Ground Doctor Pty Ltd

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24 September 2018

Hy-tec Industries Pty Ltd
Austen Quarry
391 Jenolan Caves Road
Hartley NSW 2790
rod.welsh@adbri.com.au

Attention: Mr Rodd Welsh

Dear Rodd,

RE: JUNE 2018 GROUNDWATER MONITORING RESULTS, AUSTEN QUARRY, HARTLEY, NSW

Ground Doctor was engaged by Hy-tec Industries Pty Ltd (Hy-tec) to undertake the June 2018 round of baseline groundwater monitoring at the Austen Quarry, 391 Jenolan Caves Road, Hartley, NSW (the site).

1 Background Information

The Stage 2 Expansion of the Austen Quarry was approved on 15 July 2015 (development application SSD-6084). An updated site specific Water Management Plan (WMP) (Groundwork Plus, 2017) was developed as required by the conditions of consent for development. The WMP included provisions for managing both surface water and groundwater impacts at the site. The revised WMP was approved in late 2017.

The WMP required the establishment of groundwater monitoring bores at three locations around the periphery of the open pit, establishment of water level data loggers in each bore and collection of four rounds of baseline groundwater quality over two years following establishment of the monitoring bores.

The monitoring bores were established in December 2017. Ground Doctor conducted the first round of baseline monitoring in early January 2018. Water level loggers were installed into the monitoring bores at the completion of the January 2018 monitoring round.

2 Objectives

The objectives of the work undertaken was to complete the second round of baseline groundwater monitoring in accordance with the WMP.

3 Monitoring Bore Locations

The monitoring bore locations are shown on *Figure 1* of *Attachment A*. Monitoring bore coordinates and details are summarised in *Table 1*. *Table 1* also presents a summary of the monitoring bore construction details.

Table 1: Monitoring Bore Construction Details

Bore ID	Easting	Northing	Approx. Surface Elevation (AHD)	Depth to Bottom (btc)	Screened Intervals (bgl)	Stickup (agl)	Depth to Water (btc)
MB01S	235245	6281077	700m	7.42m	3.7-6.7m	0.8m	4.63m
MB01D	235259	6281098	700m	29.30m	20-23m 26-28.5m	0.8m	5.49m
MB02	235915	6280398	710m	29.10m	10.5-13.5m 22.5-28.5m	0.6m	17.43m
MB03	236419	6281786	690m	25.31m	18.5-24.5m	0.4m	Dry

Eastings and northings are MGA Zone 56.
btc = below top of casing
bgl = below ground level
agl = above ground level

4 Groundwater Sampling Methodology

Each monitoring bore was gauged using an electronic dip meter prior to any disturbance of the water column. Bores were gauged on 21 June 2018. The depth to water was measured from the top of casing at each bore. MB03 was installed into a dry hole and the hole was found to be dry at the time of gauging.

The water level logger was removed from each borehole following gauging. Data stored within the water level loggers were downloaded on 22 June 2018. The water level loggers were reinstated in each monitoring bore following sampling on the morning of 22 June 2018.

Deep bores were purged dry using a bore specific disposable bailer. The deep bores were bailed dry on 21 June 2018. The wells were allowed to recover for a period of approximately 18 hours prior to sample collection. The bailer was lowered gently into the deep bores to collect samples that were free of suspended sediment. After samples had been collected additional water was bailed from the deep bores to allow measurement of field water quality parameters.

The shallow bore (MB01S) was also bailed dry prior to sampling. The well was allowed to recover for a period of approximately 20 minutes prior to sampling. Water quality parameters were measured regularly during purging of MB01S to assess the effectiveness of purging as well as being measured at the time of sampling.

A water sample was collected from a sump in the pit floor on 22 June 2018. An unpreserved sample bottle was filled directly from the ponded water in the sump. This bottle was then used to fill preserved sample bottles and samples requiring field filtering. Once sampling was complete field water quality parameters were measured. The water quality meter was placed in the pond and allowed to equilibrate for a period of approximately 10 minutes. The field water quality parameters were then recorded.

Water quality parameters were measured in Yorkeys Creek adjacent to MB01S on 22 June 2018. The water quality meter was left to equilibrate within standing water in the Creek for a period of approximately 10 minutes prior to recording the results. This location does not form part of the monitoring requirements outlined in the WMP, however, the data was collected to compliment

shallow groundwater measurements in the nearby MB01S, which may interact with water in the Creek or vice versa.

Water quality measurements were made using a YSI water quality meter hired from Airmet Scientific. The meter was calibrated prior to dispatch. A calibration record for the water quality meter is presented as *Attachment C*.

Water samples were collected into laboratory supplied bottles, each marked with the appropriate identification. Sample bottles were appropriately preserved where necessary. The samples for dissolved metals analysis were filtered in the field using disposable 45µm filters. The sampler wore disposable nitrile gloves at all times during sampling to minimise potential for cross contamination. Samples were placed into an esky with ice immediately after collection. Ice was replenished as required to ensure samples remained cool whilst in storage.

Water samples were dispatched to ALS Lithgow laboratory on the afternoon of 22 June 2018. It is understood that the samples were forwarded to the ALS Sydney laboratory for analysis on Monday 25 June 2018.

Groundwater samples collected from each monitoring bore were analysed for major cations, major anions, nutrients and dissolved metals as specified in Table 37 of the WMP (Groundwork Plus, 2017). The water samples collected from the pit were analysed for major cations, major anions, nutrients, dissolved metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs) as specified in Table 37 of the WMP (Groundwork Plus, 2017).

