

Lion-Beer, Spirits & Wine Pty Ltd
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Project 71021.15
3 June 2020
R.001.Rev0
LT:jl

Attention: Dominic Boensch

Email: dominic.boensch@lionco.com

May 2020 Groundwater Monitoring
Tooheys Brewery
29 Nyrang Street, Lidcombe

1. Introduction

This letter report by Douglas Partners Pty Ltd (DP) provides the laboratory results and a brief discussion of the May 2020 round of Groundwater Monitoring at the Tooheys Brewery Site at 29 Nyrang Street, Lidcombe.

The objectives of the groundwater monitoring programme are to assess whether any groundwater contamination identified on site in 2006 is migrating off site and to address the conditions of approval for groundwater monitoring set by the NSW Department of Planning as part of the approval for the upgrade and continued operation of the site under Part 3A of the *Environmental Planning and Assessment Act 1979*. It is understood, however, that no further rounds of monitoring were required as of 2014. However, Tooheys has requested the continued monitoring until such time as their licencing conditions are changed. The ongoing monitoring frequency is therefore as instructed by Tooheys.

As stated in DP's report *First Round of 2011 Groundwater Monitoring, Tooheys Brewery - 29 Nyrang Street, Lidcombe*, 7 June 2011, ref: 71021.03, a Phase 1 contamination assessment was conducted by DP in 2006. The results of the soil sampling and analysis conducted by DP in November and December 2006 indicated elevated total recoverable hydrocarbon (TRH) concentrations in samples collected from boreholes adjacent to the fuel underground storage tanks (USTs) for the former boiler (the former boiler USTs). Elevated TRH and toluene concentrations were detected in groundwater samples collected from the well adjacent to the former boiler USTs (BH6C). Elevated concentrations of TRH were also detected in the groundwater samples collected from the well adjacent to the refuelling USTs (BH1).

Four additional groundwater wells were installed at the boundary of the site in order to determine whether the identified contamination was migrating off site (DP report on *Field Investigation Phase 1 Contamination Assessment, 29 Nyrang Street, Lidcombe*, March 2007, ref: 44359). Further rounds of groundwater monitoring have been undertaken by DP as follows:

- *Groundwater Monitoring Report, 29 Nyrang Street, Lidcombe*, January 2010, ref: 71021.00;
- *Groundwater Monitoring Report, 29 Nyrang Street, Lidcombe*, January 2011 ref: 71021.01;

- *First Round of Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, June 2011* ref: 71021.03;
- *Second Round of Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, November 2011* ref: 71021.03;
- *First Round of Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, June 2012* ref: 71021.06;
- *Second Round of Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, October 2012* ref: 71021.06;
- *First Round of Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, May 2013* ref: 71021.07;
- *Second Round of Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, November 2013* ref: 71021.07;
- *2014 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, July 2014* ref: 71021.08;
- *2015 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, December 2015* ref: 71021.10;
- *January 2016 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, February 2016* ref: 71021.10;
- *January / February 2017 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, 6 March 2017* ref: 71021.11.R.001.Rev0;
- *March 2017 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, 13 April 2017* ref: 71021.11.R.002.Rev;
- *August 2017 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, 15 September 2017* ref: 71021.12.R001.Rev0;
- *November 2017 Groundwater Monitoring, Tooheys Brewery - 29 Nyrang Street, Lidcombe, 1 December 2017* ref: 71021.12.R.002.Rev0;
- *August 2018 Groundwater Monitoring Tooheys Brewery - 29 Nyrang Street, Lidcombe, 12 September 2018* ref: 71021.13.R.001.Rev0;
- *Groundwater Monitoring - November 2018, 29 Nyrang Street, Lidcombe, 12 December 2018* ref: 71021.13.R.002.Rev0;
- *August / September 2019 Groundwater Monitoring Round, 29 Nyrang Street, Lidcombe, 1 November 2019* ref: 71021.14.R.001.Rev0; and
- *November 2019 Groundwater Monitoring, Tooheys Brewery - 29 Nyrang Street, Lidcombe, 11 December 2019* ref: 71021.14.R.002.Rv0.

2. Site Information

The brewery is located at 29 Nyrang Street, Lidcombe, within the Local Government Area of Cumberland and comprises a roughly rectangular area of approximately 6.2 hectares (ha). The site is contained within Lot 10, DP 1008367. It is Zoned 4(a) Industrial Enterprise and is surrounded by industrial sites to the north, west and south and a residential area to the east.

Haslams Creek is located to the immediate west of the site and flows in approximately a northerly direction. To the north of the site the creek bends to the east and flows to the northeast and discharges into Homebush Bay located approximately 3.5 km downstream from the brewery. The portion of Haslams Creek adjacent to the brewery is a concrete lined stormwater channel.

The site is used for the production and storage of Tooheys beer, which is transported and distributed by trucks to various outlets. The majority of the site is occupied by large warehouse structures and large fermentation, maturation and storage tanks/silos. A site drawing and borehole location plan are presented in Drawing 1, attached.

Six decommissioned USTs were located along the northern boundary of the utility building. The USTs are reported to have been emptied 18 years ago when the boilers were converted to natural gas. It was reported by ARUP that in September 2008, Tooheys decommissioned the six former boiler USTs *in situ*, which involved removal of the residual water / fuel mix inside the tanks and foam filling.

A further three USTs were located on the north eastern boundary of the site which were formerly used for the storage of petrol or diesel for on-site vehicle refuelling. A concrete plinth and awning structure indicated that a bowser was also located nearby. Monitoring Wells BH1 and BH2 are located to the east and west of the UST and petrol bowser respectively. It was reported that the former refuelling UST were decommissioned *in situ* by being sand filled and capped approximately 20 years ago.

DP prepared a remediation action plan (RAP) for the removal and validation of the above three USTs on the north-east boundary. The RAP was entitled *Remediation Action Plan, 29 Nyrang Street, Lidcombe*, October 2011, ref 71021.02 Revision 2. The subsequent remediation and validation for the underground petroleum storage system (UPSS) in this area was undertaken shortly after the completion of the second round of groundwater monitoring for 2011 carried out on 21 October 2011. The procedure and results of the remediation and validation of the UPSS in the north eastern boundary area were reported separately in, *UPSS Validation Assessment, Tooheys Brewery, 29 Nyrang Street, Lidcombe*, project reference 71021.04, dated February 2012. The successful validation was subject to a Site Audit undertaken by ENVIRON Australia Pty Ltd.

3. Groundwater Default Guideline Values

Groundwater default guideline values (DGV) have been sourced from the ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2018) default guideline values for toxicants in fresh waters for the protection of 95% of species. It is noted that the groundwater investigation levels (GIL) for groundwater monitoring rounds prior to the August 2018 were sourced from the ANZECC

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000), trigger values for toxicants in fresh waters for the protection of 95% of species.

It is noted that as of 29 August 2018, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)* revoked the documents listed below:

- The Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, November 1992); and
- The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, October 2000).

Previously, in the absence of ANZECC (2000) criteria for TRH, the laboratory limits of reporting were adopted as the screening criteria as nominated for the auditor-approved RAP GILs. In order to be consistent with the adopted modified values and with the EPL, the laboratory limits of reporting for TRH have continued to be used. It is noted also that the DGV values for TRH are more stringent to those adopted in earlier groundwater monitoring rounds (pre-November 2011).

The current adopted DGV are given in Table 1 for the contaminants of concern.

