	BH02	8.1	1700	370	8.5	52	120	370	67	750	<10	<20	750	0.11	<0.02	0.12	0.05	<0.25	<0.2	<0.25	<1	>2,400	20
Bore	BH02	On-site	2019-09-05	BH02	8.5	1400	260	5.3	36	76	380	58	710	44	<20	760	0.06	<0.02	0.07	0.07	0.2	<0.2	0.27	<10	520	13
Bore	BH02	On-site	2020-02-27	BH02	8.3	1300	250	4.5	38	68	550	73	770	<10	<20	770	0.15	0.03	-	0.04	<0.2	<0.2	<0.2	1	77	13
Bore	BH03	On-site	2013-07-04	BH3/50040713	7.93	920	216	6	22	48	270	-	295	<1	<1	295	17.5	0.1	17.6	0.07	<0.1	-	-	-	-	-
Bore	BH03	On-site	2017-07-19	BH03/5019071	-	780	190	5	29	43	270	29	330	<10	<10	330	19	<0.02	19	<0.01	1.1	1.1	20	-	-	-
Bore	BH03	On-site	2018-02-28	BH03/5028021	8	800	220	5.1	26	47	240	31	310	<10	<10	310	22	<0.02	22	<0.01	1.7	-	24	<1	<1	<5
Bore	BH03	On-site	2018-08-10	BH03	8.3	840	240	8.5	24	45	270	35	320	<10	-	-	19	<0.02	19	<0.01	1.1	1.1	20	<10	<10	<5
Bore	BH03	On-site	2019-09-05	BH03	8.5	810	230	5.2	28	57	210	30	300	17	<20	310	19	<0.02	19	0.05	1.4	1.35	20.4	180	1700	<5
Bore	BH03	On-site	2020-02-27	BH03	8.2	730	190	4.2	24	43	680	37	440	<10	<20	440	22	<1	-	0.56	<0.2	<0.2	22	1	3	<5
Bore	BH04	On-site	2017-07-20	BH04/5020071	-	380	74	2.7	25	27	61	15	170	<10	<10	170	26	<0.02	26	0.01	2.4	2.4	28	-	-	-
Bore	BH04	On-site	2018-02-28	BH04/5028021	7.8	460	83	2.8	25	29	64	12	180	<10	<10	180	32	<0.02	32	<0.01	1.9	-	34	<1	<1	<5
Bore	BH04	On-site	2018-08-10	BH04	8.1	450	95	6	21	27	64	14	160	<10	-	-	30	<0.02	30	<0.01	1.3	1.3	31	<1	<1	<5
Bore	BH04	On-site	2019-02-21	BH04	8.3	470	65	2.2	18	23	60	12	130	<10	<20	140	28	<0.02	28	<0.01	5.5	5.5	34	<1	1	<5
Bore	BH04	On-site	2019-09-05	BH04	8.2	440	80	2.6	20	25	58	12	170	<10	<20	170	31	<0.02	31	<0.01	1.8	1.8	32.8	<1	3	<5
Bore	BH04	On-site	2020-02-27	BH04	7.6	310	68	2.1	18	23	88	14	180	<10	<20	180	35	<0.02	-	<0.01	<0.2	<0.2	35	7	9	<5
Bore	BH05	On-site	2017-07-20	BH05/5020071	-	650	160	2.9	23	25	190	32	330	<10	<10	330	13	<0.02	13	0.04	1.7	1.7	15	-	-	-
Bore	BH05	On-site	2018-03-01	BH05/5001031	7.9	620	170	2.9	19	26	180	32	220	<10	<10	220	14	<0.02	14	<0.01	1.6	-	16	2	3	<5
Bore	BH05	On-site	2018-08-10	BH05	8.4	660	170	5.1	25	31	190	38	240	<10	-	-	13	<0.02	13	<0.01	0.9	0.88	13	<10	<10	<5
Bore	BH05	On-site	2019-02-21	BH05	8.2	820	190	3.2	25	32	190	48	260	<10	<20	260	11	0.03	11	<0.01	1.3	1.3	12	<1	1	7.8
Bore	BH05	On-site	2019-09-05	BH05	8.3	650	160	2.9	21	26	180	40	320	<10	<20	320	14	<0.02	14	<0.01	1.5	1.5	15.5	<10	<10	5.8
Bore	BH05	On-site	2020-02-27	BH05	8.1	570	150	2.3	17	22	200	40	350	<10	<20	350	13	0.05	-	<0.01	<0.2	<0.2	13	110	2	<5
Bore	BH06	On-site	2017-07-19	BH06/5019071	-	330	71	2.4	18	23	43	11	110	<10	<10	110	31	<0.02	31	0.01	3.6	3.6	35	-	-	-
Bore	BH06	On-site	2018-03-02	BH06/5002031	7.8	370	72	2.5	22	27	66	10	110	<10	<10	110	33	<0.02	33	<0.01	4.1	-	37	440	7	<5
Bore	BH06	On-site	2018-08-10	BH06	8.1	410	110	2.3	20	25	51	58	110	<10	-	-	32	<0.02	32	<0.01	1.5	1.5	34	1	<1	<5
Bore	BH06	On-site	2019-02-21	BH06	8.1	500	83	2.4	18	28	47	12	110	<10	<20	110	30	<0.02	30	<0.01	3.5	3.5	33	<1	<1	<5
Bore	BH06	On-site	2019-09-05	BH06	8.1	410	66	2.2	17	22	47	12	120	<10	<20	120	35	<0.02	35	<0.01	1.3	1.3	36.3	<1	<1	<5
Bore	BH06	On-site	2020-02-27	BH06	7.4	380	72	1.9	16	21	110	15	150	<10	<20	150	38	<0.02	-	<0.01	<0.2	<0.2	38	<1	<1	<5
Bore	BH94	On-site	2017-07-20	BH94/5020071	-	360	110	3.1	20	22	55	13	250	<10	<10	250	7.5	0.23	7.7	5.8	6.6	0.8	14	-	-	-
Bore	BH94	On-site	2018-03-01	BH94/5001031	7.9	410	94	4	17	24	79	6.6	250	<10	<10	250	0.72	0.39	1.1	9.9	18	-	19	13	>2,400	30

					Heavy Metals		MAH						PAH	Total Petroleum Hydrocarbons										
					Iron (Filtered)	Manganese (Filtered)	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	Xylene (o)	Xylenes (Sum of total) (Lab Reported)	Naphthalene	TRH C6 - C9 Fraction	TRH C10 - C14 Fraction	TRH C15 - C28 Fraction	TRH C29 - C36 Fraction	TRH+C10 - C36 (Sum of total) (Lab Reported)	TRH+C10 - C40 (Sum of total) (Lab Reported)	TRH C6 - C10 Fraction F1	TRH C6 - C10 Fraction Less BTEX F1	TRH >C10 - C16 Fraction F2	TRH >C10 - C16 Fraction Less Naphthalene F2	TRH >C16 - C34 Fraction F3	TRH >C34 - C40 Fraction F4
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL							0.001	0.001	0.001	0.002	0.001	0.002	0.005	0.02	0.05	0.1	0.1	0.1	0.1	0.02	0.02	0.05	0.05	0.1	0.1
GMMP- Groundwater Quality Trigger Levels					0.2	0.3	0.001	0.025	0.003			0.02	0.016	0.6	0.6			0.6	0.6						
Type	**Location Co**	**Location Description**	**Date**	**Field ID**																					
Bore	BH01	On-site	2013-07-10	BH1/50100713	<0.05	0.003	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	-	-	-	-	-	-	-	-	-	-	-	-
Bore	BH02	On-site	2013-07-04	BH2/50040713	<0.05	0.157	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	-	-	-	-	-	-	-	-	-	-	-	-
Bore	BH02	On-site	2018-03-01	BH02/5001031	0.74	0.23	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH02	On-site	2018-03-02	BH02/5002031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bore	BH02	On-site	2019-02-21	BH02	2.8	1.3	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH02	On-site	2019-09-05	BH02	<0.05	0.8	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH02	On-site	2020-02-27	BH02	<0.05	0.43	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH03	On-site	2013-07-04	BH3/50040713	<0.05	0.015	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	-	-	-	-	-	-	-	-	-	-	-	-
Bore	BH03	On-site	2017-07-19	BH03/5019071	<0.05	0.011	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH03	On-site	2018-02-28	BH03/5028021	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH03	On-site	2018-08-10	BH03	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH03	On-site	2019-09-05	BH03	<0.05	0.33	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH03	On-site	2020-02-27	BH03	<0.05	0.065	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH04	On-site	2017-07-20	BH04/5020071	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH04	On-site	2018-02-28	BH04/5028021	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH04	On-site	2018-08-10	BH04	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH04	On-site	2019-02-21	BH04	<0.05	0.017	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH04	On-site	2019-09-05	BH04	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH04	On-site	2020-02-27	BH04	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH05	On-site	2017-07-20	BH05/5020071	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH05	On-site	2018-03-01	BH05/5001031	0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH05	On-site	2018-08-10	BH05	<0.05	0.007	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH05	On-site	2019-02-21	BH05	<0.05	0.014	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH05	On-site	2019-09-05	BH05	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH05	On-site	2020-02-27	BH05	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH06	On-site	2017-07-19	BH06/5019071	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH06	On-site	2018-03-02	BH06/5002031	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH06	On-site	2018-08-10	BH06	<0.05	0.006	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH06	On-site	2019-02-21	BH06	<0.05	0.14	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH06	On-site	2019-09-05	BH06	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH06	On-site	2020-02-27	BH06	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Bore	BH94	On-site	2017-07-20	BH94/5020071	0.22	0.08	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	0.8	1.5	2.3	-	<0.02	<0.02	<0.05	<0.05	2.2	<0.1
Bore	BH94	On-site	2018-03-01	BH94/5001031	0.25	0.084	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	0.6	0.9	1.5	-	<0.02	<0.02	0.06	0.06	1.4	0.1