5 Field Observations

Field observations were recorded on bore sampling forms, which are presented as *Attachment B*. Depth to water results and measured field parameters at the time of sampling are presented in *Table 2* with data collected during the first (January 2018) monitoring round.

Table 2: Summary of Field Observations

Bore ID	Date	DTW (m btc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
MB01S	Jan-18	4.63m	15.9	6.08	575	6.27	-11.6
	Jun-18	4.48m	16.5	5.41	343	7.41	94
MB01D	Jan-18	5.49m	16.7	2.64	1170	7.02	-22
	Jun-18	1.94m	14.7	1.56	779	7.44	85
MB02	Jan-18	17.43m	16.4	3.73	1210	7.03	-5
	Jun-18	17.54m	12.9	5.08	927	7.32	130
MB03	Jan-18	Dry	-	-	-	-	-
	Jun-18	Dry	-	-	-	-	-
Pit Water	Jan-18	-	21.9	4.30	820	7.00	8
	Jun-18	-	7.6	6.97	357	7.01	119
Yorkeys Creek	Jan-18	-	-	-	-	-	-
	Jun-18	-	6.7	12.25	353	7.93	104

6 Analytical Results

The certificate of analysis for water samples is presented as *Attachment E*.

A summary of analytical data is presented in *Table G1* of *Attachment G*. The summary table presented January 2018 and June 2018 baseline groundwater quality against preliminary triggers outlined in the WMP (Groundwork Plus, 2017).

Only two rounds of data have been collected from the site to date with the aim of establishing a baseline. There can be no meaningful interpretation of data trends in a two point data set.

Exceedances of preliminary triggers in the June 2018 monitoring round were as follows:

- The reported zinc concentration in the water sample collected from the "pit" exceeded the ANZECC (2000) threshold for 95% protection of fresh water aquatic ecosystems. Zinc was detected in the "pit" sample in both monitoring rounds, as well as in two of the groundwater monitoring bores.

- The reported cadmium concentration in the water sample collected from the "pit" exceeded the ANZECC (2000) threshold for 95% protection of fresh water aquatic ecosystems and the Australian Drinking Water (2011) threshold. Cadmium was detected in the "pit" sample in both monitoring rounds.

- The report manganese concentration in the sample collected from "MB01D" exceeded the Australian Drinking Water (2011) threshold.

There is no obvious source of metals contamination within the quarry. The observed occurrences of metals in water in the base of the quarry and in some groundwater monitoring wells is attributed to naturally occurring sources. The significance of the reported concentrations of metals at the designated monitoring points will be reassessed once four rounds of baseline data have been collected.

7 Water Level Logger Data

All water level loggers were set to record water level at 6 hour intervals commencing 12am on 12 January 2018. The water level data loggers were not vented. A barologger was deployed to record air pressure at the same recording interval to allow water level logger readings to be corrected to account for changes in air pressure.

Water level data loggers installed in MB01S, MB01D and MB02, and the barometric pressure logger installed at MB03, were downloaded on 22 June 2018.

The raw data was corrected for changes in air pressure using the barometric pressure data. The manual water level measurement collected at the time the loggers were removed from each borehole were used to convert the water level logger data to a depth to water relative to the top of the PVC bore casing.

At the completion of the monitoring round the water level loggers were redeployed in their respective boreholes.

Corrected water level data is presented graphically as *Attachment D*.

Water levels within MB01S and MB02 were relatively consistent across the monitoring period. The water level within MB01D stayed below the water level logger for a period of approximately 3 weeks after deployment owing to the slow rate of groundwater recharge following purging and sampling in January 2018. Once groundwater had risen above the data logger in MB01D the depth

to water varied by more than 3m over the monitoring period. The reason for variation in MB01D is not well understood but should become more apparent with the collection of longer term water level data.

At the time of reporting relative bore elevation data was not available. Using the observable elevation difference between MB01D and MB01S it is apparent that the standing water level in MB01D is higher than that in the nearby MB01S. This observation indicates that there is upward flow of groundwater toward Yorkeys Creek in the vicinity of those monitoring bores. That is, water within Yorkeys Creek is likely to be comprised of both surface water and groundwater discharge.

8 Estimated Groundwater Inflow to Pit

The WMP specifies that water inflow to the pit should be estimated on a quarterly basis by measuring changes to water levels within the pit during a period of fine weather and no water extraction. Ground Doctor monitored water level changes in a sump excavated into the lowest part of the pit between 9am on 21 June 2018 and 9am on 22 June 2018.

Water had not been removed from the pit for several days prior to monitoring. There had been no significant rainfall in the days leading up to the monitoring period and there was no obvious overland flow of water into the pit floor during the monitoring period.

A measuring benchmark was established in the sump at the commencement of monitoring and the height of standing water was noted to the nearest millimetre. The height of water at the benchmark was noted 24 hours later. Ground Doctor recorded a change in water level of 15mm during the 24 hour monitoring period.

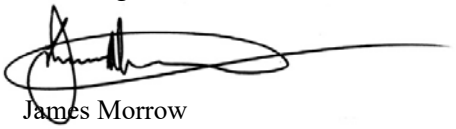
A photographic log of the measurement point and the extent of the pit and location of the sump is presented as *Attachment F*.