Table 1: Groundwater Default Guideline Values (DGV) and Rationale

Contaminant	Adopted Criteria (DGV) µg/L	Source
Metals Arsenic (V) Cadmium Chromium (III) Copper Lead Mercury Nickel Zinc	13.0 2.4 33.1 1.4 121.1 0.6 120.2 87.4	ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality for the protection of 95% of freshwater species. The threshold levels have been adjusted for extremely hard water (500 mg CaCO ₃ /L) in accordance with the guidelines which uses the algorithm available in ANZECC (2000).
TRH C ₆ – C ₉ >C ₉ >C ₁₀ – C ₁₆	10 250 50	Screening DGV (at limit of reporting) – require further investigation if exceeded.
BTEX Benzene Toluene Ethylbenzene Xylene	950 180 80 550	ANZG (2018) Australian Water Quality Guidelines for the protection of 95% of freshwater species. Reliability of DGV for toluene and ethylbenzene is unknown. DGV for xylene is the sum of o-xylene and p-xylene default guideline values.

4. Groundwater Monitoring Methodology and Field Observations

4.1 Identification of Wells

The locations of the six existing wells labelled BH1, BH2, BH7, BH8, BH9 and BH10 along the western and northern boundaries of the site are presented in the attached Drawing 1.

4.2 Frequency of Sampling

The groundwater monitoring wells BH1, BH2, BH7, BH8, BH9 and BH10 have now been sampled once in 2015, 2016, four times in 2017, twice in 2018, twice in 2019 and once in 2020. Prior and up to 2013, monitoring was conducted twice a year on a six-monthly interval during April and October and then as of 2014 has been once a year. The reduction in the monitoring frequency was due to previous results being within the DGVs and an understanding that no further rounds of monitoring were required as of 2014. However, Tooheys has requested the continued monitoring until such time as their licencing conditions are changed.

4.3 Well Development

Prior to collecting groundwater samples, each well was fully developed on 12 May 2020 using a submersible 12V pump in order to remove stagnant water and to provide good hydraulic connectivity to the local groundwater system. The exception was monitoring well BH7 that was developed with a peristaltic pump as the submersible 12V pump was unable to be lowered beyond a bend in the pipe.

Well development was achieved by the removal of a minimum of three well volumes of water or until the well was dry, whichever was the lesser. Monitoring wells BH7, BH9 and BH10 became dry during development. All wells were left to equilibrate to the groundwater over a one-day period.

4.4 Collection of Groundwater Samples

The collection of groundwater samples from each of the six monitoring wells was carried out in accordance with the methodology as set out in the DP *Field Procedures Manual*. Groundwater sampling was undertaken on 13 May 2020 by a DP Environmental Engineer using a low flow peristaltic pump. Samples were taken from near the middle of the screened section, being close to the middle of the water column. The sampling programme included 10% field replicates for QA / QC purposes. The replicate sample was identified as "BD1/20200513" and was also collected on 13 May 2020 from BH1. A trip spike and blank were also taken to site and tested for BTEX.

The samples were collected after stable readings were obtained for pH, conductivity, temperature and dissolved oxygen. Samples were carefully pumped into laboratory prepared sample containers including hydrochloric acid preserved BTEX vials. The groundwater samples collected for heavy metal testing were filtered in the field using a 45 µm filter. Completed field sheets are attached to this report.

No phase separated hydrocarbons (PSH) were noted in the groundwater collected in all wells sampled in this monitoring round.

Sample containers were labelled and stored in the field and transported in an esky cooled with ice and later stored in a fridge at the office or laboratory. The samples were delivered to a NATA accredited laboratory, Envirolab Services (ELS), together with chain-of-custody records.

4.5 Quality Assurance and Quality Control (QA / QC)

QA / QC sampling and analysis included the analysis of one replicate sample and one trip blank and trip spike for each groundwater monitoring event in the monitoring programme.

An intra-laboratory replicate analysis was conducted as a check of the reproducibility of results and as a measure of consistency of sampling techniques.

The comparative results of analysis between original and intra-laboratory replicate sample are summarised in Table 2.

Table 2: RPD Results - Intra-laboratory Results

Well	Analyte	BH1	BD1/202005133*	Difference	RPD (%)
Heavy Metals	As	<1	2	1	67
	Cd	<0.1	<0.1	0	0
	Cr	<1	<1	0	0
	Cu	7	<1	6	140
	Pb	<1	<1	0	0
	Hg	<0.05	<0.05	0	0
	Ni	3	2	1	50
	Zn	<1	<1	0	0
TRH	C6-C9	<10	<10	0	0
	C10-C36	<250	<250	0	0
	>C10-C16	<50	<50	0	0
Benzene		<1	<1	0	0
Toluene		<1	<1	0	0
Ethyl-Benzene		<1	<1	0	0
Total Xylene		<3	<3	0	0

*BD1/20200513 = Blind replicate sample of BH1

The calculated RPD were all within the acceptable range of ± 30 for inorganic analytes and $\pm 50\%$ for organics with the exception of those shaded. However, the actual difference was low. Therefore, the intra-laboratory replicate comparison indicates that the sampling technique was generally consistent and repeatable, and the laboratory sampling handling and analytical methods are comparable.

A trip spike and trip blank were also analysed, and the results indicated that appropriate transport and handling techniques were adopted.

4.6 Laboratory Analysis

The groundwater samples (including QA / QC samples) were sent for the following analysis at a NATA accredited laboratory:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); and
- TRH and BTEX.

Table 3 shows the analytical scheme for the groundwater samples.

Table 3: Analytical Scheme for Groundwater Samples

Sample ID	Heavy Metals	TRH	BTEX
BH1, 2, 7, 8, 9, 10	✓	✓	✓
BD1/20200513*	✓	✓	✓
Spike / Blank			✓

*BD1/20200513 = Blind duplicate sample of BH1

5. Results

5.1 Field Testing Results

Piezometric levels were measured prior to development and prior to sampling from the groundwater wells. The measured levels are summarised in Table 4. The groundwater flow direction is shown to be in a north-westerly direction, with the location of BH2 being hydraulically down-gradient from the former location of the UPSS near the north eastern boundary of the property. It is noted that groundwater levels are transient and change over time due to climatic, anthropogenic and other influences.

Table 4: Piezometric Levels

Monitoring Well	m AHD (surface)	Date			
		12/05/2020 (well development)		13/05/2020 (groundwater sampling)	
		m bgl	m AHD	m bgl	m AHD
1	6.46	2.45	3.95	2.41	4.05
2	6.25	2.73	3.52	2.44	3.81
7	6.38	0.87	5.51	2.87	3.51
8	6.50	4.48	2.02	4.56	1.94
9	6.00	4.15	1.85	4.15	1.85
10	5.12	1.45	3.72	4.00	1.12

Notes: m bgl metres below ground level
 m AHD level in metres above Australian Height Datum

The water level appeared to have recovered to the equilibrium level or close to the equilibrium level after development in each of the wells.

Groundwater samples were noted to be mostly clear. Samples were taken after stable readings were obtained for temperature, dissolved oxygen, conductivity, pH, turbidity and reduction potential as presented in Table 5. It is noted that the wells BH7, BH8 and BH10 pumped dry before readings could stabilise.

Table 5: Groundwater Readings Prior to Sampling

Monitoring Well	Temperature (°C)	Dissolved Oxygen (% saturation)	Conductivity (µS/cm)	pH	Turbidity (NTU)	Redox (mV)
1	22.3	1.22	2115	6.24	46.2	-22
2	22.4	1.29	12360	6.45	54.7	8
7	21.9	0.71	892	5.93	12.7	-15
8	23.8	1.88	21750	5.90	220	11
9	22.1	2.70	10420	6.17	68.7	12
10	21.7	2.58	3540	6.62	116.7	-22

5.2 Analytical Results

The attached Tables 6 to 16 provide the results of groundwater testing in July 2014, October 2015, January 2016, January, March, August and November 2017, August and November 2018, August and November 2019 for reference purposes. The laboratory results of the current groundwater samples plus the QA / QC results are summarised in the attached Table 17. The laboratory test results certificates and chain-of-custody information are attached.