					pH	Major Ions											Nutrients							Biological		
					pH (Lab)	Total Dissolved Solids @180°C	Sodium	Potassium	Calcium	Magnesium	Chloride	Sulphate (as SO4)	Bicarbonate Alkalinity (as CaCO3)	Carbonate Alkalinity (as CaCO3)	Hydroxide Alkalinity (as CaCO3)	Total Alkalinity (as CaCO3)	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total Oxidised)	Ammonia (as N)	Total Kjeldahl Nitrogen (as N)	Nitrogen (Organic)	Nitrogen (Total)	E. coli	Enterococci	Biological Oxygen Demand
					pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	cfu/100 ml	cfu/100 m	mg/L
EQL					0.01	10	0.5	0.5	0.5	0.5	1	5	1	1	1	1	0.01	0.01	0.01	0.01	0.1	0.2	0.2	1	1	5
GMMP- Spring Water Quality Trigger Levels					6.3-8.5	600	150		1000	2000	150	250					50	0.9		0.74			50	1	1	
Type	**Location Co**	**Location Description**	**Date**	**Field ID**																						
Spring	BAIN	Bain Spring	2017-07-19	BAIN/5020071	-	310	52	1.9	18	21	50	7.2	110	<10	<10	110	29	0.03	29	<0.01	2.8	2.8	32	-	-	-
Spring	BAIN	Bain Spring	2018-02-28	BAIN/5028021	8	320	63	2.4	16	23	59	6.3	100	<10	<10	100	28	0.13	29	0.4	3.1	-	32	-	-	5.3
Spring	BAIN	Bain Spring	2018-03-01	BAIN/5001031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390	>2,400	-
Spring	BAIN	Bain Spring	2018-10-19	BS01	8.3	310	68	2.2	20	24	75	11	120	<10	<20	120	23	0.1	23	0.12	1.6	1.5	25	53	58	<5
Spring	BAIN	Bain Spring	2019-02-21	BS01	8.2	440	74	2.3	20	28	53	9.3	97	<10	<20	97	23	0.05	23	<0.01	4.4	4.4	27	82	5	<5
Spring	BAIN	Bain Spring	2019-09-05	BS01	8.2	320	87	2.1	16	20	46	8	82	<10	<20	82	25	<0.02	25	<0.01	2.1	2.1	27.1	110	12	<5
Spring	BAIN	Bain Spring	2020-02-27	BS01	7.7	330	49	1.5	15	19	54	11	130	<10	<20	130	32	0.02	-	<0.01	0.2	0.2	32.2	1000	210	<5
Spring	SH	Mawallock Spring	2017-07-19	SH/50190717	-	360	69	2.1	22	26	85	13	120	<10	<10	120	24	<0.02	24	<0.01	2.1	2.1	26	-	-	-
Spring	SH	Mawallock Spring	2018-02-28	SH/50280218	7.7	430	79	2.8	20	28	100	13	120	<10	<10	120	26	<0.02	26	0.42	1.6	-	28	-	-	<5
Spring	SH	Mawallock Spring	2018-03-01	SH/50010318	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	980	690	-
Spring	STONE1	Meallack Spring	2017-07-20	STONE1/50200	-	410	80	2.1	21	26	100	16	170	<10	<10	170	20	<0.02	20	0.02	0.8	0.8	21	-	-	-
Spring	STONE1	Meallack Spring	2018-03-01	STONE1/60010	7.5	450	95	2.5	24	32	130	17	160	<10	<10	160	20	0.14	20	<0.01	3.8	-	24	-	-	20
Spring	STONE1	Meallack Spring	2018-03-02	STONE1/60020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2100	28	-
Spring	STONE1	Meallack Spring	2018-10-19	MES01	8.1	450	97	2.2	23	30	100	17	180	<10	<20	180	19	<0.02	19	<0.01	<0.2	<0.2	19	<1	<1	<5
Spring	STONE1	Meallack Spring	2019-02-21	MS01	7.9	500	150	3.4	28	48	110	17	130	<10	<20	130	18	<0.02	18	<0.01	5.6	5.5	23	<1	980	<5
Spring	STONE1	Meallack Spring	2019-09-05	MS01	8.1	390	84	2.1	16	23	74	15	110	<10	<20	110	25	<0.02	25	<0.01	1.3	1.3	26.3	1	1	<5
Spring	STONE1	Meallack Spring	2020-02-27	MS01	7.4	400	72	1.6	17	23	110	18	200	<10	<20	200	27	<2	-	<1	<0.2	<1	27	3	<1	<5
Spring	STONE2	Stoneleigh's Main Sprin	2017-07-20	STONE2/50200	-	340	84	3.4	11	28	87	12	190	18	<10	200	8.2	0.11	8.4	0.03	1.2	1.2	10	-	-	-
Spring	STONE2	Stoneleigh's Main Sprin	2018-03-01	STONE2/60010	8.1	420	90	2.3	22	30	83	11	170	<10	<10	170	23	<0.02	23	<0.01	23	-	46	-	-	<5
Spring	STONE2	Stoneleigh's Main Sprin	2018-03-02	STONE/600203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1100	440	-
Spring	WG	Wangatta Spring	2017-07-19	WG/50190717	-	350	70	2.3	22	27	85	12	150	<10	<10	150	22	<0.02	23	0.02	2.4	2.4	25	-	-	-
Spring	WG	Wangatta Spring	2018-02-28	WG/50280218	8	390	76	2.6	19	27	89	9.6	140	<10	<10	140	25	<0.02	25	<0.01	1.7	-	27	-	-	<5
Spring	WG	Wangatta Spring	2018-03-01	WG/50010318	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	19	-

					Heavy Metals		MAH						PAH	Total Petroleum Hydrocarbons											
					Iron (Filtered)	Manganese (Filtered)	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	Xylene (o)	Xylenes (Sum of total) (Lab Reported)	Naphthalene	TRH C6 - C9 Fraction	TRH C10 - C14 Fraction	TRH C15 - C28 Fraction	TRH C29 - C36 Fraction	TRH+C10 - C36 (Sum of total) (Lab Reported)	TRH+C10 - C40 (Sum of total) (Lab Reported)	TRH C6 - C10 Fraction F1	TRH C6 - C10 Fraction Less BTEX F1	TRH >C10 - C16 Fraction F2	TRH >C10 - C16 Fraction Less Naphthalene F2	TRH >C16 - C34 Fraction F3	TRH >C34 - C40 Fraction F4
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL							0.001	0.001	0.001	0.002	0.001	0.002	0.005	0.02	0.05	0.1	0.1	0.1	0.1	0.02	0.02	0.05	0.05	0.1	0.1
GMMP- Spring Water Quality Trigger Levels					0.2	0.1	0.001	0.025	0.003			0.02	0.016	0.6	0.6			0.6							
Type	**Location Co**	**Location Description**	**Date**	**Field ID**																					
Spring	BAIN	Bain Spring	2017-07-19	BAIN/5020071	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	BAIN	Bain Spring	2018-02-28	BAIN/5028021	<0.05	0.006	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	BAIN	Bain Spring	2018-03-01	BAIN/5001031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spring	BAIN	Bain Spring	2018-10-19	BS01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	BAIN	Bain Spring	2019-02-21	BS01	<0.05	0.047	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	BAIN	Bain Spring	2019-09-05	BS01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	BAIN	Bain Spring	2020-02-27	BS01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	SH	Mawallock Spring	2017-07-19	SH/50190717	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	SH	Mawallock Spring	2018-02-28	SH/50280218	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	SH	Mawallock Spring	2018-03-01	SH/50010318	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spring	STONE1	Meallack Spring	2017-07-20	STONE1/50200	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE1	Meallack Spring	2018-03-01	STONE1/60010	<0.05	0.006	<0.002	<0.002	<0.002	<0.004	<0.002	<0.006	<0.02	<0.04	<0.05	<0.1	<0.1	<0.1	-	<0.04	<0.04	<0.05	<0.05	<0.1	<0.1
Spring	STONE1	Meallack Spring	2018-03-02	STONE1/60020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spring	STONE1	Meallack Spring	2018-10-19	MES01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE1	Meallack Spring	2019-02-21	MS01	<0.05	0.25	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE1	Meallack Spring	2019-09-05	MS01	<0.05	0.022	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE1	Meallack Spring	2020-02-27	MS01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE2	Stoneleigh's Main Sprin	2017-07-20	STONE2/50200	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE2	Stoneleigh's Main Sprin	2018-03-01	STONE2/60010	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	STONE2	Stoneleigh's Main Sprin	2018-03-02	STONE/600203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spring	WG	Wangatta Spring	2017-07-19	WG/50190717	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	WG	Wangatta Spring	2018-02-28	WG/50280218	<0.05	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.003	<0.01	<0.02	<0.05	<0.1	<0.1	<0.1	-	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1
Spring	WG	Wangatta Spring	2018-03-01	WG/50010318	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