The sump had direct connection to rock in the base of the pit that had been blasted, but not excavated. The pit floor at the time of monitoring was estimated to be approximately 230m long with an average width of 30m, giving an estimated area of approximately 6900m^2. The average porosity of the material in the base of the pit was assumed to be 20%. This was considered conservative as the rock had not previously been excavated so was likely to have a much lower porosity. A 15mm (0.015m) change in water levels across 6900m^2 area with average porosity of 20% equates to approximately 20.7m^3/day (20,700L) of groundwater inflow. The estimated rate of inflow is equivalent to an annual rate of 7,555m^3/yr (or 7.6ML/yr). The calculated groundwater inflow is less than Hy-Tec's licensed annual take of groundwater from the pit.

The procedure outlined in the WMP includes incorporation of evaporation data into calculations of water level changes. The monitoring methodology outlined in the WMP was developed on the assumption that water was present in an open lake at the base of the pit. The site conditions at the time of monitoring differed from those inferred when the water inflow measurement procedure was developed. Most of the water in the base of the pit is situated beneath the surface in previously blasted rock. As such, evaporation would be minimal and has been assumed to have not influenced water levels in the pit sump during the monitoring period.

If you have any questions regarding the works outlined in this report please contact the undersigned on 0407 875 302.

Kind Regards



James Morrow
Environmental Engineer
Ground Doctor Pty Ltd

2018-GD001-L2v2

Attachment A – Figure

Attachment B – Groundwater Sampling Forms

Attachment C – Water Quality Meter Calibration Record

Attachment D – Groundwater Level Charts

Attachment E – Laboratory Certificate of Analysis

Attachment F – Pit Water Level Monitoring Photographs

Attachment G – Analytical Results Summary Table

9 References

- Groundwork Plus (2017), "*Austen Quarry Water Management Plan*", Report Number 1517_610_002_RPTO_Water Management Plan_V8, 10 October 2017

Attachment A

Figure

Ground Doctor Pty Ltd

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Project Name: Groundwater Monitoring Bore Installation and January 2018 Groundwater Monitoring Round	Figure 1
Project Number: 2018-GD001	Groundwater Monitoring Bore Locations

Attachment B

Groundwater Sampling Forms

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB01S
Date:	21 and 22 June 2018

Depth to Water:	4.480m
Depth to Bottom:	7.42m
Saturated Well Depth:	2.94m
Well Volume:	6L (Saturated Well Depth x 2L)

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
10L	16.5	3.71	464	7.44	68
20L	16.5	4.67	460	7.4	91
25L	16.5	5.41	343	7.41	94

Description of Works / Observations:
Good water inflow but bailed dry after 25L removed.
Groundwater was turbid (grey-brown) during purging.
Groundwater was allowed to settle before sampling to minimise turbidy in samples.

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB01D
Date:	21 and 22 June 2018

Depth to Water:	1.94m
Depth to Bottom:	29.3m
Saturated Well Depth:	27.4m
Well Volume:	55L

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
55L	14.7	1.56	779	7.44	85

Description of Works / Observations:
Well bailed dry after 55L removed (well volume)
Water was turbid grey-brown during purging, becoming siltier with increased drawdown.
Well allowed to recover overnight.
Water sampled was clear and colourless (low turbidy).

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB02
Date:	21 and 22 June 2018

Depth to Water:	17.535m
Depth to Bottom:	29.10m
Saturated Well Depth:	11.6m
Well Volume:	23.2L

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
35L	12.9	5.08	927	7.32	130

Description of Works / Observations:
Well bailed dry after 35L removed (well volume plus annulus volume)
Water was turbid grey during purging, becoming siltier with increased drawdown.
Well allowed to recover overnight.
Water sampled was clear and colourless (low turbidy).

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB03
Date:	21 and 22 June 2018

Depth to Water:	Well Dry
Depth to Bottom:	25.31m
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA					

Description of Works / Observations:
Well was dry.

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	Pit Sump
Date:	22-Jun-18

Depth to Water:	NA
Depth to Bottom:	NA
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA	7.6	6.97	357	7.01	119

Description of Works / Observations:
Water in pit sump was clear and colourless.
No hydrocarbon sheen visible on surface of pit water.
No unnatural odour noted in sampled water.

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	Yorkeys Creek
Date:	22-Jun-18

Depth to Water:	NA
Depth to Bottom:	NA
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA	6.7	12.25	353	7.93	104

Description of Works / Observations:
Field parametrs measured in Yorkeys Creek adjacent to MB01S

Attachment C

Water Quality Meter Calibration Form

Multi Parameter Water Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 09K100887

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		309865	pH 9.71
1. pH 7.00		pH 7.00		307928	pH 7.02
2. pH 4.00		pH 4.00		307927	pH 4.13
3. mV		230.8mV		306014/311901	230.8mV
4. EC		2.76mS		306341	2.76mS
5. D.O		0.00ppm		5253	0.00ppm
6. Temp		20.5°C		MultiTherm	20.2°C