6. Discussion

Concentrations of TRH and BTEX were reported below the laboratory limits of reporting for all monitoring wells sampled during this round of sampling with the exception of a trace level of TRH (C15-C28 of 110 µg/L and >C16-C34 of 100 µg/L). Elevated concentrations of TRH have previously been detected (at higher concentrations) in this location previously.

Concentrations of heavy metals were reported either below their respective laboratory limits of reporting or DGV for all monitoring wells sampled during this round of sampling with the exception of copper in all monitoring wells ranging from 7 to 26 µg/L which exceeds the DGV of 1.4 µg/L. Low levels of heavy metals have consistently been detected in groundwater at the site and is generally consistent with diffuse urban pollution that cannot be attributed to any one site or source.

7. Conclusion

Based on the current round of groundwater monitoring at the site, the laboratory results indicate that the groundwater is not significantly impacted by petroleum hydrocarbon contamination at the monitored locations.

The results are generally consistent with the previous monitoring rounds. Based on the current results, it is considered that the concentration of TRH in groundwater is not increasing.

8. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at 29 Nyrang Street, Lidcombe in accordance with DP's proposal (SYD200554) dated 25 May 2020 and acceptance received from Mr Domonic Boensch of Tooheys Pty Ltd. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Tooheys Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the groundwater components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd



Lisa Teng
Environmental Engineer



Kurt Plambeck
Senior Associate

Reviewed by



Paul Gorman
Principal

Attachments: Notes About this Report
 Drawing 1
 Field Notes
 Results of Laboratory Analysis, Tables 6 - 17
 Laboratory Certificate of Analysis, Sample Receipt Advice and Chain of Custody
 Documentation

About this Report

Douglas Partners



Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

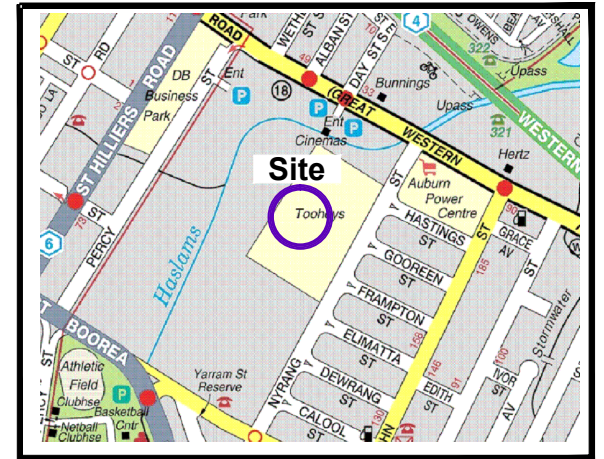
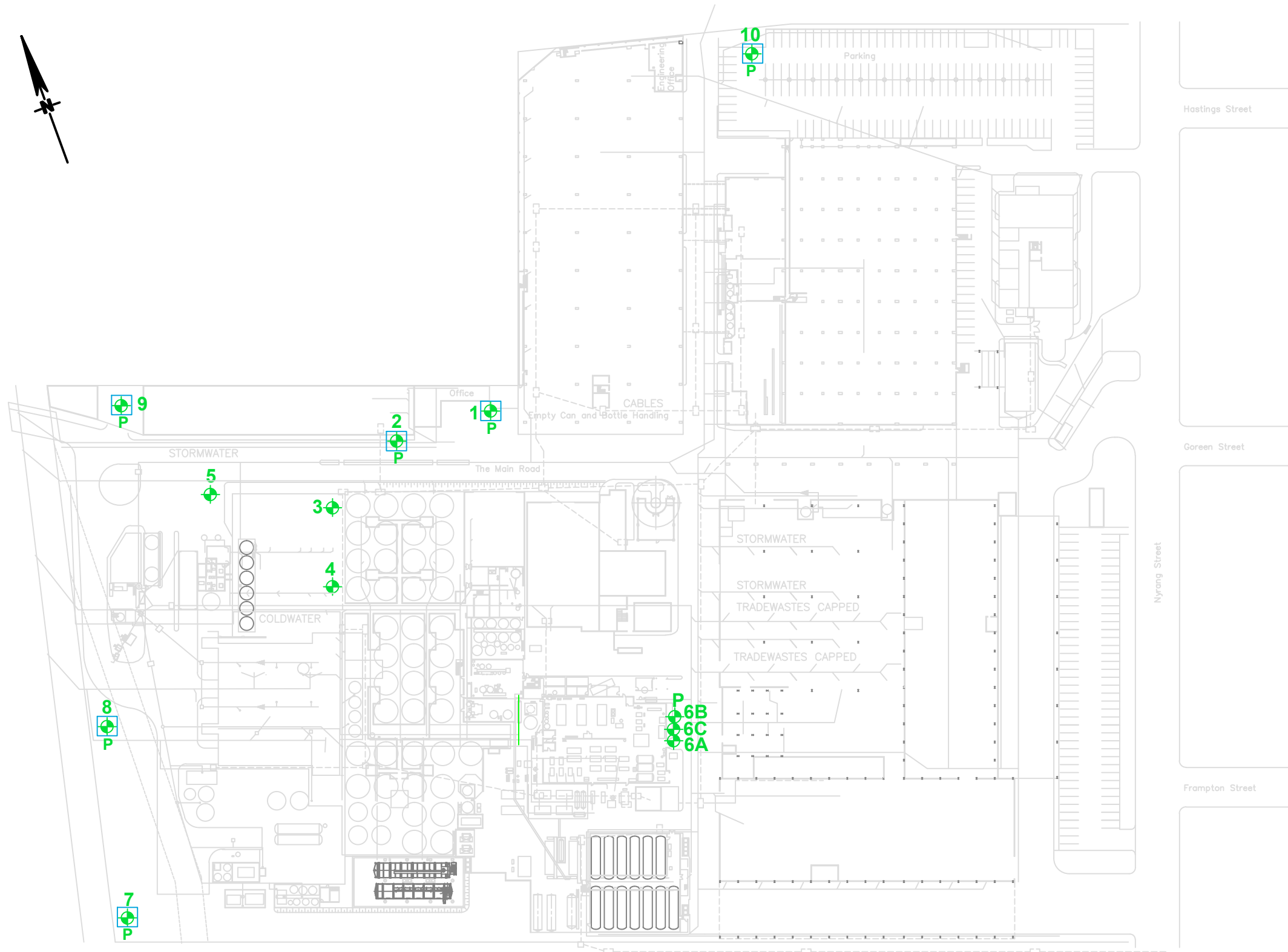
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

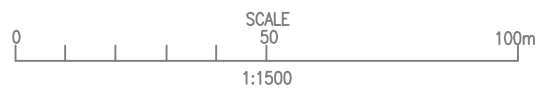
The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.