			Lab Report Number	705051	705051		705051	EM2003341	
			Field ID	BH04	QC1	**RPD**	BH04	QC 2	**RPD**
			Sampled Date/Time	27/02/2020	27/02/2020		27/02/2020	27/02/2020	
Chem Group	**ChemName**	**Units**	**EQL**						
Microbiological	E. coli	cfu/100 ml	1	**7**	**4**	**55**	7	-	-
	Enterococci	-	1	9	6	40	9	-	-
Heavy Metals	Iron (Filtered)	mg/l	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	Manganese (Filtered)	mg/l	0.005 : 0.001 (Interlab)	<0.005	<0.005	0	<0.005	<0.001	0
MAH	Benzene	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	Toluene	mg/l	0.001 : 0.002 (Interlab)	<0.001	<0.001	0	<0.001	<0.002	0
	Ethylbenzene	mg/l	0.001 : 0.002 (Interlab)	<0.001	<0.001	0	<0.001	<0.002	0
	Xylenes (m & p)	mg/l	0.002	<0.002	<0.002	0	<0.002	<0.002	0
	Xylene (o)	mg/l	0.001 : 0.002 (Interlab)	<0.001	<0.001	0	<0.001	<0.002	0
	Xylenes (Sum of total) (Lab Reported)	mg/l	0.003 : 0.002 (Interlab)	<0.003	<0.003	0	<0.003	<0.002	0
PAH	Naphthalene	mg/l	0.01 : 0.005 (Interlab)	<0.01	<0.01	0	<0.01	<0.005	0
Sample Quality Parameters	Nitrate + Nitrite (as N)	mg/l	0.05	35	35	0	35	27.5	24
	pH (Lab)	pH_Units	0.1 : 0.01 (Interlab)	7.6	7.6	0	7.6	7.93	4
	Total Dissolved Solids @180°C	mg/l	10	310	390	23	**310**	**536**	**53**
	Sodium	mg/l	0.5	68	65	5	68	79	15
	Potassium	mg/l	0.5	2.1	2	5	2.1	3	35
	Calcium	mg/l	0.5	18	18	0	18	20	11
	Magnesium	mg/l	0.5	23	23	0	23	26	12
	Chloride	mg/l	1	88	110	22	88	56	44
	Sulphate (as SO4)	mg/l	5	14	15	7	14	10	33
	Bicarbonate Alkalinity (as CaCO3)	mg/l	20 : 1 (Interlab)	180	200	11	180	148	20
	Carbonate Alkalinity (as CaCO3)	mg/l	10 : 1 (Interlab)	<10	<10	0	<10	<1	0
	Hydroxide Alkalinity (as CaCO3)	mg/l	20 : 1 (Interlab)	<20	<20	0	<20	<1	0
	Total Alkalinity (as CaCO3)	mg/l	20 : 1 (Interlab)	180	200	11	180	148	20
	Nitrate (as N)	mg/l	0.02 : 0.01 (Interlab)	35	35	0	35	27.5	24
	Nitrite (as N)	mg/l	0.02 : 0.01 (Interlab)	<0.02	0.02	0	<0.02	0.02	0
	Ammonia (as N)	mg/l	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Total Kjeldahl Nitrogen (as N)	mg/l	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	**<0.2**	**1.1**	**138**
	Nitrogen (Organic)	mg/l	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	**<0.2**	**1.1**	**138**
	Nitrogen (Total)	mg/l	0.2 : 0.1 (Interlab)	35	35	0	35	28.6	20
	Biological Oxygen Demand	mg/l	5	<5	<5	0	<5	-	-
Total Petroleum Hydrocarbons	TRH C6 - C9 Fraction	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0
	TRH C10 - C14 Fraction	mg/l	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	TRH C15 - C28 Fraction	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	TRH C29 - C36 Fraction	mg/l	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/l	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	TRH C6 - C10 Fraction F1	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0
	TRH C6 - C10 Fraction Less BTEX F1	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0
	TRH >C10 - C16 Fraction F2	mg/l	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0
	TRH >C10 - C16 Fraction Less Naphthalene F2	mg/l	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0
	TRH >C16 - C34 Fraction F3	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	TRH >C34 - C40 Fraction F4	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (1-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary lab

Lab Report Number	705051
Field ID	QC3
Sampled_Date/Time	27/02/2020
Sample Type	Rinsate

Chem_Group	ChemName	Units	EQL	
Heavy Metals	Iron (Filtered)	mg/l	0.05	<0.05
	Manganese (Filtered)	mg/l	0.005	<0.005
MAH	Benzene	mg/l	0.001	<0.001
	Toluene	mg/l	0.001	<0.001
	Ethylbenzene	mg/L	0.001	<0.001
	Xylenes (m & p)	mg/l	0.002	<0.002
	Xylene (o)	mg/l	0.001	<0.001
	Xylenes (Sum of total) (Lab Reported)	mg/l	0.003	<0.003
Microbiological	E. coli	cfu/100 ml	1	
	Enterococci	-	1	
PAH	Naphthalene	mg/l	0.01	<0.01
Sample Quality Parameters	Nitrate + Nitrite (as N)	mg/l	0.05	<0.05
	pH (Lab)	pH_Units	0.1	
	Total Dissolved Solids @180°C	mg/L	10	
	Sodium	mg/L	0.5	<0.5
	Potassium	mg/l	0.5	<0.5
	Calcium	mg/L	0.5	<0.5
	Magnesium	mg/l	0.5	<0.5
	Chloride	mg/L	1	**49**
	Sulphate (as SO4)	mg/l	5	<5
	Bicarbonate Alkalinity (as CaCO3)	mg/l	20	<20
	Carbonate Alkalinity (as CaCO3)	mg/l	10	<10
	Hydroxide Alkalinity (as CaCO3)	mg/l	20	<20
	Total Alkalinity (as CaCO3)	mg/l	20	<20
	Nitrate (as N)	mg/l	0.02	<0.02
	Nitrite (as N)	mg/l	0.02	<0.02
	Ammonia (as N)	mg/L	0.01	<0.01
	Total Kjeldahl Nitrogen (as N)	mg/l	0.2	<0.2
	Nitrogen (Organic)	mg/l	0.2	<0.2
	Nitrogen (Total)	mg/l	0.2	<0.2
	Biological Oxygen Demand	mg/l	5	
Total Petroleum Hydrocarbons	TRH C6 - C9 Fraction	mg/l	0.02	<0.02
	TRH C10 - C14 Fraction	mg/l	0.05	<0.05
	TRH C15 - C28 Fraction	mg/l	0.1	<0.1
	TRH C29 - C36 Fraction	mg/l	0.1	<0.1
	TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/l	0.1	<0.1
	TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/l	0.1	<0.1
	TRH C6 - C10 Fraction F1	mg/l	0.02	<0.02
	TRH C6 - C10 Fraction Less BTEX F1	mg/l	0.02	<0.02
	TRH >C10 - C16 Fraction F2	mg/L	0.05	<0.05
	TRH >C10 - C16 Fraction Less Naphthalene F2	mg/l	0.05	<0.05
	TRH >C16 - C34 Fraction F3	mg/l	0.1	<0.1
	TRH >C34 - C40 Fraction F4	mg/l	0.1	<0.1

APPENDIX A

Field records

GROUNDWATER SYNOPTIC DIP

PROJECT NUMBER:	LK174	WEATHER:	OVERCAST
SITE NAME:	SHWF	METER:	HERON
SAMPLING AREA:	QUARRY		HDT1005A
SAMPLING ID(s):	AS LABELLED		(S/N 18731)
SCIENTIST(S):	KW		
DATE:	25/2/20.		
TIME:			

GROUNDWATER GAUGING DATA

TIME	WELL ID	DTW (mbtoc)	DTB (mbtoc)	TIME	WELL ID	DTW (mbtoc)	DTB (mbtoc)
9:02	BH03	23.005	36.00				
9:15	WM01 (1)	13.367					
9:30	WM07 (1)	29.979					
10:27	BH04	11.919	18.88				
10:39	BH06	14.475	23.27				
10:51	BH99	14.057	16.03				
11:00	BH05	14.883	20.59				
11:18	BH03	23.005					
13:50	BH02	24.686	33.86				
14:06	BH03	23.005					

ADDITIONAL COMMENTS:

(1) Moderate Breeze

BH02 702941.57 E
5841209.69 N

GROUNDWATER MONITOR WELL PURGE RECORD

PROJECT NUMBER:	LK174	PURGE METHOD:	DC PUMP
SITE NAME:	SHWF	DEPTH TO GROUNDWATER (mbtoc / mbgl):	24.686
SAMPLING AREA:	QUARRY	DEPTH TO BASE: (mbtoc / mbgl):	33.66
MONITOR WELL ID:	BH02	DISPOSAL OF GROUNDWATER	
SCIENTIST(S):	KW		
DATE INSTALLED			
DATE DEVELOPED			
26/2/20			

GROUNDWATER PURGING DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	Volume Removed - cumulative in L
8:15	GOOD FLOW* - INITIALLY THICK WITH SEDIMENT.					
8:20	CLEAR	COLOURLESS	———			~7.5L
8:29	-PUMPED DRY -		DTW ~ 30.9 mbtoc			15L+
9:22	DTW 30.538 mbtoc					

PURGE RATE (Litres/Min):	15/67 = 0.22

ADDITIONAL COMMENTS:
* Initially supplied battery, then ute running

EASTING:		NORTHING:	

GROUNDWATER MONITOR WELL PURGE RECORD

PROJECT NUMBER:	LK174	PURGE METHOD:	FOOT VALVE
SITE NAME:	SHWF	DEPTH TO GROUNDWATER (mbtoc / mbgl):	23.005
SAMPLING AREA:	QUARRY	DEPTH TO BASE: (mbtoc / mbgl):	36.00
MONITOR WELL ID:	BH03	DISPOSAL OF GROUNDWATER	
SCIENTIST(S):	KW	RECOVERY DEPTH ~3M FROM BASE	
DATE INSTALLED			
DATE DEVELOPED			
26/2/20			

GROUNDWATER PURGING DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	Volume Removed - cumulative in L
13:32	GOOD FLOW — CLEAR COLLECT					
13:43	CLOUDY	BROWN/GREY				5L
14:07	" "	"	" DTW 24.00mbtoc			15L
14:20	SL. CLOUDY.	L. BROWN				20L
14:28	CLEAR	COLLECT	DTW 24.56	mbtoc		25L.

PURGE RATE (Litres/Min):	25/56 = 0.45
ADDITIONAL COMMENTS:	DC PUMP COULD NOT BE SEATED CLEARLY BELOW SWL.