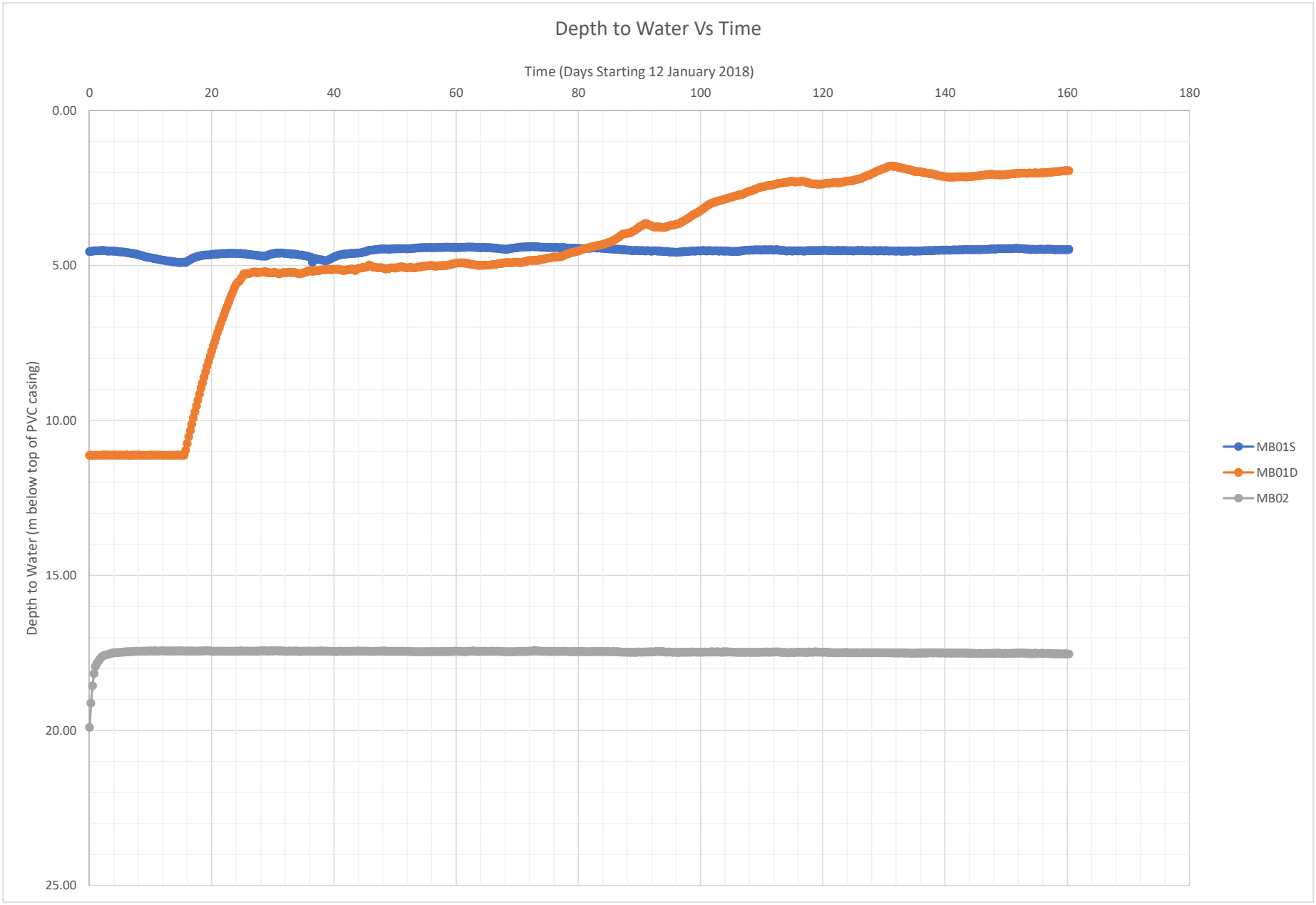
Calibrated by: SB **Sophie Boler**

Calibration date: **15/06/2018**

Next calibration due: **15/07/2018**

Attachment D

Groundwater Level Chart


Depth to Water Vs Time
Time (Days Starting 12 January 2018)
0
20
40
60
80
100
120
140
160
180
0.00
5.00
10.00
15.00
20.00
25.00
Depth to Water (m below top of PVC casing)
MB01S
MB01D
MB02

Attachment E

Laboratory Certificate of Analysis

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1818613**	Page	: 1 of 7
Client	: **HY-TEC INDUSTRIES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MARK TAYLOR	Contact	: Customer Services ES
Address	: GATEWAY BUSINESS PARK 4/63-79 PARRAMATTA RD SILVERWATER NSW 2128	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Hytec Austen Quarry Baseline Groundwater Monitoring	Date Samples Received	: 26-Jun-2018 08:30
Order number	: 2201035512	Date Analysis Commenced	: 27-Jun-2018
C-O-C number	: ----	Issue Date	: 02-Jul-2018 18:57
Sampler	: James Morrow		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 5		
No. of samples analysed	: 5		