Locality Plan

LEGEND

- Test Bore Location
- Piezometer
- Monitoring Well



CLIENT: Tooheys Pty Ltd		
DRAWN BY: PSCH	SCALE: As shown	OFFICE: Sydney
APPROVED BY:	DATE: 5.12.2019	

TITLE: Location of Monitoring Wells Groundwater Monitoring 29 Nyranng Street, LIDCOMBE	PROJECT No: 71021.14
	DRAWING No: 1
	REVISION: 0

Groundwater Field Sheet

Project and Bore Installation Details							
Bore / Standpipe ID:	BH1						
Project Name:	Tooheys August 2020 Monitoring						
Project Number:	71021.15						
Site Location:	29 Nyrnag Street, Lidcombe						
Bore RL	6.5 m AHD						
Bore Easting:				Northing:			
Installation Date:	24-Oct-16						
GW Level (during drilling):	m bgl						
Well Depth:	14.2 m bgl						
Screened Interval:	2.0-14.2 m bgl						
Contaminants/Comments:							
Bore Development Details							
Date/Time:	Tuesday 11 May 2020 12 MAY						
Purged By:	LT						
GW Level (pre-purge):	2.45 m bgl						
GW Level (post-purge):	2.46 m bgl						
PSH observed:	Yes / <input checked="" type="checkbox"/> No (interface/visual). ? mm thick						
Observed Well Depth:	14.19 m bgl						
Estimated Bore Volume:	85 L						
Total Volume Purged:	220 L						
Equipment:	12 Volt pump						
Micropurge and Sampling Details							
Date/Time:	Wednesday 12-May 2020 13 MAY						
Sampled By:	LT						
Weather Conditions:	overcast						
GW Level (pre-purge):	2.41 m bgl						
GW Level (post sample):	2.44 m bgl						
PSH observed:	Yes / <input checked="" type="checkbox"/> No (interface/visual). ? mm thick						
Observed Well Depth:	14.19 m bgl						
Estimated Bore Volume:	85 L						
Total Volume Purged:	3 L						
Equipment:	peristaltic pump and TPS multimeter						
Water Quality Parameters							
Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)	
Stabilisation Criteria (3 readings)	0.1 °C	+/- 0.3 mg/L	+/- 3%	+/- 0.1	+/- 10%	+/- 10 mV	
10:36	20.0	4.98	2074	6.11	-	-31	
10:37	20.7	2.35	1961	6.19	-	-27	
10:38	21.3	1.48	1967	6.23	75	-24	
10:39	21.7	1.21	2017	6.24	53.9	-22	
10:40	21.9	1.19	2074	6.24	52.4	-21	
10:41	22.2	1.30	2104	6.24	49.1	-22	
10:42	22.2	1.10	2110	6.24	49.9	-22	
10:43	22.3	1.22	2115	6.24	46.2	-22	
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS				
Sample Details							
Sampling Depth (rationale):	6 m bgl, mid col → tubing won't go further						
Sample Appearance (e.g. colour, siltiness, odour):	clear						
Sample ID:	BH1						
QA/QC Samples:	BD1 / 20200513						
Sampling Containers and filtration:	3 x 125ml 500mL glass, 2x 40mL glass vials (HCl), 1x 100mL plastic (HNO3 (filtered))						
Comments / Observations:	—						

Groundwater Field Sheet

Project and Bore Installation Details						
Bore / Standpipe ID:	BH2					
Project Name:	Tooheys August 2020 Monitoring					
Project Number:	71021.15					
Site Location:	29 Nyrnag Street, Lidcombe					
Bore RL	6.2 m AHD					
Bore Easting:				Northing:		
Installation Date:	20-Oct-16					
GW Level (during drilling):	m bgl					
Well Depth:	14.5 m bgl					
Screened Interval:	2.0-14.5 m bgl					
Contaminants/Comments:						
Bore Development Details						
Date/Time:	Tuesday 11 May 2020					
Purged By:	Lisa Teng					
GW Level (pre-purge):	2.73 m bgl					
GW Level (post-purge):	2.74 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick					
Observed Well Depth:	14.08 m bgl					
Estimated Bore Volume:	81.7 L					
Total Volume Purged:	0.40 L					
Equipment:	12 Volt pump					
Micropurge and Sampling Details						
Date/Time:	Wednesday 12 May 2020					
Sampled By:	Lisa Teng					
Weather Conditions:	overcast					
GW Level (pre-purge):	2.44 m bgl					
GW Level (post sample):	2.62 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick					
Observed Well Depth:	14.05 m bgl					
Estimated Bore Volume:	0.4 L					
Total Volume Purged:	4 L					
Equipment:	peristaltic pump and TPS multimeter					
Water Quality Parameters						
Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	0.1 °C	+/- 0.3 mg/L	+/- 3%	+/- 0.1	+/- 10%	+/- 10 mV
10:03	19.7	11.02	11.69	6.13		3
10:04	20.4	3.23	12.22	6.32	63	5
10:05	21.4	1.87	12.32	6.37	50.8	6
10:06	21.9	1.35	12.39	6.40	56	6.7
10:07	22.2	1.41	12.38	6.41	59.9	8
10:08	22.4	1.29	12.36	6.42	54.7	8
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			
Sample Details						
Sampling Depth (rationale):	8 m bgl, mid 10'					
Sample Appearance (e.g. colour, siltiness, odour):	slightly cloudy					
Sample ID:	BH2					
QA/QC Samples:	—					
Sampling Containers and filtration:	2x 125ml 500mL glass, 2x 40mL glass vials (HCl) , 1x 100mL plastic (HNO3 (filtered))					
Comments / Observations:	—					

Groundwater Field Sheet

Project and Bore Installation Details						
Bore / Standpipe ID:	BH7					
Project Name:	Tooheys August 2020 Monitoring					
Project Number:	71021.15					
Site Location:	29 Nyrnag Street, Lidcombe					
Bore RL	6.4 m AHD					
Bore Easting:				Northing:		
Installation Date:	7-Dec-16					
GW Level (during drilling):	m bgl					
Well Depth:	6.5 m bgl					
Screened Interval:	1.5-6.5 m bgl					
Contaminants/Comments:	Bend in pipe - development requires peristaltic pump					
Bore Development Details						
Date/Time:	Tuesday 11 May 2020 12 MAY					
Purged By:	Lisa Teng					
GW Level (pre-purge):	0.81 m bgl					
GW Level (post-purge):	1.49 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick					
Observed Well Depth:	3 m bgl 1.49 with interface, 3m with tubing					
Estimated Bore Volume:	15 L due to bend in pipe					
Total Volume Purged:	10 L					
Equipment:	12 Volt pump					
Micropurge and Sampling Details						
Date/Time:	Wednesday 12-May 2020 13 MAY					
Sampled By:	Lisa Teng					
Weather Conditions:	overcast					
GW Level (pre-purge):	2.87 m bgl					
GW Level (post sample):	3.43 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick NO (interface)					
Observed Well Depth:	5.50 m bgl					
Estimated Bore Volume:	19 L					
Total Volume Purged:	2 L					
Equipment:	peristaltic pump and TPS multimeter					
Water Quality Parameters						
Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	0.1 °C	+/- 0.3 mg/L	+/- 3%	+/- 0.1	+/- 10%	+/- 10 mV
7:55	18.9	2.62	980	5.24	—	-2
7:56	19.8	1.33	985	5.37	—	-12
7:57	20.7	1.15	934	5.58	—	-17
7:58	21.1	1.00	939	5.72	—	-19
7:59	21.4	0.88	923	5.84	260	-18
8:00	21.7	0.86	908	5.89	241	-18
8:01	21.9	0.71	892	5.93	12.7	-15
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			
Sample Details						
Sampling Depth (rationale):	4. m bgl, mid col					
Sample Appearance (e.g. colour, siltiness, odour):	clear, slightly yellow.					
Sample ID:	BH7					
QA/QC Samples:						
Sampling Containers and filtration:	2x 125ml 500mL glass, 2x 40mL glass vials (HCl) , 1x 100mL plastic (HNO3 (filtered))					
Comments / Observations:	block/bend, tubing pushed down with interface meter					