EASTING:		NORTHING:	

GROUNDWATER MONITOR WELL PURGE RECORD

PROJECT NUMBER:	LK174	PURGE METHOD:	DC PUMP
SITE NAME:	SHWF	DEPTH TO GROUNDWATER (mbtoc / mbgl):	11.919
SAMPLING AREA:	QUARRY	DEPTH TO BASE: (mbtoc / mbgl):	18.88
MONITOR WELL ID:	BH04	DISPOSAL OF GROUNDWATER	
SCIENTIST(S):	KW	RECOVERY DEPTH ~1m FROM BASE	
DATE INSTALLED			
DATE DEVELOPED			
25/2/20			

GROUNDWATER PURGING DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	Volume Removed - cumulative in L
16:04	GOOD FLOW - ~~CLEAR~~ SL CLOUDY COL'LESS					
16:10	SL-CLOUDY	COL'LESS/WHITE				15L
16:15			17.9	751	601	25L

PURGE RATE (Litres/Min): 25/11 = 2.27

ADDITIONAL COMMENTS:

EASTING: NORTHING:

GROUNDWATER MONITOR WELL PURGE RECORD

PROJECT NUMBER:	LK174	PURGE METHOD:	DC PUMP
SITE NAME:	SHWF	DEPTH TO GROUNDWATER (mbtoc / mbgl):	14.883
SAMPLING AREA:	QUARRY	DEPTH TO BASE: (mbtoc / mbgl):	20.59
MONITOR WELL ID:	BH05	DISPOSAL OF GROUNDWATER	
SCIENTIST(S):	KW	RECORDED DEPTH ~ 17 mbtoc	
DATE INSTALLED			
DATE DEVELOPED			
25/2/20			

GROUNDWATER PURGING DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	Volume Removed - cumulative in L
18:52	GOOD FLOW - CLEAR COLLESS					
19:01	CLEAR	COLLESS	—	—	—	10L
19:05	"	"	—	—	—	15L
19:10	"	"	22.0	7.72	4.8	20L

PURGE RATE (Litres/Min):	20/18 = 1.11
ADDITIONAL COMMENTS:	

EASTING:		NORTHING:	

GROUNDWATER MONITOR WELL PURGE RECORD

PROJECT NUMBER:	LK174	PURGE METHOD:	DC PUMP
SITE NAME:	SHWF	DEPTH TO GROUNDWATER (mbtoc / mbgl):	14.475
SAMPLING AREA:	QUARRY	DEPTH TO BASE: (mbtoc / mbgl):	23.27
MONITOR WELL ID:	BH06	DISPOSAL OF GROUNDWATER	
SCIENTIST(S):	KW	RECOVERY DEPTH ~2M FROM BOTTOM	
DATE INSTALLED			
DATE DEVELOPED			
25/2/20			

GROUNDWATER PURGING DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	Volume Removed - cumulative in L
17:44	GOOD FLOW - CLEAR COLOURLESS					
17:52	CLEAR	COLOURLESS	—	—	—	10L
17:55	"	"	—	—	—	15L
18:02	"	"	20.2	7.41	20.8	22.5L

PURGE RATE (Litres/Min):	22.5/18 = 1.25

ADDITIONAL COMMENTS:

EASTING:		NORTHING:	

GROUNDWATER SAMPLING LOG

PROJECT NUMBER:	LK174	SAMPLE RECOVERY METHOD:	FOOT VALVE.
SITE NAME:	SHWF	COLLAR ELEVATION (m AHD):	
SAMPLING AREA:	QUARRY	DEPTH TO GROUNDWATER (mbtoc / ~~mbgl~~):	27.285
SAMPLING LOCATION ID:	BH02	STANDING WATER LEVEL (m AHD)	
SCIENTIST(S):	KW	RECOVERY DEPTH (mbtoc / mbgl):	~32
DATE:	27/2/20	DEPTH TO BASE: (mbtoc / mbgl):	33.66
TIME:		SAMPLE STORAGE / PRESERVATION:	ICE
QA/QC SAMPLE IDs:			

GROUNDWATER STABILISATION DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	REDOX (mV)	D.O. (ppm)
16:15	SL. CLOUDY	L. BROWN	13.5	7.82	1801	163.5	8.58
	SAMPLED BH02 x 8 CONT's						
16:38	DTW after sampling 31.214 mbtoc						
		FINAL STABILITY	13.5	7.82	1801	163.5	8.58

PURGE RATE (Litres/Min):	15/67 = 0.22
SAMPLING RATE (Litres/Mn):	15/23 = 0.65
0.45 MICRON FILTRATION USED (Y/N):	Y FOR DISS METALS
ADDITIONAL COMMENTS:	TOTAL FOOT VALVE EXTRACTED GW ~15L — RESULTING IN DRAWDOWN OF 4M+

EASTING:		NORTHING:	

GROUNDWATER SAMPLING LOG

PROJECT NUMBER:	LK174	SAMPLE RECOVERY METHOD:	FOOT VALVE
SITE NAME:	SHWF	COLLAR ELEVATION (m AHD):	
SAMPLING AREA:	QUARRY	DEPTH TO GROUNDWATER (mbtoc / ~~mbgl~~):	23.224
SAMPLING LOCATION ID:	~~BH~~03	STANDING WATER LEVEL (m AHD)	
SCIENTIST(S):	KW	RECOVERY DEPTH (mbtoc / ~~mbgl~~):	~27
DATE:	27/2/20	DEPTH TO BASE: (mbtoc / mbgl):	36.00
TIME:		SAMPLE STORAGE / PRESERVATION:	ICE
QA/QC SAMPLE IDs:			

GROUNDWATER STABILISATION DATA

TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	REDOX (mV)	D.O. (ppm)
11:15	SL. CLOUDY/~~CLR~~	L-BROWN	15.7	7.93	1281	159.1	9.33
11:30	SAMPLED	HERE ~~BH~~03 x 8 CONT'S.					
	DTW 23.748 mbtoc						
		FINAL STABILITY	15.7	7.93	1281	159.1	9.33

PURGE RATE (Litres/Min):	25/56 = 0.45
SAMPLING RATE (Litres/Min):	10/15 = 0.67
0.45 MICRON FILTRATION USED (Y/~~N~~):	Y - FOR DISS. METALS.

ADDITIONAL COMMENTS: TOTAL VOLUME ~ 10L

EASTING:		NORTHING:	

GROUNDWATER SAMPLING LOG

PROJECT NUMBER:	LK174	SAMPLE RECOVERY METHOD:	LOW FLOW
SITE NAME:	SHWF	COLLAR ELEVATION (m AHD):	
SAMPLING AREA:	QUARRY	DEPTH TO GROUNDWATER (mbtoc / ~~mbgl~~):	11.927
SAMPLING LOCATION ID:	BH04	STANDING WATER LEVEL (m AHD)	
SCIENTIST(S):	K.W.	RECOVERY DEPTH (mbtoc / ~~mbgl~~):	~16
DATE:	27/2/20	DEPTH TO BASE: (mbtoc / mbgl):	18.88
TIME:		SAMPLE STORAGE / PRESERVATION:	ICE
QA/QC SAMPLE IDs:	QC1 (DUP), QC2 (TRIP), QC3 (BLANK AT BH04)		

GROUNDWATER STABILISATION DATA

	TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	REDOX (mV)	D.O. (ppm)
	12:02	COMMENCED LOW-FLOW						
~6L	12:16	CLEAR	COLOURED	15.8	7.59	590	144.9	9.20
~12L	12:27	"	"	15.9	7.73	567	140.7	7.21
~14L	12:32	"	"	15.9	7.73	565	141.8	7.03
	↳	SAMPLED HERE BH04, QC1, QC2, QC3						
	12:56	"	"	15.9	7.80	571	142.4	6.93
		DTW 11.935 mbtoc						
			FINAL STABILITY	15.9	7.80	571	142.4	6.93

PURGE RATE (Litres/Min):	25/11 = 2.27
SAMPLING RATE (Litres/Min):	20/54 = 0.37
0.45 MICRON FILTRATION USED (Y/N):	Y FOR DISS. METALS

ADDITIONAL COMMENTS:

EASTING:		NORTHING:	

GROUNDWATER SAMPLING LOG

PROJECT NUMBER:	LK174	SAMPLE RECOVERY METHOD:	LOW FLOW BLADDER
SITE NAME:	SHWF	COLLAR ELEVATION (m AHD):	
SAMPLING AREA:	QUARRY	DEPTH TO GROUNDWATER (mbtoc / ~~mbgl~~):	14.910
SAMPLING LOCATION ID:	BH05	STANDING WATER LEVEL (m AHD)	
SCIENTIST(S):	KW	RECOVERY DEPTH (mbtoc / mbgl):	~18.
DATE:	27/2/20	DEPTH TO BASE: (mbtoc / mbgl):	20.59
TIME:		SAMPLE STORAGE / PRESERVATION:	ICE
QA/QC SAMPLE IDs:			

GROUNDWATER STABILISATION DATA

	TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	REDOX (mV)	D.O. (ppm)
	8:16	COMMENCED LOW-FLOW.						
~5L	8:35	CLEAR	COLOURLESS	14.6	7.77	908	145.9	8.33
~10L	8:44	"	"	14.7	7.79	906	145.8	6.26
	→	SAMPLED HERE BH05. X 8 CONTS						
	8:57	"	"	14.7	7.80	915	145.9	6.18
		DTW 16.425 mbtoc						
			FINAL STABILITY	14.7	7.80	915	145.9	6.18

PURGE RATE (Litres/Min):	20/18 = 1.11
SAMPLING RATE (Litres/Min):	13/41 = 0.32
0.45 MICRON FILTRATION USED (Y/N):	Y FOR DISS METALS

ADDITIONAL COMMENTS:

EASTING:		NORTHING:	

GROUNDWATER SAMPLING LOG

PROJECT NUMBER:	LK174	SAMPLE RECOVERY METHOD:	LOW FLOW
SITE NAME:	SHWF	COLLAR ELEVATION (m AHD):	
SAMPLING AREA:	QUARRY	DEPTH TO GROUNDWATER (mbtoc / ~~mbgl~~):	14.367
SAMPLING LOCATION ID:	BH06	STANDING WATER LEVEL (m AHD)	
SCIENTIST(S):	KW	RECOVERY DEPTH (mbtoc / ~~mbgl~~):	~ 18
DATE:	27/2/20	DEPTH TO BASE: (mbtoc / mbgl):	23.27
TIME:		SAMPLE STORAGE / PRESERVATION:	ICE
QA/QC SAMPLE IDs:			