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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- 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	MB01S	MB01D	MB02	Pit	DUPB
				Client sampling date / time	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		ES1818613-001	ES1818613-002	ES1818613-003	ES1818613-004	ES1818613-005
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		370	753	822	420	416
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		232	335	520	201	197
Total Alkalinity as CaCO3	----	1	mg/L		232	335	520	201	197
ED040F: Dissolved Major Anions									
Silicon	7440-21-3	0.05	mg/L		10.1	31.6	11.3	19.4	19.3
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		23	248	127	98	98
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		44	23	78	10	13
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		74	150	71	49	50
Magnesium	7439-95-4	1	mg/L		13	15	31	26	25
Sodium	7440-23-5	1	mg/L		22	59	190	25	25
Potassium	7440-09-7	1	mg/L		1	1	2	3	3
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L		0.001	0.005	0.004	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		0.013	0.055	0.085	0.029	0.029
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	0.0019	0.0020
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L		<0.001	0.003	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.153	0.530	0.046	0.188	0.196
Molybdenum	7439-98-7	0.001	mg/L		<0.001	0.004	0.002	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	0.003	0.002	0.001	0.002
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		0.245	0.897	3.01	0.231	0.233
Titanium	7440-32-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MB01S	MB01D	MB02	Pit	DUPB
				Client sampling date / time	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		ES1818613-001	ES1818613-002	ES1818613-003	ES1818613-004	ES1818613-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.006**	<0.005	**0.160**	**0.164**
Boron	7440-42-8	0.05	mg/L		<0.05	**0.32**	**0.27**	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	**0.02**	**0.08**	**0.05**	**0.05**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	**0.48**	**0.48**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	**0.48**	**0.48**
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**6.36**	**12.5**	**15.2**	**6.34**	**6.34**
Total Cations	----	0.01	meq/L		**5.74**	**11.3**	**14.4**	**5.75**	**5.72**
Ionic Balance	----	0.01	%		**5.04**	**5.01**	**2.78**	**4.88**	**5.19**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		----	----	----	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L		----	----	----	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		----	----	----	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L		----	----	----	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L		----	----	----	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L		----	----	----	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L		----	----	----	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L		----	----	----	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L		----	----	----	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		----	----	----	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		----	----	----	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		----	----	----	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		----	----	----	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		----	----	----	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		----	----	----	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MB01S	MB01D	MB02	Pit	DUPB
				Client sampling date / time	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		ES1818613-001	ES1818613-002	ES1818613-003	ES1818613-004	ES1818613-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		----	----	----	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		----	----	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		----	----	----	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		----	----	----	<20	<20
C10 - C14 Fraction	----	50	µg/L		----	----	----	<50	<50
C15 - C28 Fraction	----	100	µg/L		----	----	----	<100	<100
C29 - C36 Fraction	----	50	µg/L		----	----	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		----	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		----	----	----	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		----	----	----	<20	<20
>C10 - C16 Fraction	----	100	µg/L		----	----	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L		----	----	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L		----	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		----	----	----	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		----	----	----	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		----	----	----	<1	<1
Toluene	108-88-3	2	µg/L		----	----	----	<2	<2
Ethylbenzene	100-41-4	2	µg/L		----	----	----	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		----	----	----	<2	<2
ortho-Xylene	95-47-6	2	µg/L		----	----	----	<2	<2
^ Total Xylenes	----	2	µg/L		----	----	----	<2	<2
^ Sum of BTEX	----	1	µg/L		----	----	----	<1	<1
Naphthalene	91-20-3	5	µg/L		----	----	----	<5	<5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		----	----	----	**21.4**	**17.6**
2-Chlorophenol-D4	93951-73-6	1.0	%		----	----	----	**55.9**	**47.2**
2.4.6-Tribromophenol	118-79-6	1.0	%		----	----	----	**49.7**	**49.0**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		----	----	----	**76.4**	**87.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MB01S	MB01D	MB02	Pit	DUPB
				Client sampling date / time	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00	22-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		ES1818613-001	ES1818613-002	ES1818613-003	ES1818613-004	ES1818613-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	1.0	%		----	----	----	**86.6**	**65.8**
4-Terphenyl-d14	1718-51-0	1.0	%		----	----	----	**91.0**	**76.6**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		----	----	----	**106**	**99.4**
Toluene-D8	2037-26-5	2	%		----	----	----	**100**	**86.6**
4-Bromofluorobenzene	460-00-4	2	%		----	----	----	**94.2**	**91.7**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1818613**	Page	: 1 of 10
Client	: **HY-TEC INDUSTRIES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MARK TAYLOR	Contact	: Customer Services ES
Address	: GATEWAY BUSINESS PARK 4/63-79 PARRAMATTA RD SILVERWATER NSW 2128	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Hytec Austen Quarry Baseline Groundwater Monitoring	Date Samples Received	: 26-Jun-2018
Order number	: 2201035512	Date Analysis Commenced	: 27-Jun-2018
C-O-C number	: ----	Issue Date	: 02-Jul-2018
Sampler	: James Morrow		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 5		
No. of samples analysed	: 5		

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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

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 (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1764300)									
ES1818571-022	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1230	1360	9.59	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1757047)									
ES1818613-004	Pit	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	201	199	0.884	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	201	199	0.884	0% - 20%
ES1818579-042	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	1910	1910	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1910	1910	0.00	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 1757544)									
ES1818613-001	MB01S	ED040F: Silicon	7440-21-3	0.05	mg/L	10.1	9.94	1.33	0% - 20%
ES1817359-003	Anonymous	ED040F: Silicon	7440-21-3	0.05	mg/L	1.56	1.56	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1757543)									
ES1818613-003	MB02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	127	108	16.0	0% - 20%
ES1817359-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	47	45	4.28	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1757542)									
ES1818491-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ES1817359-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	35	36	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1757198)									
ES1818340-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	300	298	0.826	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	20	20	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	632	641	1.30	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/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 (%)*
ED093F: Dissolved Major Cations (QC Lot: 1757198) - continued									
ES1818574-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	13	13	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	15	14	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	84	84	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757199)									
ES1818340-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.114	0.113	1.14	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.323	0.324	0.411	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	1.24	1.27	3.06	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.12	0.00	No Limit
ES1818574-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.029	0.029	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.019	0.019	0.00	0% - 50%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.09	0.09	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757200)									