Groundwater Field Sheet

Project and Bore Installation Details						
Bore / Standpipe ID:	BH8					
Project Name:	Tooheys August 2020 Monitoring					
Project Number:	71021.15					
Site Location:	29 Nyrnag Street, Lidcombe					
Bore RL	6.5 m AHD					
Bore Easting:				Northing:		
Installation Date:	7-Dec-06					
GW Level (during drilling):	m bgl					
Well Depth:	8.25 m bgl					
Screened Interval:	2.0-8.25 m bgl					
Contaminants/Comments:						
Bore Development Details						
Date/Time:	Tuesday 11-May 2020 12 may					
Purged By:	Lisa Teng					
GW Level (pre-purge):	4.48 m bgl					
GW Level (post-purge):	4.60 m bgl					
PSH observed:	Yes / (No) (interface/visual). ? mm thick					
Observed Well Depth:	8.25 m bgl					
Estimated Bore Volume:	27.5 L					
Total Volume Purged:	87.5 L					
Equipment:	12 Volt pump					
Micropurge and Sampling Details						
Date/Time:	Wednesday 12-May 2020 13 may					
Sampled By:	Lisa Teng					
Weather Conditions:	overcast - cool					
GW Level (pre-purge):	4.56 m bgl					
GW Level (post sample):	4.60 m bgl					
PSH observed:	Yes / (No) (interface/visual). ? mm thick					
Observed Well Depth:	8.27 m bgl					
Estimated Bore Volume:	L					
Total Volume Purged:	2 L					
Equipment:	peristaltic pump and TPS multimeter					
Water Quality Parameters						
Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	0.1 °C	+/- 0.3 mg/L	+/- 3%	+/- 0.1	+/- 10%	+/- 10 mV
8:38	21.1	2.04	21.28	5.79	—	6
8:39	22.2	2.06	21.64	5.86	—	8
8:40	23.1	1.97	21.67	5.88	—	9
8:41	23.8	1.88	21.75	5.90	220	11
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			
Sample Details						
Sampling Depth (rationale):	6 m bgl, mid col					
Sample Appearance (e.g. colour, siltiness, odour):	clear					
Sample ID:	BH8					
QA/QC Samples:						
Sampling Containers and filtration:	2x 125ml 500mL glass, 2x 40mL glass vials (HCl) , 1x 100mL plastic (HNO3 (filtered))					
Comments / Observations:						

Groundwater Field Sheet

Project and Bore Installation Details						
Bore / Standpipe ID:	BH9					
Project Name:	Tooheys August 2020 Monitoring					
Project Number:	71021.15					
Site Location:	29 Nyrnag Street, Lidcombe					
Bore RL	6.0 m AHD					
Bore Easting:				Northing:		
Installation Date:	7 December 20016					
GW Level (during drilling):	m bgl					
Well Depth:	6.5 m bgl					
Screened Interval:	1.5-6.5 m bgl					
Contaminants/Comments:						
Bore Development Details						
Date/Time:	Tuesday 11 May 2020 12 May					
Purged By:	Lisa Teng					
GW Level (pre-purge):	4.15 m bgl					
GW Level (post-purge):	5.93 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick					
Observed Well Depth:	6.63 m bgl					
Estimated Bore Volume:	17.8 L					
Total Volume Purged:	15 L					
Equipment:	12 Volt pump					
Micropurge and Sampling Details						
Date/Time:	Wednesday 12 May 2020 13 May					
Sampled By:	Lisa Teng					
Weather Conditions:						
GW Level (pre-purge):	4.15 m bgl					
GW Level (post sample):	4.45 m bgl					
PSH observed:	Yes / (No) (interface/visual). ? mm thick					
Observed Well Depth:	6.65 m bgl					
Estimated Bore Volume:	L					
Total Volume Purged:	3 L					
Equipment:	peristaltic pump and TPS multimeter					
Water Quality Parameters						
Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	0.1 °C	+/- 0.3 mg/L	+/- 3%	+/- 0.1	+/- 10%	+/- 10 mV
9:25	19.3	5.18	5.56	5.54		0
9:26	20.1	4.08	5.95	5.74		2
9:27	21.2	3.99	5.91	5.82		3
9:28	20.8	4.39	6.92	6.01		11
9:35	21.0	3.88	8.62	6.07		13
9:36	21.2	3.56	9.09	6.10	12.9	12
9:37	21.5	3.20	9.52	6.13	95	12
9:38	21.7	3.09	9.95	6.15	81.3	12
9:39	21.9	2.85	10.24	6.16	76.6	12
9:40	22.1	2.73	10.35	6.17	64.4	12
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			
9:41	22.1	2.70	10.42	6.17	68.17	12
Sample Details						
Sampling Depth (rationale):	5.5 m bgl, mid col					
Sample Appearance (e.g. colour, siltiness, odour):	clear, slightly yellow					
Sample ID:	B+9					
QA/QC Samples:	-					
Sampling Containers and filtration:	500mL glass, 2x 40mL glass vials (HCl) , 1x 100mL plastic (HNO3 (filtered))					
Comments / Observations:	Sampled first -> low expected water volume					

Groundwater Field Sheet

Project and Bore Installation Details						
Bore / Standpipe ID:	BH10					
Project Name:	Tooheys August 2020 Monitoring					
Project Number:	71021.15					
Site Location:	29 Nyrnag Street, Lidcombe					
Bore RL	5.1 m AHD					
Bore Easting:				Northing:		
Installation Date:	7-Dec-06					
GW Level (during drilling):	m bgl					
Well Depth:	5 m bgl					
Screened Interval:	1.5-5.0 m bgl					
Contaminants/Comments:						
Bore Development Details						
Date/Time:	Tuesday 11 May 2020					
Purged By:	Lisa Teng					
GW Level (pre-purge):	1.45 m bgl					
GW Level (post-purge):	4.45 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick					
Observed Well Depth:	5.15 m bgl					
Estimated Bore Volume:	27 L					
Total Volume Purged:	30 L					
Equipment:	12 Volt pump					
Micropurge and Sampling Details						
Date/Time:	Wednesday 12 May 2020					
Sampled By:	Lisa Teng					
Weather Conditions:	cloudy					
GW Level (pre-purge):	4.00 m bgl					
GW Level (post sample):	4.89 m bgl					
PSH observed:	Yes / No (interface/visual). ? mm thick					
Observed Well Depth:	5.15 m bgl					
Estimated Bore Volume:	L					
Total Volume Purged:	5 L					
Equipment:	peristaltic pump and TPS multimeter					
Water Quality Parameters						
Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	0.1 °C	+/- 0.3 mg/L	+/- 3%	+/- 0.1	+/- 10%	+/- 10 mV
11:20	20.5	5.39	4.38	6.60	-	-71
11:21	20.8	2.80	4.26	6.60	-	-72
11:22	21.0	1.54	4.15	6.63	-	-68
11:23	21.2	1.24	3.96	6.67	272	-55
11:24	21.4	1.61	3.76	6.70	204	-45
11:25	21.5	2.24	3.60	6.70	162	-34
11:26	21.6	2.53	3.56	6.69	144.9	-30
11:27	21.7	2.65	3.54	6.65	132.8	-24
11:28	21.7	2.58	3.54	6.62	116.7	-22
11:29						
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			
Sample Details						
Sampling Depth (rationale):	5 m bgl, mid column					
Sample Appearance (e.g. colour, siltiness, odour):	clear slightly silty yellow-brown					
Sample ID:	BH10					
QA/QC Samples:						
Sampling Containers and filtration:	500mL glass, 2x 40mL glass vials (HCl), 1x 100mL plastic (HNO3 (filtered))					
Comments / Observations:	2x125mL					