GROUNDWATER STABILISATION DATA

	TIME (Mins)	APPEARANCE	COLOUR	TEMP (°C)	pH	E.C. (µs/cm)	REDOX (mV)	D.O. (ppm)
	9:39	COMMENCED LOW-FLOW						
~5L	9:57	CLEAR	COLOURLESS	14.7	7.47	499	144.2	9.18
~10L	10:07	"	"	15.0	7.62	4984	138.1	7.90
~12L	10:15	"	"	15.0	7.63	496.3	139.1	7.69
	↳	SAMPLED HERE BH06 x 8 CONT'S						
	10:24	"	"	15.2	7.68	499.0	139.1	~~8.07~~
		DTW	16.104	mbtoc				
			FINAL STABILITY	15.2	7.68	499.0	139.1	7.67

PURGE RATE (Litres/Min):	22.5/18 = 1.25
SAMPLING RATE (Litres/Min):	15/45 = 0.33
0.45 MICRON FILTRATION USED (Y/N):	Y FOR DISS METALS

ADDITIONAL COMMENTS:

EASTING:		NORTHING:	

SURFACE WATER SAMPLING LOG

PROJECT NUMBER:	LK174	DATE:	27/2/20
SITE NAME:	~~SHARK~~	TIME:	AS SHOWN
SAMPLING AREA:	SPRING	SAMPLE RECOVERY METHOD:	CLEAN BOTTLE
SAMPLING LOCATION:		RECOVERY DEPTH (m):	<0.2m
SCIENTIST(S):	KW	SAMPLE STORAGE / PRESERVATION:	ICE
QA/QC SAMPLE IDs:			

SURFACE WATER SAMPLING DATA

SAMPLE ID	DESCRIPTION (Colour, Turbidity, Odour etc)	TEMP (°C)	pH	E.C. (µs/cm)	REDOX (mV)	D.O. (ppm)
BORE#2	CLEAR, COLOURLESS	15.1	7.83	7271	164.9	7.70
14:45 MS01	" "	15.4	~~7~~92	694	151.9	7.13
15:40 BSO 1	Slu Cloudy,	16.1	8.16	468.5	141.0	12.13
0.45 MICRON FILTRATION USED (Y/N):		Y FOR DISS. METALS.				

ADDITIONAL COMMENTS:

1 TDS (by Meter) 5830.50 ppm — NOT A MONITORED SPRING

EASTING:		NORTHING:	

APPENDIX B

Instrument calibration records

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

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fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au
214 Lord St Perth WA 6000

EQUIPMENT INFORMATION

Instrument: GSUB1

Serial Number: 01D0030 (SS Pump, cable and reel)

08071201 (Controller)

17E04015 (Inverter)

EQUIPMENT CHECK	Enclosed	Comment
Stainless Steel Pump - on Reel	✓	
Pump Controller	✓	
12VDC to 230VAC out Inverter	✓	
Power cable - Controller to Reel	✓	
Power cable - Inverter to Controller	✓	
Manual	✓	
Carry Bag for Accessories	✓	
Carry Case	✓	

Pump Performance Table @ maximum power		
Pressure Test	Equivalent to mH20	Litre per Minute
500kPa	50.1	
400kPa	40.8	2.0
300kPa	30.6	4.0
200kPa	20.4	6.0

Inspection Details	Pass	Fail	Comment
De-con wash of reel, cable (60m) and SS pump	✓		
De-con wash of carry case	✓		
Inspection for faults, corrosion, damage	✓		
Unit in good working order, clean & ready to use	✓		

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

J.Couronne

ECO Environmental Equipment Specialist

Date: 20.11.2019

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

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fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
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214 Lord St Perth WA 6000

Equipment Information

Instrument: YSIPP5A
Serial Number: 11G101604 (Display)
13J100283 (Sonde)

Equipment Check

	Enclosed	Returned	Comment
YSI Pro Plus Display	☑	☐	
YSI Quatro Sonde	☑	☐	
- YSI 1001 pH Probe *(LN: 12C)*	☑	☐	
- YSI 1002 ORP Probe *(LN: 12C)*	☑	☐	
- YSI 5560 Cond/Temp Probe *(LN: 13E)*	☑	☐	
- YSI Polarographic DO Sensor *(LN: 14B)*	☑	☐	
Flow Cell & attachments	☑	☐	
Probe Guard	☑	☐	
Rubber Storage/Calibration Sleeve	☑	☐	
Calibration Cup + cap	☑	☐	
YSI Cable Management Kit	☑	☐	
YSI Pro Series ProComm II Kit	☑	☐	
User Manual + Flow Cell Manual + CD-Rom	☑	☐	
Spare Batteries (x 2) & Screwdriver	☑	☐	
Laminated Quick Start Guide	☑	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	☑	☐
Dissolved Oxygen	☑ 100% Saturation	±2%	☑	☐
	Pressure Compensation	1018 hPa	☑	☐
Conductivity	☑ 12.88mS/cm	±0.5%	☑	☐
	☑ Check linearity at 1.413mS/cm	±0.5%	☑	☐
Salinity	Auto Calibrated	±1%	☑	☐
pH	☑ pH 7.00	± 0.2	☑	☐
	☑ pH 4.00	± 0.2	☑	☐
ORP	☐ 238 mV at 20 °C	±20mV	☑	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards

Dave McGraw 14/11/19

Equipment Specialist
ECO Environmental

ECO Environmental

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& sampling equipment
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fax: +61 8 9328 2677
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www.ecoenvironmental.com.au
214 Lord St Perth WA 6000

Equipment Information

Instrument: HDT1005A
Serial Number: 18731

Equipment Check

	Enclosed	Returned	Comment
Heron Water Level Meter	☑	☐	
Heron Carry Bag	☑	☐	
Spare 9V Battery	☑	☐	
Laminated Field Sheet	☑	☐	

Inspection Details

	Pass	Comment
De-con wash of tape (100m)	☑	
De-con wash of reel	☑	
Inspection for faults, corrosion, damage	☑	
Meter in good working order, clean and ready for use	☑	

This is to certify that where possible, this instrument has been cleaned in accordance with the manufacturer's general maintenance procedure as recommended in the instrument service manual.

Regards

Dave McGraw 2/12/19

Equipment Specialist
ECO Environmental

checked 19/2/20 DR

ECO Environmental

Environmental monitoring & sampling equipment Rentals and sales

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214 Lord St Perth WA 6000

Equipment Information

Instrument: 12Volt Battery Pack : BATTERY 2

Equipment Check

	Enclosed	Returned	Comment
Battery Pack	☑	☐	
Battery Isolator Key	☑	☐	
12V Battery	☑	☐	
Wall charger	☑	☐	

Inspection Details

	Pass	Fail	Comment
Decon wash of Battery Pack	☑	☐	
Inspection for faults, corrosion, damage	☑	☐	
Unit in good working order, clean and ready for use	☑	☐	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

Regards

Dave McGraw 25/11/19

Equipment Specialist
ECO Environmental

checked 19/2/20 DM

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

Tel: +61 8 9328 2900
fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au
214 Lord St Perth WA 6000

Equipment Information

Instrument: LFKIT5A
Serial Number: # 1565 (Controller)
846 (Bladder Pump)

Equipment Check

	Enclosed	Returned	Comment
GeoControl Pro Controller	☑	☐	
12v Portable Battery & Charger	☑	☐	
Car Battery Adapter (Red & Black)	☐	☐	
Power Supply Cable	☑	☐	
SS Bladder Pump, Loop and Quick Link	☑	☐	
Carry Case	☑	☐	
Tubing Cutter	☑	☐	
Laminated Field Sheet	☑	☐	
Stainless Steel Cable on Reel (60m)	☑	☐	
Carry Bag for Stainless Steel Cable	☑	☐	

Additional Items Enclosed

	Enclosed	Returned	Comment
5 x O-rings (6)	☐	☐	
2 x bladder compression rings	☑	☐	

Inspection Details

	Pass	Fail	Comment
Check tubing inlet connection is present	☑	☐	
De-con wash of bladder pump	☑	☐	
De-con wash of controller, battery & carry case	☑	☐	
De-con wash of stainless steel cable and reel	☑	☐	
Inspection for faults, corrosion, damage	☑	☐	
Unit in good working order, clean and ready for use	☑	☐	

This is to certify that where possible, this instrument has been cleaned in accordance with the manufacturer's general maintenance procedure as recommended in the instrument service manual.

Regards

Dave McGraw 9/9/19

Equipment Specialist
ECO Environmental

checked 19/2/20
DM

APPENDIX C

Laboratory reports

Page _1_ of _1_

SITE: Stockyard Hill Wind Farm - Springs
PROJECT REF.: Quote#181110SNC_1/
PO 3AUC003-PO-1083
SCIENTIST (S): K. Webb
SAMPLE TYPE: Water

REPORT TO: kelvin@landkwality.com.au; Shaun.Gutsell@wbho.com.au

SNC-Lavalin WBHO Infrastructure Joint Venture
PO Box 7678
Cloisters Square PO WA 6850

Contact: Kelvin Webb 0432 495 417
kelvin@landkwality.com.au

SAMPLE ID.	DATE	PRESERVATION			ANALYSIS SUITES											
		Ice	Acid	None	pH, TDS	Suite B11C	Suite B11E	Dissolved Fe, Mn	Nitrogens - speciated (TKN, NH3, NO2, NO3, Total N, Organic N, NOX)	Suite B1	BOD (5 day)	E.coli	Enterococci		Total	REMARKS
BH02	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	Please include reporting data in ESDAT format
BH03	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
BH04	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
BH05	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
BH06	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
MS01	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
BS01	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
QC1	27/02/2020	X			X	X	X	X	X	X	X	X	X		7	
QC3	27/02/2020	X				X	X	X	X	X					5	
QC4	27/02/2020	X				X	X	X	X	X					5	
** Please chill all samples on receipt until analysis **																
										Total Number of Containers					66	

Relinquished by _Kelvin Webb_ Organisation _Land Kwality (JV contractor)_
Date _28/02/20_ Time 18:34

Received by Tom Wong Organisation Eurofins
Date 28/02/2020 Time 6:37pm

Relinquished by _____ Organisation _____
Date _____ Time _____

Received by _____ Organisation _____
Date _____ Time _____

705051

#AU_CAU001_EnviroSampleVic

From: Kelvin Webb <kelvin@landkwality.com.au>
Sent: Saturday, 29 February 2020 4:24 PM
To: #AU_CAU001_EnviroSampleVic
Subject: Re: Eurofins Sample Receipt Advice - Report 705051 : Site STOCKYARD HILL WIND FARM - SPRINGS
Attachments: LK174 SHWF COC 28Feb20.xlsx

Hi,

Thank you for clarification. Sample QC4 was not supplied with this batch.