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 (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757200) - continued									
ES1818471-001	Anonymous	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.866	0.856	1.28	0% - 20%
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757202)									
ES1818613-003	MB02	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.085	0.085	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.046	0.049	5.76	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.27	0.28	4.23	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1757201)									
ES1818477-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1818613-004	Pit	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1757534)									
ES1818392-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	7.50	7.50	0.00	0% - 20%
ES1818636-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	45.9	44.8	2.30	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1757546)									
ES1818613-001	MB01S	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: 1757535)									
ES1818613-001	MB01S	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.02	80.6	No Limit
ES1818701-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.13	0.14	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1759381)									
ES1818566-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
ES1818691-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1759381)									
ES1818566-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
ES1818691-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1759381)									

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: 1759381) - continued									
ES1818566-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	0.004 mg/L	4	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	0.004 mg/L	4	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	0.003 mg/L	4	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit
ES1818691-001	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

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: 1764300)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	87	109
				<10	293 mg/L	105	66	126
ED037P: Alkalinity by PC Titrator (QCLot: 1757047)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	105	81	111
				----	50 mg/L	94.0	70	130
ED040F: Dissolved Major Anions (QCLot: 1757544)								
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	114	91	123
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1757543)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 1757542)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	92.9	81	127
ED093F: Dissolved Major Cations (QCLot: 1757198)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	91.6	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.7	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.7	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757199)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.1	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.3	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.7	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	94.4	85	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757199) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.4	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757200)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	99.2	81	113
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	99.6	77	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757202)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.8	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.2	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.8	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.3	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.2	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.3	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.1	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.9	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.7	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 1757201)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.3	83	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1757534)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.3	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1757546)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1757535)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.4	91	113
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1754565)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	71.0	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	70.8	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	69.7	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	72.8	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	90.9	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	71.6	64	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1754565) - continued								
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	81.9	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	80.1	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	76.5	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	78.3	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	68.1	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	79.4	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	79.0	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	70.8	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	71.8	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	73.1	59	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1754566)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	85.9	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.4	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	84.8	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1759381)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	84.6	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1754566)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	95.6	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	96.2	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	88.2	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1759381)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.0	75	127
EP080: BTEXN (QCLot: 1759381)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	91.9	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	90.2	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	88.6	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	84.9	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	87.3	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	80.7	70	120

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**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Recovery Limits (%)

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
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1757543)							
ES1817359-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1757542)							
ES1817359-003	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	107	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757199)							
ES1818340-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	87.4	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	84.5	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	85.2	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	84.0	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	82.3	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	84.7	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	86.7	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	79.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	82.2	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	85.4	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	85.2	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	85.8	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757202)							
ES1818613-005	DUPB	EG020A-F: Arsenic	7440-38-2	1 mg/L	83.9	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	85.6	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	82.2	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	82.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	72.8	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	81.2	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	82.0	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	79.2	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	82.0	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	82.2	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	81.9	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	83.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1757201)							
ES1818477-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	91.7	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1757534)							
ES1818392-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1757546)							
ES1818613-001	MB01S	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	100	70	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*
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1757535)							
ES1818613-001	MB01S	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1759381)							
ES1818566-004	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	93.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1759381)							
ES1818566-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	92.6	70	130
EP080: BTEXN (QCLot: 1759381)							
ES1818566-004	Anonymous	EP080: Benzene	71-43-2	25 µg/L	83.3	70	130
		EP080: Toluene	108-88-3	25 µg/L	90.6	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	89.5	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	90.8	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	86.6	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1818613**	Page	: 1 of 8
Client	: **HY-TEC INDUSTRIES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MARK TAYLOR	Telephone	: +61-2-8784 8555
Project	: Hytec Austen Quarry Baseline Groundwater Monitoring	Date Samples Received	: 26-Jun-2018
Site	: ----	Issue Date	: 02-Jul-2018
Sampler	: James Morrow	No. of samples received	: 5
Order number	: 2201035512	No. of samples analysed	: 5

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							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1817359--003	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK055G: Ammonia as N by Discrete Analyser	ES1818392--002	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
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
MB01S, MB01D, MB02, Pit, DUPB	----	----	----	27-Jun-2018	24-Jun-2018	**3**

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)					
PAH/Phenols (GC/MS - SIM)	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	6	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

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
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**29-Jun-2018**	29-Jun-2018	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	06-Jul-2018	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural (ED040F)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	19-Dec-2018	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓

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
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	24-Jun-2018	×
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
MB01S, MB01D, MB02, Pit, DUPB	**22-Jun-2018**	**----**	----	----	**27-Jun-2018**	20-Jul-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
Pit, DUPB	**22-Jun-2018**	**29-Jun-2018**	29-Jun-2018	✓	**29-Jun-2018**	08-Aug-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
Pit, DUPB	**22-Jun-2018**	**29-Jun-2018**	29-Jun-2018	✓	**29-Jun-2018**	08-Aug-2018	✓
Clear glass VOC vial - HCl (EP080)							
Pit, DUPB	**22-Jun-2018**	**29-Jun-2018**	06-Jul-2018	✓	**29-Jun-2018**	06-Jul-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
Pit, DUPB	**22-Jun-2018**	**29-Jun-2018**	29-Jun-2018	✓	**29-Jun-2018**	08-Aug-2018	✓
Clear glass VOC vial - HCl (EP080)							
Pit, DUPB	**22-Jun-2018**	**29-Jun-2018**	06-Jul-2018	✓	**29-Jun-2018**	06-Jul-2018	✓
EP080: BTEXN							
Clear glass VOC vial - HCl (EP080)							
Pit, DUPB	**22-Jun-2018**	**29-Jun-2018**	06-Jul-2018	✓	**29-Jun-2018**	06-Jul-2018	✓