Table 6: Results of Laboratory Analysis in July 2014 (µg/L)

Well	Hardness (mg CaCO ₃ /L)	Heavy Metals ¹								TRH		Benzene	Toluene	Ethyl- benzene	Total Xylene
		As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₃₆				
1	130	<1	<0.1	<1	1	<1	<0.05	4	82	<10	<250	<1	<1	<1	<3
² BD1/ 180714		<1	<0.1	<1	<1	<1	<0.05	3	74	<10	<250	<1	<1	<1	<3
2	890	<1	0.2	<1	4	<1	<0.05	9	110	<10	<250	<1	<1	<1	<3
7	100	<1	<0.1	<1	3	<1	<0.05	6	28	<10	<250	<1	<1	<1	<3
8	1900	<1	0.2	<1	3	<1	<0.05	4	18	<10	<250	<1	<1	<1	<3
9	350	<1	<0.1	<1	1	<1	<0.05	2	18	<10	<250	<1	<1	<1	<3
10	380	<1	<0.1	<1	4	<1	<0.05	6	24	<10	<250	<1	<1	<1	<3
TS	-	-	-	-	-	-	-	-	-	-	-	101%	104%	102%	105% ⁴
TB	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<3
GIL		13	3.5	14.1	21.7	205	0.6	171	124.3	10	250	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene
- 5 After silica gel clean-up

bold

exceeds GIL

Table 7: Results of Laboratory Analysis in October 2015 (µg/L)

Well	Hardness (mg CaCO ₃ /L)	Heavy Metals ¹								TRH		Benzene	Toluene	Ethyl- benzene	Total Xylene
		As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ ⁻ C ₉	C ₁₀ ⁻ C ₃₆				
1	670	2	<0.1	<1	4	<1	<0.05	7	55	<10	<250	<1	<1	<1	<3
² BD1/ 301015		2	<0.1	<1	<1	<1	<0.05	1	19	<10	<250	<1	<1	<1	<3
2	1000	<1	0.2	<1	2	<1	<0.05	10	50	<10	<250	<1	<1	<1	<3
7	180	3	<0.1	<1	<1	<1	<0.05	6	14	<10	<250	<1	<1	<1	<3
8	2300	<1	0.7	<1	4	<1	<0.05	4	17	<10	<250	<1	<1	<1	<3
9	420	<1	<0.1	<1	2	<1	<0.05	7	36	<10	<250	<1	<1	<1	<3
10	160	5	<0.1	<1	<1	<1	<0.05	9	8	<10	520	<1	<1	<1	<3
TS	-	-	-	-	-	-	-	-	-	-	-	81%	92%	98%	104% ⁴
TB	-	-	-	-	-	-	-	-	-	<10	-	<1	<1	<1	<3
GIL		13	3.5	14.1	21.7	205	0.6	171	124.3	10	250	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene
bold exceeds GIL

Table 8: Results of Laboratory Analysis in January 2016 (µg/L)

Well	Hardness (mg CaCO ₃ /L)	Heavy Metals ¹								TRH			Benzene	Toluene	Ethyl- benzene	Total Xylene
		As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₃₆	>C ₁₀ -C ₁₆				
1	360	3	<0.1	<1	<1	<1	<0.05	<1	12	<10	<250	66	<1	<1	<1	<3
² BD1/ 180714		2	<0.1	<1	<1	<1	<0.05	<1	15	<10	<250	79	<1	<1	<1	<3
2	720	<1	0.2	<1	3	<1	<0.05	14	120	<10	<250	<50	<1	<1	<1	<3
7	110	3	<0.1	<1	<1	<1	<0.05	8	13	<10	<250	<50	<1	<1	<1	<3
8	1900	<1	0.3	<1	4	<1	<0.05	4	18	<10	<250	<50	<1	<1	<1	<3
9	480	<1	<0.1	<1	2	<1	<0.05	5	43	<10	<250	<50	<1	<1	<1	<3
10	170	4	<0.1	<1	<1	<1	<0.05	2	5	<10	<250	<50	<1	<1	<1	<3
TS	-	-	-	-	-	-	-	-	-	-	-	-	94%	95%	92%	93% ⁴
TB	-	-	-	-	-	-	-	-	-	<10	-	-	<1	<1	<1	<3
GIL		13	3.5	14.1	21.7	205	0.6	171	124.3	10	250	50	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene

bold	exceeds GIL
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Table 9: Results of Laboratory Analysis in January / February 2017 (µg/L)

Well	Heavy Metals ¹								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene
	As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	1	<0.1	<1	1	<1	<0.05	4	28	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	0.2	<1	<1	<1	<0.05	5	20	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	3	<0.1	<1	<1	<1	<0.05	6	1	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	0.5	<1	6	<1	<0.05	4	14	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	<1	<0.1	<1	2	<1	<0.05	8	38	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1	<1	<0.1	<1	1	<1	<0.05	8	34	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	3	<0.1	<1	7	<1	<0.05	50	150	<10	<50	220	<100	98	<1	<1	<1	<3
GIL	13	3.5	14.1	21.7	205	0.6	171	124.3	10	250			50	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene

bold	exceeds GIL
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Table 10: Results of Laboratory Analysis in March 2017 (µg/L)

Well	Heavy Metals ¹								TRH					Benzene	Toluene	Ethyl- benzene	Total Xylene
	As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	2	<0.1	<1	1	<1	<0.05	10	90	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1	2	<0.1	<1	<1	<1	<0.05	11	92	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	3	<1	<0.05	5	38	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	3	<0.1	<1	<1	<1	<0.05	8	2	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	<0.1	<1	4	<1	<0.05	4	16	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	1	<0.1	<1	3	<1	<0.05	7	42	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	2	<0.1	<1	2	<1	<0.05	4	33	<10	<50	<100	<100	<50	<1	<1	<1	<3
GIL	13	3.5	14.1	21.7	205	0.6	171	124.3	10	250			50	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene

bold exceeds GIL

Table 11: Results of Laboratory Analysis in August 2017 (µg/L)

Well	Heavy Metals ¹								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene
	As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	1	<0.1	<1	<1	<1	<0.05	5	19	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	<1	<1	<0.05	4	12	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1	<1	<0.1	<1	<1	<1	<0.05	4	13	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	9	<0.1	<1	<1	<1	<0.05	17	19	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	1	<1	27	<1	<0.05	4	20	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	5	<0.1	<1	4	<1	<0.05	30	420	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	5	<0.1	<1	2	<1	<0.05	16	44	<10	<50	<100	<100	<50	<1	<1	<1	<3
GIL	13	3.5	14.1	21.7	205	0.6	171	124.3	10	250			50	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene

bold	exceeds GIL
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Table 12: Results of Laboratory Analysis in November 2017 (µg/L)

Well	Heavy Metals ¹								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene
	As	Cd	Cr ³	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	<1	<0.1	<1	2	<1	<0.05	2	10	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	<1	<1	<0.05	3	6	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1/15 112017	<1	<0.1	<1	<1	<1	<0.05	3	5	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	17	<0.1	<1	<1	<1	<0.05	24	69	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	0.4	<1	11	<1	<0.05	3	14	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	1	<0.1	<1	<1	<1	<0.05	7	82	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	3	<0.1	<1	<1	<1	<0.05	3	12	<10	<50	<100	<100	<50	<1	<1	<1	<3
GIL	13	3.5	14.1	21.7	205	0.6	171	124.3	10	250			50	950	180	80	550