I attach EXCEL form of COC for reference.

Kind regards,

Kelvin

Dr Kelvin Webb, Principal
Land Kwality (ABN 12 194 327 297) Assessment • Risk • Management
PO Box 71 Northbridge WA 6865
T: +61 8 6336 7705 **M:** 0432 495 417 **E: kelvin@landkwality.com.au**

From: EnviroSampleVic@eurofins.com <EnviroSampleVic@eurofins.com>
Sent: Saturday, 29 February 2020 6:29 AM
To: Kelvin Webb <kelvin@landkwality.com.au>
Subject: Eurofins Sample Receipt Advice - Report 705051 : Site STOCKYARD HILL WIND FARM - SPRINGS

Dear Valued Client,

QC4 NOT RECEIVED

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Steven Borg
Sample Receipt

Eurofins | mgt
6 Monterey Road
Dandenong South 3175
AUSTRALIA
Phone: +61 385 645 000
Email: EnviroSampleVic@eurofins.com
Website:environment.eurofins.com.au
EnviroNote 1079 - PFAS Fingerprinting
EnviroNote 1080 - Total Organofluorine Analysis & PFAS Investigations

eurofins | Environment Testing

Melbourne
6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**SNC-Lavalin / WBHO Infrastructure JV**
Contact name:	Shaun Gutsell
Project name:	STOCKYARD HILL WIND FARM - SPRINGS
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Feb 28, 2020 6:37 PM
Eurofins reference:	**705051**

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ Attempt to chill was evident.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Appropriate sample containers have been used.
- ☑ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

QC4 NOT RECEIVED

Contact notes

If you have any questions with respect to these samples please contact:

Ursula Long on Phone : or by e.mail: UrsulaLong@eurofins.com

Results will be delivered electronically via e.mail to Shaun Gutsell - Shaun.Gutsell@wbho.com.au.

Note: A copy of these results will also be delivered to the general SNC-Lavalin / WBHO Infrastructure JV email address.

eurofins | Environment Testing

ABN – 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: SNC-Lavalin / WBHO Infrastructure JV
Address: PO Box 7678
Cloisters Square PO
WA 6850

Project Name: STOCKYARD HILL WIND FARM - SPRINGS

Order No.: 3AUC003-PO-1083
Report #: 705051
Phone: 8 9442 2555
Fax:

Received: Feb 28, 2020 6:37 PM
Due: Mar 10, 2020
Priority: 5 Day
Contact Name: Shaun Gutsell

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	E.coli	Enterococci	Iron (filtered)	Manganese (filtered)	pH (at 25°C)	Nitrogens (speciated)	Eurofins | mgt Suite B1	Eurofins | mgt Suite B11E: Cl/SO4/Alkalinity	Eurofins | mgt Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																
Brisbane Laboratory - NATA Site # 20794																
Perth Laboratory - NATA Site # 23736																
External Laboratory																
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**											
1	BH02	Feb 27, 2020		Water	M20-Fe42869	X	X	X	X	X	X	X	X	X	X	X
2	BH03	Feb 27, 2020		Water	M20-Fe42870	X	X	X	X	X	X	X	X	X	X	X
3	BH04	Feb 27, 2020		Water	M20-Fe42871	X	X	X	X	X	X	X	X	X	X	X
4	BH05	Feb 27, 2020		Water	M20-Fe42872	X	X	X	X	X	X	X	X	X	X	X
5	BH06	Feb 27, 2020		Water	M20-Fe42873	X	X	X	X	X	X	X	X	X	X	X
6	MS01	Feb 27, 2020		Water	M20-Fe42874	X	X	X	X	X	X	X	X	X	X	X
7	BS01	Feb 27, 2020		Water	M20-Fe42875	X	X	X	X	X	X	X	X	X	X	X
8	QC1	Feb 27, 2020		Water	M20-Fe42876	X	X	X	X	X	X	X	X	X	X	X
9	QC3	Feb 27, 2020		Water	M20-Fe42877				X	X		X	X	X	X	
Test Counts						8	8	8	9	9	8	9	9	9	9	8

SNC-Lavalin / WBHO Infrastructure JV
PO Box 7678
Cloisters Square PO
WA 6850

Attention: **Shaun Gutsell**

Report **705051-W**
Project name STOCKYARD HILL WIND FARM - SPRINGS
Received Date Feb 28, 2020

Client Sample ID			**BH02**	[G01]**BH03**	**BH04**	**BH05**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M20-Fe42869**	**M20-Fe42870**	**M20-Fe42871**	**M20-Fe42872**
Date Sampled			**Feb 27, 2020**	**Feb 27, 2020**	**Feb 27, 2020**	**Feb 27, 2020**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	96	87	108	113
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Ammonia (as N)	0.01	mg/L	0.04	[R09]0.56	< 0.01	< 0.01
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	13	< 5	< 5	< 5
Chloride	1	mg/L	550	680	88	200
Nitrate & Nitrite (as N)	0.05	mg/L	0.18	22	35	13
Nitrate (as N)	0.02	mg/L	0.15	22	35	13
Nitrite (as N)	0.02	mg/L	0.03	< 1	< 0.02	0.05
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
pH (at 25°C)	0.1	pH Units	8.3	8.2	7.6	8.1
Sulphate (as SO4)	5	mg/L	73	37	14	40
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1300	730	310	570
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	< 0.2	22	35	13

Client Sample ID			BH02	[G01]BH03	BH04	BH05
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Fe42869	M20-Fe42870	M20-Fe42871	M20-Fe42872
Date Sampled			Feb 27, 2020	Feb 27, 2020	Feb 27, 2020	Feb 27, 2020
Test/Reference	LOR	Unit				
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	770	440	180	350
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	770	440	180	350
Heavy Metals						
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.43	0.065	< 0.005	< 0.005
Alkali Metals						
Calcium	0.5	mg/L	38	24	18	17
Magnesium	0.5	mg/L	68	43	23	22
Potassium	0.5	mg/L	4.5	4.2	2.1	2.3
Sodium	0.5	mg/L	250	190	68	150
Pathogens						
E.coli	1	MPN/100mL	1.0	1.0	7.0	110
Enterococci	1	MPN/100mL	77	3.0	9.0	2.0

Client Sample ID			BH06	[G01]MS01	BS01	QC1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Fe42873	M20-Fe42874	M20-Fe42875	M20-Fe42876
Date Sampled			Feb 27, 2020	Feb 27, 2020	Feb 27, 2020	Feb 27, 2020
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	89	95	85	85
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			BH06	[G01]MS01	BS01	QC1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Fe42873	M20-Fe42874	M20-Fe42875	M20-Fe42876
Date Sampled			Feb 27, 2020	Feb 27, 2020	Feb 27, 2020	Feb 27, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	[R09]< 1	< 0.01	< 0.01
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Chloride	1	mg/L	110	110	54	110
Nitrate & Nitrite (as N)	0.05	mg/L	38	27	32	35
Nitrate (as N)	0.02	mg/L	38	27	32	35
Nitrite (as N)	0.02	mg/L	< 0.02	< 2	0.02	0.02
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2	< 1	0.2	< 0.2
pH (at 25°C)	0.1	pH Units	7.4	7.4	7.7	7.6
Sulphate (as SO4)	5	mg/L	15	18	11	15
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	380	400	330	390
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	0.2	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	38	27	32.2	35
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	150	200	130	200
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	150	200	130	200
Heavy Metals						
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Alkali Metals						
Calcium	0.5	mg/L	16	17	15	18
Magnesium	0.5	mg/L	21	23	19	23
Potassium	0.5	mg/L	1.9	1.6	1.5	2.0
Sodium	0.5	mg/L	72	72	49	65
Pathogens						
E.coli	1	MPN/100mL	< 1	3.0	1000	4.0
Enterococci	1	MPN/100mL	< 1	< 1	210	6.0

Client Sample ID			QC3
Sample Matrix			Water
Eurofins Sample No.			M20-Fe42877
Date Sampled			Feb 27, 2020
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	82

Client Sample ID			QC3
Sample Matrix			**Water**
Eurofins Sample No.			**M20-Fe42877**
Date Sampled			**Feb 27, 2020**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
Ammonia (as N)	0.01	mg/L	< 0.01
Chloride	1	mg/L	49
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2
Sulphate (as SO4)	5	mg/L	< 5
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	< 0.2
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20
Heavy Metals			
Iron (filtered)	0.05	mg/L	< 0.05
Manganese (filtered)	0.005	mg/L	< 0.005
Alkali Metals			
Calcium	0.5	mg/L	< 0.5
Magnesium	0.5	mg/L	< 0.5
Potassium	0.5	mg/L	< 0.5
Sodium	0.5	mg/L	< 0.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Mar 02, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Mar 02, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Mar 02, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Mar 02, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			
Nitrogens (speciated)			
Ammonia (as N)	Melbourne	Mar 02, 2020	28 Days
- Method: LTM-INO-4200 Ammonia by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Mar 02, 2020	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrate (as N)	Melbourne	Mar 02, 2020	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrite (as N)	Melbourne	Mar 02, 2020	2 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Organic Nitrogen (as N)*	Melbourne	Feb 29, 2020	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Total Kjeldahl Nitrogen (as N)	Melbourne	Mar 02, 2020	7 Days
- Method: LTM-INO-4310 TKN in Waters & Soils by FIA			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	Mar 02, 2020	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
pH (at 25°C)	Melbourne	Mar 02, 2020	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Heavy Metals (filtered)	Melbourne	Mar 02, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins | mgt Suite B11C: Na/K/Ca/Mg	Melbourne	Mar 02, 2020	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
E.coli	Melbourne	Feb 29, 2020	24 Hour
- Method: LTM-MIC-6621 E.Coli and Total Coliforms by the MPN			
Enterococci	Melbourne	Feb 29, 2020	24 Hour
- Method: APHA 9230D Enterococci by MPN			
Eurofins | mgt Suite B11E: Cl/SO4/Alkalinity			
Chloride	Melbourne	Mar 02, 2020	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Sulphate (as SO4)	Melbourne	Mar 02, 2020	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Mar 02, 2020	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Mar 02, 2020	7 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			

eurofins | Environment Testing

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Address: PO Box 7678
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WA 6850