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	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Dissolved	ED040F	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	6	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
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	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Dissolved	ED040F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	**8.33**	**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							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Dissolved	ED040F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**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
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)
Major Anions - Dissolved	ED040F	WATER	In house: Referenced to APHA 3120. The 0.45µm filtered samples are determined by ICP/AES for Sulfur and/or Silcon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
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.
Dissolved Metals by ICP-MS - Suite B	EG020B-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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
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)
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)
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)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with 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
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 60mL 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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1818613**

Client	: **HY-TEC INDUSTRIES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MARK TAYLOR	Contact	: Customer Services ES
Address	: GATEWAY BUSINESS PARK 4/63-79 PARRAMATTA RD SILVERWATER NSW 2128	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: mark.taylor@hy-tec.com.au	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: Hytec Austen Quarry Baseline Groundwater Monitoring	Page	: 1 of 3
Order number	: 2201033833	Quote number	: EB2017HYTIND0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: James Morrow		

Dates

Date Samples Received	: 26-Jun-2018 08:30	Issue Date	: 27-Jun-2018
Client Requested Due Date	: 02-Jul-2018	Scheduled Reporting Date	: **02-Jul-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.2 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

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
- 27/6/18: This is an updated SRN which indicates the removal of pH/EC/redox as per James as analysis was done in the field.
- **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.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

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 - EA015H Total Dissolved Solids - Standard Level	WATER - ED040F Dissolved Major Anions	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG035F Dissolved Mercury	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-04 Nitrite and Nitrate
ES1818613-001	22-Jun-2018 00:00	MB01S	✓	✓	✓	✓	✓	✓	✓
ES1818613-002	22-Jun-2018 00:00	MB01D	✓	✓	✓	✓	✓	✓	✓
ES1818613-003	22-Jun-2018 00:00	MB02	✓	✓	✓	✓	✓	✓	✓
ES1818613-004	22-Jun-2018 00:00	Pit	✓	✓	✓	✓	✓	✓	✓
ES1818613-005	22-Jun-2018 00:00	DUPB	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-07 TRH/BTEX/N/PAH
ES1818613-004	22-Jun-2018 00:00	Pit	✓
ES1818613-005	22-Jun-2018 00:00	DUPB	✓

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 Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
DUPB	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	×	----	----
MB01D	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	×	----	----
MB01S	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	×	----	----
MB02	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	×	----	----
Pit	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	×	----	----
EK057G: Nitrite as N by Discrete Analyser							
DUPB	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	×	----	----
MB01D	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	×	----	----
MB01S	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	×	----	----

MB02	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	✘	----	----
Pit	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	✘	----	----

Requested Deliverables

ACCOUNT

- A4 - AU Tax Invoice (INV)	Email	accountspayable@hy-tec.com.au

MARK TAYLOR

- *AU Certificate of Analysis - NATA (COA)	Email	mark.taylor@hy-tec.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mark.taylor@hy-tec.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mark.taylor@hy-tec.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mark.taylor@hy-tec.com.au
- Chain of Custody (CoC) (COC)	Email	mark.taylor@hy-tec.com.au
- EDI Format - ENMRG (ENMRG)	Email	mark.taylor@hy-tec.com.au
- EDI Format - XTab (XTAB)	Email	mark.taylor@hy-tec.com.au

CHAIN OF CUSTODY - Client

Client: Hy-Tec	**Client Project Name / Number / Site etc (ie report title):** Hytec Austen Quarry Baseline Groundwater Monitoring	**ALS** 277-289 Smithpark Road, Smithfield, NSW
Contact person: James Morrow ph: 0407 875 302		**Phone:** 02 87848555
Project Mgr: James Morrow	**PO No.:**	**E-mail:**
Sampler: James Morrow	**Envirolab Quote No. :**	**Contact:**
Address: Austen Quarry, 391 Jenolan Caves Road, Hartley, NSW	**Standard TAT**	
	Or choose: standard / same day / 1 day / 2 day / 3 day	
Phone: -- **Mob:** 0428855447	*Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	
Fax: --	**Lab comments:**	
Email:		

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Hy-tec Suite (see table below)	TRH, BTEX, PAHs													Provide as much information about the sample as you can
1	MB01S	-	22-Jun-18	Water	x														
2	MB01D	-	22-Jun-18	Water	x														
3	MB02	-	22-Jun-18	Water	x														
4	Pit	-	22-Jun-18	Water	x	x													
5	DUPB	-	22-Jun-18	Water	x	x													

Environmental Division
Sydney
Work Order Reference
ES1818613

Telephone : +61-2-8784 8555

Relinquished by (company):	Hytec	**Received by (company):**	J-Cweely ALS
Print Name:	Mark Taylor	**Print Name:**	Jessie
Date & Time:	11/01/2018	**Date & Time:**	26/6/18 08:30
Signature:	MT	**Signature:**	

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: (if applicable)
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

HYTEC Groundwater Suite

Analyte Group	Analyte
Physical Parameters (measure in field)	EC, pH, Eh, Temperature
Dissolved Solids	Total Dissolved Solids
Major Cations	Magnesium Calcium Sodium Potassium
Major Anions	Sulphate Chloride Hydroxide as $CaCO_3$ Carbonate as $CaCO_3$ Bicarbonate as $CaCO_3$
Heavy Metals (Dissolved)	Aluminium Arsenic Boron Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Molybdenum Nickel Selenium Silicon Silver Strontium Titanium Vanadium Zinc
Nutrients	Ammonia Nitrate Nitrite

Attachment F

Pit Water Level Monitoring Photographs

Photograph of measuring post in pit sump. Taken 9am on 21 June 2018.

Photograph of measuring post in pit sump. Taken 9am on 22 June 2018.

Photograph of pit from the lookout. Photo taken at 0930am on 21 June 2018. The pit sump is visible at the far (north east) end of the pit.

Attachment G

Analytical Results Summary Table

Table G1
Baseline Analytical Data Summary - January 2018 to June 2018

		ANZECC (2000)	Aust. Drinking Water	10/01/2018	22/06/2018	10/01/2018	22/06/2018	10/01/2018	22/06/2018	10/01/2018	22/06/2018	Units
		2000 (Fresh)	2011	MB01S	MB01S	MB01D	MB01D	MB02	MB02	PIT	Pit	
Major Cations (mg/L)	Calcium	-	-	66	74	144	150	52	71	71	49	mg/L
	Magnesium	-	-	14	13	16	15	24	31	45	26	mg/L
	Sodium	-	-	23	22	95	59	200	190	26	25	mg/L
	Potassium	-	-	1	1	3	1	2	2	4	3	mg/L
Major Anions (mg/L)	Sulphate	-	-	**22**	**23**	**259**	**248**	**120**	**127**	**183**	**98**	mg/L
	Chloride	-	-	**43**	**44**	**58**	**23**	**68**	**78**	**9**	**10**	mg/L
	Hydroxide as CaCO3	-	-	<1	<1	<1	<1	<1	<1	<1	<1	mg/L
	Carbonate as CaCO3	-	-	<1	<1	<1	<1	<1	<1	<1	<1	mg/L
	Bicarbonate as CaCO3	-	-	**216**	**232**	**307**	**335**	**476**	**520**	**181**	**201**	mg/L
Heavy Metals (Dissolved) (mg/L)	Aluminium	0.055	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Arsenic	0.013	0.01	**0.003**	**0.001**	**0.005**	**0.005**	**0.004**	**0.004**	<0.001	<0.001	mg/L
	Boron	0.37	4	<0.05	<0.05	**0.33**	**0.32**	**0.32**	**0.27**	<0.05	<0.05	mg/L
	Barium	-	2	**0.015**	**0.013**	**0.08**	**0.055**	**0.065**	**0.085**	**0.032**	**0.029**	mg/L
	Beryllium	-	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Cadmium	0.0002	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	**0.0088**	**0.0019**	mg/L
	Chromium	0.001	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Cobalt	-	-	<0.001	<0.001	**0.002**	**0.003**	<0.001	<0.001	**0.003**	<0.001	mg/L
	Copper	0.0014	2	**0.001**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Iron	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/L
	Lead	0.0034	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Manganese	1.9	0.5	**0.123**	**0.153**	**0.353**	**0.53**	**0.038**	**0.046**	**2**	**0.188**	mg/L
	Mercury	0.6	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/L
	Molybdenum	-	0.05	**0.002**	<0.001	**0.03**	**0.004**	**0.009**	**0.002**	**0.004**	<0.001	mg/L
	Nickel	0.011	0.02	**0.001**	<0.001	**0.018**	**0.003**	**0.003**	**0.002**	**0.008**	**0.001**	mg/L
	Selenium	0.005	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Silicon	-	-	**9.15**	**10.1**	**24.4**	**31.6**	**9.6**	**11.3**	**15.2**	**19.4**	mg/L
	Silver	0.00005	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Strontium	-	-	**0.208**	**0.245**	**0.897**	**0.897**	**2.36**	**3.01**	**0.298**	**0.231**	mg/L
	Titanium	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Vanadium	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Zinc	0.008	-	**0.03**	<0.005	<0.005	**0.006**	<0.005	<0.005	**0.443**	**0.16**	mg/L
Nutrients (mg/L)	Nitrate*	10 (asN)	50 (as NO3)	**0.05**	<0.01	**0.08**	<0.01	<0.01	<0.01	**4.45**	**0.48**	mg/L
	Nitrite	None	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	mg/L
	Ammonia	0.9	-	**0.03**	**0.05**	**0.03**	**0.02**	<0.01	**0.08**	**0.4**	**0.05**	mg/L
Hydrocarbons (ug/L)	TRH	-	-	-	-	-	-	-	-	**<EQL**	**<EQL**	ug/L
	Benzene	950	1	-	-	-	-	-	-	<1	<1	ug/L
	Toluene	-	800	-	-	-	-	-	-	<2	<2	ug/L
	Ethylbenzene	-	300	-	-	-	-	-	-	<2	<2	ug/L
	Xylene	200	600	-	-	-	-	-	-	<2	<2	ug/L
	Naphthalene	16	-	-	-	-	-	-	-	<5	<5	ug/L
	Benzo(a)pyrene	-	0.01	-	-	-	-	-	-	<0.5	<0.5	ug/L