Notes:

- 1 Heavy metals thresholds adjusted for a hardness of 500 mg/L
- 2 Field replicate of sample listed immediately above
- 3 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 4 (m+p) +o xylene

bold	exceeds GIL
-------------	-------------

Table 13: Results of Laboratory Analysis in August 2018 (µg/L)

Well	Heavy Metals ²								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene ⁵
	As	Cd	Cr ⁴	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	1	<0.1	<1	3	<1	<0.05	5	30	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	3	<1	<0.05	3	12	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1/20 180828 3	<1	<0.1	<1	<1	<1	<0.05	3	9	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	11	0.8	<1	4	1	<0.05	77	670	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	1.7	<1	10	<1	<0.05	3	21	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	2	<0.1	<1	5	<1	<0.05	7	110	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	4	<0.1	<1	3	<1	<0.05	8	59	22	190	610	<100	230	8	<1	<1	<3
DGV¹	13	2.4	33.1	1.4	121.1	0.6	120.2	87.4	10	250			50	950	180	80	550 ⁵

Notes:

- 1 DGV from the default guideline values provided in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)
- 2 Heavy metal thresholds are adjusted for a hardness of 500 mg/L
- 3 Field replicate of sample listed immediately above
- 4 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 5 m+p+o xylene

bold exceeds GIL

Table 14: Results of Laboratory Analysis in November 2018 (µg/L)

Well	Heavy Metals ²								TRH					Benzene	Toluene	Ethyl- benzene	Total Xylene ⁵
	As	Cd	Cr ⁴	Cu	Pb	Hg	Ni	Zn	C ₆ ⁻ C ₉	C ₁₀ ⁻ C ₁₄	C ₁₅ ⁻ -C ₂₈	C ₂₉ ⁻ C ₃₆	>C ₁₀ ⁻ C ₁₆				
1	<1	<0.1	<1	2	<1	<0.05	6	45	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	1	<1	<0.05	4	19	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1/2018 ³	<1	<0.1	<1	<1	<1	<0.05	4	16	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	15	<0.1	<1	1	<1	<0.05	9	10	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	0.7	<1	5	<1	<0.05	4	24	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	3	<0.1	1	14	<1	<0.05	17	250	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	4	<0.1	<1	6	<1	<0.05	6	30	<10	<50	<100	<100	<50	<1	<1	<1	<3
DGV ¹	13	2.4	33.1	1.4	121.1	0.6	120.2	87.4	10	250			50	950	180	80	550 ⁵

Notes:

- 1 DGV from the default guideline values provided in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)
- 2 Heavy metal thresholds are adjusted for a hardness of 500 mg/L
- 3 Field replicate of sample listed immediately above
- 4 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 5 m+p+o xylene

bold	exceeds GIL
-------------	-------------

Table 15: Results of Laboratory Analysis in August / September 2019 (µg/L)

Well	Heavy Metals ²								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene ⁵
	As	Cd	Cr ⁴	Cu	Pb	Hg	Ni	Zn	C ₆ ⁻ C ₉	C ₁₀ ⁻ C ₁₄	C ₁₅ ⁻ C ₂₈	C ₂₉ ⁻ C ₃₆	>C ₁₀ ⁻ C ₁₆				
1	<1	<0.1	<1	2	<1	<0.05	3	69	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	0.2	<1	2	<1	<0.05	4	16	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1/ 20190902 ³	<1	0.2	<1	2	<1	<0.05	4	19	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	42	<0.1	<1	1	<1	<0.05	22	14	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	0.8	<1	8	<1	<0.05	4	16	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	3	<0.1	<1	2	<1	<0.05	3	39	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	3	<0.1	<1	2	<1	<0.05	22	34	<10	<50	<100	<100	<50	<1	<1	<1	<3
DGV¹	13	2.4	33.1	1.4	121.1	0.6	120.2	87.4	10	250			50	950	180	80	550 ⁵

Notes:

- 1 DGV from the default guideline values provided in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)
- 2 Heavy metal thresholds are adjusted for a hardness of 500 mg/L
- 3 Field replicate of sample listed immediately above
- 4 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 5 m+p+o xylene

bold exceeds GIL

Table 16: Results of Laboratory Analysis in November 2019 (µg/L)

Well	Heavy Metals ²								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene ⁵
	As	Cd	Cr ⁴	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	<1	<0.1	<1	<1	<1	<0.05	6	40	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1/ 20191125 ³	<1	<0.1	<1	1	<1	<0.05	6	40	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	1	<1	<0.05	5	25	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	8	<0.1	<1	1	<1	<0.05	22	39	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	0.3	<1	1	<1	<0.05	4	21	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	3	<0.1	<1	2	<1	<0.05	3	42	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	3	<0.1	<1	<1	<1	<0.05	5	24	<10	<50	<100	<100	<50	<1	<1	<1	<3
DGV¹	13	2.4	33.1	1.4 ¹	121.1	0.6	120.2	87.4	10	250			50	950	180	80	550 ⁵

Notes:

- 1 DGV from the default guideline values provided in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)
- 2 Heavy metal thresholds are adjusted for a hardness of 500 mg/L
- 3 Field replicate of sample listed immediately above
- 4 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 5 m+p+o xylene

bold exceeds GIL

Table 17: Results of Laboratory Analysis in May 2020 (µg/L)

Well	Heavy Metals ²								TRH					Benzene	Toluene	Ethyl-benzene	Total Xylene ⁵
	As	Cd	Cr ⁴	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	>C ₁₀ -C ₁₆				
1	<1	<0.1	<1	7	<1	<0.05	3	<1	<10	<50	<100	<100	<50	<1	<1	<1	<3
BD1/ 20200513 ³	2	<0.1	<1	<1	<1	<0.05	2	<1	<10	<50	<100	<100	<50	<1	<1	<1	<3
2	<1	<0.1	<1	17	<1	<0.05	5	3	<10	<50	<100	<100	<50	<1	<1	<1	<3
7	3	<0.1	<1	19	<1	<0.05	13	16	<10	<50	<100	<100	<50	<1	<1	<1	<3
8	<1	1.9	<1	26	<1	<0.05	11	68	<10	<50	<100	<100	<50	<1	<1	<1	<3
9	5	<0.1	<1	20	<1	<0.05	9	49	<10	<50	<100	<100	<50	<1	<1	<1	<3
10	2	<0.1	<1	9	<1	<0.05	6	14	<10	<50	110	<100	<50	<1	<1	<1	<3
DGV¹	13	2.4	33.1	1.4 ¹	121.1	0.6	120.2	87.4	10	250			50	950	180	80	550 ⁵

Notes:

- 1 DGV from the default guideline values provided in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)
- 2 Heavy metal thresholds are adjusted for a hardness of 500 mg/L
- 3 Field replicate of sample listed immediately above
- 4 All chromium are assumed to exist in the stable Cr (III) oxidation state, as Cr (VI) will be too reactive and unstable under the normal environment.
- 5 m+p+o xylene

bold exceeds GIL



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CERTIFICATE OF ANALYSIS 242897

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck, Lisa Teng
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>71021.15, Tooheys, Lidcombe</u>
Number of Samples	9 Water
Date samples received	14/05/2020
Date completed instructions received	14/05/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by 21/05/2020