Project Name: STOCKYARD HILL WIND FARM - SPRINGS

Order No.: 3AUC003-PO-1083
Report #: 705051
Phone: 8 9442 2555
Fax:

Received: Feb 28, 2020 6:37 PM
Due: Mar 10, 2020
Priority: 5 Day
Contact Name: Shaun Gutsell

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	E.coli	Enterococci	Iron (filtered)	Manganese (filtered)	pH (at 25°C)	Nitrogens (speciated)	Eurofins | mgt Suite B1	Eurofins | mgt Suite B11E: Cl/SO4/Alkalinity	Eurofins | mgt Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																
Brisbane Laboratory - NATA Site # 20794																
Perth Laboratory - NATA Site # 23736																
External Laboratory																
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**											
1	BH02	Feb 27, 2020		Water	M20-Fe42869	X	X	X	X	X	X	X	X	X	X	X
2	BH03	Feb 27, 2020		Water	M20-Fe42870	X	X	X	X	X	X	X	X	X	X	X
3	BH04	Feb 27, 2020		Water	M20-Fe42871	X	X	X	X	X	X	X	X	X	X	X
4	BH05	Feb 27, 2020		Water	M20-Fe42872	X	X	X	X	X	X	X	X	X	X	X
5	BH06	Feb 27, 2020		Water	M20-Fe42873	X	X	X	X	X	X	X	X	X	X	X
6	MS01	Feb 27, 2020		Water	M20-Fe42874	X	X	X	X	X	X	X	X	X	X	X
7	BS01	Feb 27, 2020		Water	M20-Fe42875	X	X	X	X	X	X	X	X	X	X	X
8	QC1	Feb 27, 2020		Water	M20-Fe42876	X	X	X	X	X	X	X	X	X	X	X
9	QC3	Feb 27, 2020		Water	M20-Fe42877				X	X		X	X	X	X	
Test Counts						8	8	8	9	9	8	9	9	9	9	8

eurofins | Environment Testing

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram | **mg/L:** milligrams per litre | **ug/L:** micrograms per litre

ppm: Parts per million | **ppb:** Parts per billion | **%:** Percentage

org/100mL: Organisms per 100 millilitres | **NTU:** Nephelometric Turbidity Units | **MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	116			70-130	Pass	
TRH C10-C14	%	94			70-130	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
BTEX							
Benzene	%	94			70-130	Pass	
Toluene	%	88			70-130	Pass	
Ethylbenzene	%	87			70-130	Pass	
m&p-Xylenes	%	82			70-130	Pass	
Xylenes - Total	%	83			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	93			70-130	Pass	
TRH C6-C10	%	115			70-130	Pass	
TRH >C10-C16	%	90			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	100			70-130	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	%	109			70-130	Pass	
Chloride	%	105			70-130	Pass	
Nitrate & Nitrite (as N)	%	112			70-130	Pass	
Nitrate (as N)	%	112			70-130	Pass	
Nitrite (as N)	%	105			70-130	Pass	
Sulphate (as SO4)	%	122			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	86			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	86			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	119			70-130	Pass	
Total Alkalinity (as CaCO3)	%	130			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	117			70-130	Pass	
Magnesium	%	111			70-130	Pass	
Potassium	%	92			70-130	Pass	
Sodium	%	115			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M20-Ma04255	NCP	%	126			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M20-Ma04255	NCP	%	105			70-130	Pass	
Toluene	M20-Ma04255	NCP	%	112			70-130	Pass	
Ethylbenzene	M20-Ma04255	NCP	%	107			70-130	Pass	
m&p-Xylenes	M20-Ma04255	NCP	%	124			70-130	Pass	
o-Xylene	M20-Ma04255	NCP	%	103			70-130	Pass	
Xylenes - Total	M20-Ma04255	NCP	%	117			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M20-Ma04255	NCP	%	117			70-130	Pass	
TRH C6-C10	M20-Ma04255	NCP	%	110			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M20-Ma04434	NCP	%	114			70-130	Pass	
Nitrate (as N)	M20-Ma04434	NCP	%	113			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B20-Fe40990	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Carbonate Alkalinity (as CaCO3)	B20-Fe40693	NCP	%	87			70-130	Pass	
Total Alkalinity (as CaCO3)	B20-Fe40693	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Iron (filtered)	M20-Ma00459	NCP	%	70			70-130	Pass	
Manganese (filtered)	M20-Ma00459	NCP	%	70			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M20-Fe42870	CP	%	79			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M20-Fe42870	CP	%	76			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M20-Fe42873	CP	%	99			70-130	Pass	
Chloride	M20-Fe42873	CP	%	96			70-130	Pass	
Nitrite (as N)	M20-Fe42873	CP	%	106			70-130	Pass	
Sulphate (as SO4)	M20-Fe42873	CP	%	109			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M20-Fe42874	CP	%	82			70-130	Pass	
Magnesium	M20-Fe42874	CP	%	80			70-130	Pass	
Potassium	M20-Fe42874	CP	%	102			70-130	Pass	
Sodium	M20-Fe42874	CP	%	83			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M20-Fe42869	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M20-Fe42869	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M20-Fe42869	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M20-Fe42869	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M20-Fe42869	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M20-Fe42869	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Nitrate (as N)	M20-Ma03684	NCP	mg/L	18	0.31	1.0	30%	Pass	
pH (at 25°C)	M20-Fe42869	CP	pH Units	8.3	8.2	pass	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	M20-Fe42869	CP	mg/L	1300	1200	5.0	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M20-Ma00947	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M20-Fe42869	CP	mg/L	770	750	2.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M20-Fe42869	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M20-Fe42869	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M20-Fe42869	CP	mg/L	770	750	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron (filtered)	M20-Ma00459	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M20-Ma00459	NCP	mg/L	0.060	0.059	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Potassium	M20-Fe38806	NCP	mg/L	13	9.5	5.0	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-Fe42851	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-Fe42851	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M20-Fe42851	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M20-Fe42851	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M20-Fe42851	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M20-Fe42851	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	M20-Fe42851	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-Fe42851	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M20-Fe42851	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M20-Fe42873	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Nitrite (as N)	M20-Fe42873	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M20-Fe42874	CP	mg/L	17	17	1.0	30%	Pass	
Magnesium	M20-Fe42874	CP	mg/L	23	23	<1	30%	Pass	
Sodium	M20-Fe42874	CP	mg/L	72	71	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M20-Fe42875	CP	mg/L	54	71	27	30%	Pass	
Sulphate (as SO4)	M20-Fe42875	CP	mg/L	11	13	12	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Biochemical Oxygen Demand (BOD-5 Day)	M20-Fe42876	CP	mg/L	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
R09	Theoretically the TKN result should be greater or equal to ammonia concentration. However the difference reported is within the uncertainty of the individual tests

Authorised By

Ursula Long	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Nandhini Uthayakumaran	Senior Analyst-Microbiology (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 3-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee mail@alsglobal.com

NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: SNC-Lavalin WBHO JV Stockyard Hill Wind Farm	**TURNAROUND REQUIREMENTS :** ☐ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 1474 Stockyard Hill Rd, Stockyard Hill VIC 3373	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes No N/A
PROJECT: SHWF Water	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)** — Free ice / frozen ice bricks present upon receipt? Yes No N/A
PURCHASE ORDER NUMBER:	**COUNTRY OF ORIGIN: AUSTRALIA**	COC: 1 2 3 4 5 6 7 — Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Shaun Gutsell	**CONTACT PH: 0409 434 425**	OF: 1 2 3 4 5 6 7 — Other comment:
SAMPLER: Kelvin Webb	**SAMPLER MOBILE: 0432 495 417**	**RELINQUISHED BY:** K. WEBB — **RECEIVED BY:** — **RELINQUISHED BY:** — **RECEIVED BY:**
COC Emailed to ALS? (YES / ~~NO~~)	**EDD FORMAT (or default): Include ESDAT**	DATE/TIME: 28/2/20 17:05 — DATE/TIME: 29/2/20 5:05 — DATE/TIME: — DATE/TIME:
Email Reports to: Kelvin@landkwality.com.au; Shaun.Gutsell@wbho.com.au		
Email Invoice to: Emma.Heyde@snclavalin.com; Shaun.Gutsell@wbho.com.au		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	pH, TDS	Major Cations	Major Anions (incl. Alkalinity)	Dissolved Fe, Mn	Nitrogens - speciated (TKN, NH3, NO2, NO3, Total N, Organic N, NOX)	TRH, BTEXN (NEPM 2013)			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	QC 2	27/02/2020	Water	Indicated on Bottles	6	X	X	X	X	X	X			
	** Please chill [freeze nutrients] all samples on receipt until analysis **													
				TOTAL	6									

Environmental Division
Melbourne
Work Order Reference
EM2003341

Telephone : + 61-3-8549 9600

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2003341**

Client	: **SNC-Lavalin / WBHO Infrastructure Joint Venture**	Laboratory	: Environmental Division Melbourne
Contact	: SHAUN GUTSELL	Contact	: Customer Services EM
Address	: PO Box 7678 CLOISTERS SQUARE 6850	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: shaun.gutsell@wbho.com.au	E-mail	: ALSEnviro.Melbourne@alsglobal.com
Telephone	: ----	Telephone	: +61-3-8549 9600
Facsimile	: ----	Facsimile	: +61-3-8549 9626
Project	: SHWF Water	Page	: 1 of 2
Order number	: 3AUC003-PO-0270	Quote number	: EM2019SNCWBHJV0002 (EN/333)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: KW		

Dates

Date Samples Received	: 28-Feb-2020 17:05	Issue Date	: 29-Feb-2020
Client Requested Due Date	: 06-Mar-2020	Scheduled Reporting Date	: **06-Mar-2020**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 1.9°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample(s) received in non-ALS container(s).**
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EK060G Organic Nitrogen as N (TKN - NH3) By Discrete	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-07 Total Nitrogen + NO2 + NO3 + NH3	WATER - W-04 TRH/BTEXN
EM2003341-001	27-Feb-2020 00:00	QC 2	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
QC 2	Clear Plastic Bottle - Natural	----	27-Feb-2020	28-Feb-2020	×	----	----

Requested Deliverables

ACCOUNTS

- A4 - AU Tax Invoice (INV)	Email	Admin.Accounts@snclavalin.com

EMMA HEYDE

- A4 - AU Tax Invoice (INV)	Email	Emma.Heyde@snclavalin.com

KELVIN WEBB

- *AU Certificate of Analysis - NATA (COA)	Email	kelvin.webb@snclavalin.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	kelvin.webb@snclavalin.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	kelvin.webb@snclavalin.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	kelvin.webb@snclavalin.com
- Chain of Custody (CoC) (COC)	Email	kelvin.webb@snclavalin.com
- EDI Format - ENMRG (ENMRG)	Email	kelvin.webb@snclavalin.com

SHAUN GUTSELL

- *AU Certificate of Analysis - NATA (COA)	Email	shaun.gutsell@wbho.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	shaun.gutsell@wbho.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	shaun.gutsell@wbho.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	shaun.gutsell@wbho.com.au
- A4 - AU Tax Invoice (INV)	Email	shaun.gutsell@wbho.com.au
- Chain of Custody (CoC) (COC)	Email	shaun.gutsell@wbho.com.au
- EDI Format - ENMRG (ENMRG)	Email	shaun.gutsell@wbho.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2003341**	Page	: 1 of 5
Client	: **SNC-Lavalin / WBHO Infrastructure Joint Venture**	Laboratory	: Environmental Division Melbourne
Contact	: SHAUN GUTSELL	Contact	: Customer Services EM
Address	: PO Box 7678 CLOISTERS SQUARE 6850	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: SHWF Water	Date Samples Received	: 28-Feb-2020 17:05
Order number	: 3AUC003-PO-0270	Date Analysis Commenced	: 28-Feb-2020
C-O-C number	: ----	Issue Date	: 05-Mar-2020 15:38
Sampler	: KW		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA

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
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Ionic balances were calculated using: major anions - chloride, alkalinity, sulfate and NOX; and major cations - calcium, magnesium, potassium, sodium for #1.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EA015H: EM2003341 #1: 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.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC 2	----	----	----	----
				Client sampling date / time	27-Feb-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2003341-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.93	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		536	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		148	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		148	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		10	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		56	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		20	----	----	----	----
Magnesium	7439-95-4	1	mg/L		26	----	----	----	----
Sodium	7440-23-5	1	mg/L		79	----	----	----	----
Potassium	7440-09-7	1	mg/L		3	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		0.02	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		27.5	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		27.5	----	----	----	----
EK060G:Organic Nitrogen as N (TKN-NH3) By Discrete Analyser									
Organic Nitrogen as N	----	0.1	mg/L		1.1	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.1	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC 2	----	----	----	----
				Client sampling date / time	27-Feb-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2003341-001	--------	--------	--------	--------
					Result	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**28.6**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**6.71**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**6.65**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**0.45**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**124**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**107**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**107**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2003341**	Page	: 1 of 7
Client	: **SNC-Lavalin / WBHO Infrastructure Joint Venture**	Laboratory	: Environmental Division Melbourne
Contact	: SHAUN GUTSELL	Contact	: Customer Services EM
Address	: PO Box 7678 CLOISTERS SQUARE 6850	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: SHWF Water	Date Samples Received	: 28-Feb-2020
Order number	: 3AUC003-PO-0270	Date Analysis Commenced	: 28-Feb-2020
C-O-C number	: ----	Issue Date	: 05-Mar-2020
Sampler	: KW		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 2888042)									
EM2003339-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.20	7.31	1.52	0% - 20%
EM2003319-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.92	6.93	0.144	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2892187)									
EM2003340-044	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	9560	9210	3.70	0% - 20%
EM2003346-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	39800	43000	7.81	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2888041)									
EM2003331-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	884	898	1.50	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	884	898	1.50	0% - 20%
EM2003319-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	187	193	3.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	187	193	3.06	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2887954)									
EM2003336-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2260	2250	0.807	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2887957)									
EM2003348-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3040	3040	0.320	0% - 20%
EM2003336-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	6230	6290	0.906	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2890620)									
EM2003340-027	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	806	796	1.18	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1730	1720	1.08	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11600	11400	1.76	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	319	314	1.72	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 2890620) - continued									
EM2003346-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	457	448	2.05	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	955	933	2.36	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7710	7560	2.01	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	306	300	2.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2890623)									
EM2003340-051	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2003346-006	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2889225)									
EM2003266-012	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.32	0.34	5.67	0% - 20%
EM2003348-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.21	0.20	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2887958)									
EM2003340-028	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2003340-047	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2889224)									
EM2003232-016	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2003348-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.50	1.76	15.9	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2889053)									
EM2003345-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.00	No Limit
EM2003321-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	71.6	72.4	1.12	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2887487)									
EM2003320-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM2003346-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2887487)									
EM2003320-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM2003346-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2887487)									
EM2003320-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM2003346-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2887487) - continued									
EM2003346-003	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2892187)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.2	93.7	107
				<10	293 mg/L	104	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 2888041)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2887954)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	85.8	117
				<1	100 mg/L	99.7	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 2887957)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.4	85.0	122
				<1	1000 mg/L	97.6	85.0	122
ED093F: Dissolved Major Cations (QCLot: 2890620)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	94.6	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	98.7	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 2890623)								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.3	84.8	107
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.5	91.8	109
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2889225)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	93.9	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2887958)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	108	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2889224)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	106	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2889053)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	106	70.0	117
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2887431)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3330 µg/L	104	44.8	125
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16500 µg/L	95.0	51.3	135
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7800 µg/L	95.5	49.4	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2887487)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	97.8	65.5	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2887431)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2887431) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5690 µg/L	88.3	47.3	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	20700 µg/L	96.6	50.4	133
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1510 µg/L	97.7	45.2	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2887487)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	100	64.3	126
EP080: BTEXN (QCLot: 2887487)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	91.8	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	100	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	101	72.0	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	109	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	96.1	70.5	127

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2887954)							
EM2003341-001	QC 2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	96.9	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2887957)							
EM2003341-001	QC 2	ED045G: Chloride	16887-00-6	400 mg/L	103	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2890623)							
EM2003340-051	Anonymous	EG020A-F: Manganese	7439-96-5	0.2 mg/L	100	64.0	134
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2889225)							
EM2003309-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2887958)							
EM2003340-029	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	100	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2889224)							
EM2003232-017	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	70.6	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2889053)							
EM2003334-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.3	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2887487)							
EM2003320-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	72.9	43.0	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2887487)							
EM2003320-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	74.0	44.0	122
EP080: BTEXN (QCLot: 2887487)							
EM2003320-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	80.4	68.0	130
		EP080: Toluene	108-88-3	20 µg/L	82.0	72.0	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2003341**	Page	: 1 of 7
Client	: **SNC-Lavalin / WBHO Infrastructure Joint Venture**	Laboratory	: Environmental Division Melbourne
Contact	: SHAUN GUTSELL	Telephone	: +61-3-8549 9600
Project	: SHWF Water	Date Samples Received	: 28-Feb-2020
Site	: ----	Issue Date	: 05-Mar-2020
Sampler	: KW	No. of samples received	: 1
Order number	: 3AUC003-PO-0270	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK055G: Ammonia as N by Discrete Analyser	EM2003309--001	Anonymous	**Ammonia as N**	7664-41-7	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
QC 2	----	----	----	02-Mar-2020	27-Feb-2020	**4**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
QC 2	**27-Feb-2020**	**----**	----	----	**02-Mar-2020**	27-Feb-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
QC 2	**27-Feb-2020**	**----**	----	----	**04-Mar-2020**	05-Mar-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
QC 2	**27-Feb-2020**	**----**	----	----	**02-Mar-2020**	12-Mar-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
QC 2	**27-Feb-2020**	**----**	----	----	**03-Mar-2020**	26-Mar-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
QC 2	**27-Feb-2020**	**----**	----	----	**03-Mar-2020**	26-Mar-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
QC 2	**27-Feb-2020**	**----**	----	----	**04-Mar-2020**	26-Mar-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
QC 2	**27-Feb-2020**	**----**	----	----	**03-Mar-2020**	25-Aug-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
QC 2	**27-Feb-2020**	**----**	----	----	**03-Mar-2020**	26-Mar-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
QC 2	**27-Feb-2020**	**----**	----	----	**28-Feb-2020**	29-Feb-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
QC 2	**27-Feb-2020**	**----**	----	----	**03-Mar-2020**	26-Mar-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
QC 2	**27-Feb-2020**	**03-Mar-2020**	26-Mar-2020	✓	**03-Mar-2020**	26-Mar-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
QC 2	**27-Feb-2020**	**02-Mar-2020**	05-Mar-2020	✓	**02-Mar-2020**	11-Apr-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC 2	**27-Feb-2020**	**02-Mar-2020**	12-Mar-2020	✓	**02-Mar-2020**	12-Mar-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
QC 2	**27-Feb-2020**	**02-Mar-2020**	05-Mar-2020	✓	**02-Mar-2020**	11-Apr-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC 2	**27-Feb-2020**	**02-Mar-2020**	12-Mar-2020	✓	**02-Mar-2020**	12-Mar-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
QC 2	**27-Feb-2020**	**02-Mar-2020**	12-Mar-2020	✓	**02-Mar-2020**	12-Mar-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Organic Nitrogen as N (TKN - NH3) (discrete analyser)	EK060G	WATER	In house: Referenced to APHA 4500-Norg/4500-NH3. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

APPENDIX D

Important information relating to this report

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