Date of Issue 21/05/2020

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Results Approved By

Dragana Tomas, Senior Chemist

Jaimie Loa-Kum-Cheung, Metals Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		242897-1	242897-2	242897-3	242897-4	242897-5
Your Reference	UNITS	BH1	BH2	BH7	BH8	BH9
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	15/05/2020	15/05/2020	15/05/2020	15/05/2020	15/05/2020
Date analysed	-	16/05/2020	16/05/2020	16/05/2020	16/05/2020	16/05/2020
TRH C ₆ - C ₉	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	121	121	123	122	123
Surrogate toluene-d8	%	99	98	98	98	99
Surrogate 4-BFB	%	107	105	107	111	110

vTRH(C6-C10)/BTEXN in Water					
Our Reference		242897-6	242897-7	242897-8	242897-9
Your Reference	UNITS	BH10	BD1/20181125	Spike	Blank
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Water	Water	Water	Water
Date extracted	-	15/05/2020	15/05/2020	15/05/2020	15/05/2020
Date analysed	-	16/05/2020	16/05/2020	16/05/2020	16/05/2020
TRH C ₆ - C ₉	µg/L	<10	<10	[NA]	[NA]
TRH C ₆ - C ₁₀	µg/L	<10	<10	[NA]	[NA]
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	[NA]	[NA]
Benzene	µg/L	<1	<1	102%	<1
Toluene	µg/L	<1	<1	97%	<1
Ethylbenzene	µg/L	<1	<1	88%	<1
m+p-xylene	µg/L	<2	<2	85%	<2
o-xylene	µg/L	<1	<1	91%	<1
Naphthalene	µg/L	<1	<1	[NA]	<1
Surrogate Dibromofluoromethane	%	124	124	123	121
Surrogate toluene-d8	%	98	98	99	103
Surrogate 4-BFB	%	111	107	110	109

svTRH (C10-C40) in Water						
Our Reference		242897-1	242897-2	242897-3	242897-4	242897-5
Your Reference	UNITS	BH1	BH2	BH7	BH8	BH9
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	15/05/2020	15/05/2020	15/05/2020	15/05/2020	15/05/2020
Date analysed	-	16/05/2020	16/05/2020	16/05/2020	16/05/2020	16/05/2020
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	92	96	82	78	82

svTRH (C10-C40) in Water			
Our Reference		242897-6	242897-7
Your Reference	UNITS	BH10	BD1/20181125
Date Sampled		13/05/2020	13/05/2020
Type of sample		Water	Water
Date extracted	-	15/05/2020	15/05/2020
Date analysed	-	16/05/2020	16/05/2020
TRH C ₁₀ - C ₁₄	µg/L	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	110	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100
Surrogate o-Terphenyl	%	88	81

HM in water - dissolved						
Our Reference		242897-1	242897-2	242897-3	242897-4	242897-5
Your Reference	UNITS	BH1	BH2	BH7	BH8	BH9
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	15/05/2020	15/05/2020	15/05/2020	15/05/2020	15/05/2020
Date analysed	-	15/05/2020	15/05/2020	15/05/2020	15/05/2020	15/05/2020
Arsenic-Dissolved	µg/L	1	<1	3	<1	5
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	1.9	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	7	17	19	26	20
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	3	5	13	11	9
Zinc-Dissolved	µg/L	<1	3	16	68	49

HM in water - dissolved			
Our Reference		242897-6	242897-7
Your Reference	UNITS	BH10	BD1/20181125
Date Sampled		13/05/2020	13/05/2020
Type of sample		Water	Water
Date prepared	-	15/05/2020	15/05/2020
Date analysed	-	15/05/2020	15/05/2020
Arsenic-Dissolved	µg/L	2	2
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	9	<1
Lead-Dissolved	µg/L	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	6	2
Zinc-Dissolved	µg/L	14	<1

Method ID	Methodology Summary
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Client Reference: 71021.15, Tooheys, Lidcombe

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date extracted	-			15/05/2020	1	15/05/2020	18/05/2020		15/05/2020	[NT]
Date analysed	-			16/05/2020	1	16/05/2020	19/05/2020		16/05/2020	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	1	<10	<10	0	100	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	1	<10	<10	0	100	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	100	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	102	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	113	1	121	125	3	106	[NT]
Surrogate toluene-d8	%		Org-023	99	1	99	99	0	100	[NT]
Surrogate 4-BFB	%		Org-023	107	1	107	109	2	103	[NT]

Client Reference: 71021.15, Tooheys, Lidcombe

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			15/05/2020	1	15/05/2020	15/05/2020		15/05/2020	[NT]
Date analysed	-			16/05/2020	1	16/05/2020	16/05/2020		16/05/2020	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	1	<50	<50	0	94	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	1	<100	130	26	93	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	1	<100	<100	0	92	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	1	<50	59	17	94	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	1	<100	100	0	93	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	1	<100	<100	0	92	[NT]
Surrogate o-Terphenyl	%		Org-020	91	1	92	107	15	120	[NT]

Client Reference: 71021.15, Tooheys, Lidcombe

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			15/05/2020	[NT]	[NT]	[NT]	[NT]	15/05/2020	[NT]
Date analysed	-			15/05/2020	[NT]	[NT]	[NT]	[NT]	15/05/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	104	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck, Lisa Teng

Sample Login Details

Your reference	71021.15, Tooheys, Lidcombe
Envirolab Reference	242897
Date Sample Received	14/05/2020
Date Instructions Received	14/05/2020
Date Results Expected to be Reported	21/05/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	9 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	12.4
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au

Jacinta Hurst

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	HM in water - dissolved
BH1	✓	✓	✓
BH2	✓	✓	✓
BH7	✓	✓	✓
BH8	✓	✓	✓
BH9	✓	✓	✓
BH10	✓	✓	✓
BD1/20181125	✓	✓	✓
Spike	✓		
Blank	✓		

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

TPS FLT90 CALIBRATION RECORD

Serial Number: 428561

DP Identification No.

DP595

Project: TOOMEYS

Project Number: 71021.15

PARAMETER	STANDARD	PRE CALIBRATION READING		POST CALIBRATION READING	
Temperature	* 23.0 <u>21.4</u>	<u>21.5</u>	degrees C	<u>21.4</u>	degrees C
pH	10.05	<u>10.05</u>	pH units	<u>10.05</u>	pH units
	7	<u>7.04</u>	pH units	<u>7.01</u>	pH units
	4	<u>3.99</u>	pH units	<u>4.00</u>	pH units
Conductivity	0.0** uS/cm	<u> </u>	µS/cm	<u> </u>	µS/cm
	2.76 mS/cm	<u>2.91</u>	mS/cm	<u>2.75</u>	mS/cm
TDS	0.0** ppm	<u> </u>	ppm	<u> </u>	ppm
	36.0 ppk	<u> </u>	ppk	<u> </u>	ppk
Dissolved Oxygen	0.0% sat	 <u>-1.8%</u>	ppm %	<u>0.0%</u>	ppm %
	100.0***% sat	<u> </u> <u>101.9</u>	ppm %	<u>100.0%</u>	ppm %
Turbidity	0*** NTU	<u> </u>	NTU	<u> </u>	NTU
	90 NTU	<u>83.7</u>	NTU	<u>90.0</u>	NTU
ORP #	240 mV	<u>233</u>	mV	<u>-</u>	mV

Calibrated by: LT

Date: 12/5/2020

* use NATA certified reference thermometer from soils clean lab

** air

*** distilled water

factory calibrated – do a bump test

NOTES: