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Riverlea Development,
Proposed Saltwater Lakes

Dewatering Investigation and Risk Assessment Report

For Walker Buckland Park
Developments Pty Ltd

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Riverlea Development – Proposed Saltwater Lakes Dewatering Investigation and Risk Assessment Report

Report for Walker Buckland Park Developments Pty Ltd

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Abbreviations

ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013)
BTEX	benzene, toluene, ethylbenzene, xylenes
CEMP	Construction Environmental Management Plan
DEW	Department for Environment and Water, Government of South Australia
DO	dissolved oxygen
EC	electrical conductivity
DMP	Dewatering Management Plan
EHS	Environment, health and safety
EPA	Environment Protection Authority, Government of South Australia
EP Act	*Environment Protection Act 1993 (SA)*
EV	Environmental Value
GAR	Guidelines for the assessment and remediation of site contamination (EPA 2019)
GED	General Environmental Duty
GME	Groundwater monitoring event
GMRRW	Guidelines for Managing Risks in Recreational Water 2008
HCL	Hydrogeology Consulting Ltd
LBWco	LBW co Pty Ltd
LOR	Limit of reporting
mAHD	metres Australian Height Datum
mBGL	metres below ground level
mBTOC	metres below top of casing
mg/L	milligrams per litre
NATA	National Association of Testing Authorities
OCP	organochlorine pesticides
QA/QC	Quality assurance / quality control
RL	relative level
RPD	relative percentage difference
SA	South Australia
SWL	Standing water level
SWL1	Saltwater Lake 1
SWL2	Saltwater Lake 2
SWL3	Saltwater Lake 3
TDS	Total Dissolved Solids
TOC	top of casing
TRH	Total recoverable hydrocarbons
TSS	Total suspended solids
Walker	Walker Buckland Park Developments Pty Ltd
WEP	Water Engineering Projects
WQP	*Environment Protection (Water Quality) Policy 2015* (SA)

Executive Summary

LBW co Pty Ltd (LBWco) was engaged by Walker Buckland Park Developments Pty Ltd (Walker) to undertake environmental and hydrogeological investigations at Riverlea (the site), to support the assessment and approvals processes for groundwater dewatering that will be required for construction of the proposed saltwater lakes.

Three saltwater lakes are proposed to be constructed at the site and will provide a range of functions and benefits to the Riverlea development.

Walker advised that the three saltwater lakes are nominally proposed to be constructed and filled per the program below. The progression of lakes construction will be informed by the progression of the Riverlea development.

- Saltwater Lake 1 (SWL1) to be constructed by 2030
- Saltwater Lake 2 (SWL2) to be constructed by 2035
- Saltwater Lake 3 (SWL3) to be constructed by 2040
- Shallow groundwater has been identified beneath the site through previous assessment works, indicating that excavation of the proposed lakes to invert levels ranging from 0.5 - 1.5 m Australian Height Datum (mAHD) will penetrate one or more saturated zones. Therefore, dewatering of groundwater will be required to facilitate lake construction.

This report details the soil and groundwater assessment undertaken at the site to characterise the projected dewatering works and to support the assessment of appropriate management of dewatering wastewater.

The scope of work broadly included the following:

- Drilling of 17 soil bores across the site to characterise the soil lithology, depth(s) to saturated zone(s) and the presence/thickness of clay aquitard beneath shallow saturated zones.
- Three stages of groundwater well installation:
  - Stage 1: broad groundwater assessment across the Riverlea site, with focus on characterising groundwater conditions within and around the dewatering area.
  - Stage 2: targeted assessment of groundwater at four locations in the vicinity of proposed SWL1. Assessment beyond the maximum saltwater lake excavation depth of 0.5 mAHD was required to investigate the potential for intersection/upward leakage from deeper groundwater (Q2 aquifer) and possibility for heave following lake excavation.
  - Stage 3: installation of four large diameter (100 mm) wells of varying depths (EX10-EX13) to be used for pump testing. Pump test wells were installed to target the saturated zones that were anticipated to contribute the greatest flows during dewatering, based on results of slug testing in nearby wells.
- Two groundwater monitoring events to characterise groundwater quality at the site.
- Aquifer testing using both slug tests and pump tests to determine estimates of hydraulic conductivity and transmissivity for the site.
- Generation of hydrographs to investigate variation in standing water levels over time.
- A surface water monitoring event and collation of existing surface water testing data to characterise the potential receiving environment in the event that offsite disposal of dewatering wastewater is required.

- Development of a hydrogeological model for the site to estimate the required dewatering rates for construction, estimate dewatering volumes and assess potential impacts on existing users of shallow groundwater.

- Modelling of onsite storage and reuse of dewatering wastewater to determine if there is like to be a need for offsite disposal of dewatering wastewater.

Specifically, the following two questions were required to be answered to address the objectives of this dewatering investigation and inform regulatory approval considerations for the taking of the shallow groundwater:

- What pumping flow rate is required to provide control of groundwater to the level required to construct SWL1?

- What is the estimated volume of groundwater to be pumped to facilitate construction of SWL1?

Based on the investigation works undertaken, LBWco concluded the following:

- Dewatering during construction of SWL1 will be required and the wastewater produced by dewatering must be reused or disposed appropriately.

- Options under consideration by Walker for the lake lining include clay and a synthetic polymer system. Assessing the merits of either lining system was not addressed in this report, but the longer construction timeframe for a synthetic liner was adopted for dewatering modelling purposes. Based on the proposed construction methodology and hydrogeological modelling of dewatering flows, it was estimated that:

  - Dewatering during construction of SWL1 would likely be required for a period of 147 days

  - The volume of dewatering wastewater generated would be approximately 436,000 m^3.

- The modelling was conservative, so actual dewatering pumping requirements may be below those simulated. Higher pumping rates are also possible at times where preferential flows may occur through more permeable strata.

- Modelling of drawdown during and after dewatering activities indicated low risk of unacceptable impact to nearby registered users of shallow groundwater from the dewatering activity. There are no registered users of shallow groundwater within 2 km of the proposed saltwater lakes locations.

- Based on the likely onsite storage capacity and projected onsite demand for water during construction activities, it was predicted that all dewatering wastewater from SWL1 can be managed onsite through onsite storage and reuse.

  - Contingency modelling undertaken for an additional 90 days of dewatering, simulating a potential unforeseen project delay, indicated the total volume of groundwater extracted would still be within the onsite capacity.

  - In the unlikely event that onsite storage and reuse capacity is exceeded, it may be necessary to dispose dewatering wastewater offsite to Thompson Creek. Comparison of groundwater and surface water data indicated that discharge to Thompson Creek would not cause environmental harm in the receiving environment, provided that flow and suspended solids were managed appropriately.

- Modelling simulated several different approaches to groundwater extraction for dewatering of SWL1. To achieve the necessary control of groundwater across the full width of the lake, a series of horizontal well points at regular spacings are likely to be needed through the base of the lake. A network of extraction bores will also be needed around the perimeter of the lake.

LBWco recommends that a comprehensive Dewatering Management Plan (DMP) be prepared as part of the detail design process and part of the Construction Environmental Management Plan (CEMP) for the project. The DMP should be agreed by the key stakeholders relevant to the proposed activity.

The information in this report is subject to the limitations expressed in Section 12. The reader should make themselves aware of the limitations and how they relate to the conclusions provided above.

1 Introduction

LBW co Pty Ltd (LBWco) was engaged by Walker Buckland Park Developments Pty Ltd (Walker) to undertake environmental and hydrogeological investigations at Riverlea (the site), to support the assessment and approvals processes for groundwater dewatering that will be required for construction of the proposed saltwater lakes.

Three saltwater lakes are proposed to be constructed at the site and will provide a range of functions and benefits to the Riverlea development.

Walker advised that the three saltwater lakes are nominally proposed to be constructed and filled per the program below. The progression of lakes construction will be informed by the progression of the Riverlea development.

- Saltwater Lake 1 (SWL1) to be constructed by 2030
- Saltwater Lake 2 (SWL2) to be constructed by 2035
- Saltwater Lake 3 (SWL3) to be constructed by 2040

A site locality plan is presented on Figure 1 in Appendix A.

Shallow groundwater has been identified beneath the site through previous assessment works, indicating that excavation of the proposed lakes to invert levels ranging from 0.5 - 1.5 m Australian Height Datum (mAHD) will penetrate one or more saturated zones. Therefore, dewatering of groundwater will be required to facilitate lake construction.

EPA guideline *Environmental management of dewatering during construction activities* (2021), defines dewatering as

> '*the process of removal of any water that accumulates in earthwork excavations or below ground structures as a result of, for example, intersecting aquifers, seepage of soil water / groundwater, storm events or rainfall (including surface water runoff). The water removed during dewatering is classified as wastewater*'.

Walker required an assessment of the groundwater to support decision-making on a range of matters relating to management of the dewatering process, including appropriate disposal options for the wastewater, whether through stormwater, sewer or an alternative method. An assessment of surface waters in Thompson Creek, which was identified as a potential receiving environment for dewatering wastewater discharge, was also required.

This report details the soil, groundwater and surface water assessments undertaken at the site to address the objectives described below.

1.1 Objectives

The objective of the soil bore investigation was to characterise:

- The presence of shallow unconfined perched groundwater, soil lithology and saturated thickness
- The presence, lithology and thickness of an aquitard beneath the perched zone
- The lithology and saturated thickness of the Q1 aquifer underlying the shallow perched zone.

The objectives of the hydrogeological investigation were to:

- Characterise the groundwater conditions in the vicinity of the saltwater lakes with higher resolution than was evident in previous hydrogeological investigations at Riverlea
- Estimate dewatering extraction rate(s) required to lower and control groundwater to a target level suitable for construction of the lakes
- Advise on dewatering methodology to achieve the required groundwater control for construction
- Estimate total take of groundwater during predicted construction dewatering, and total dewatering wastewater reuse/disposal, to inform regulatory approvals from the Department for Environment and Water (DEW) and the Environment Protection Authority (EPA).
- Support a risk assessment of potential environmental impacts from the proposed dewatering activity.

The objectives of the groundwater and surface water quality assessments were to:

- Characterise ambient background groundwater quality entering the site from upgradient
- Characterise groundwater quality in the area of the saltwater lakes where dewatering will occur
- Assess groundwater quality downgradient of the site to assess for influence from historical site activities and to understand conditions at and near the groundwater-marine mixing zone
- Characterise surface water quality downgradient of the site to assess for ambient conditions in creeks that may receive dewatering discharge in the future.
- Support a risk assessment regarding potential for environmental harm in the receiving environment(s), if dewatering wastewater were to be disposed in this matter.

2 The Dewatering Proposal

The planned locations of the saltwater lakes are shown on Figure 2 in Appendix A. This dewatering investigation report relates mainly to SWL1, which is located within the Precinct 2 area of Riverlea. Walker is currently seeking approval for a revised masterplan within Precinct 2.

Construction of SWL1 is proposed to occur in stages, via the excavation and separation of lake segments via temporary coffer dams. The lake segments are shown as Bays 1 to 5 on the drawing extract below (WGA Bulk Earthworks Plan, preliminary issue 27.10.2023).

Groundwater dewatering will be implemented sequentially for each bay to drawdown the water table to a sufficient level for bulk earthworks to be undertaken. The drawdown target for construction is at least 1.0 m below the lake subgrade level, which Walker expects to be sufficient based on advice from civil contractors.

Lake construction is currently expected to include a liner system to support retention of saltwater within the lakes to the extent reasonable and practicable, and therefore minimising mixing of saltwater with underlying groundwater.

Liner systems are under consideration by Walker and may include modifying existing clay and adding clay to seal up permeable zones in the base and walls of the lakes, or the installation of a polymer liner. A decision has not been made on a specific liner type at the time of reporting.

In support of the waste management hierarchy, prescribed at section 4B of the *Environment Protection Act 1993* (SA) and discussed in section 4.2 below, Walker intends to minimise the production of dewatering wastewater and maximise the onsite reuse of the wastewater.

Initial reuse of the dewatering wastewater may include (but may not limited to) the following purposes including:

- Wetting of clay liner during construction
- Progressive filling of completed lake bays to balance pressure against a polymer liner once dewatering pumping has ceased
- Filling of polymer aqua dams (coffer dams)
- Soil moisture conditioning for compaction onsite

- Dust control

The sequence of construction of bays 1-5 was assessed relative to the results of this investigation and consideration of other factors by Walker.

If dewatering activity produces wastewater that is surplus to the reuse demand onsite, alternative wastewater management measures will need to be implemented. Options for wastewater management are assessed in this report.

3 Background

Site investigations of the geology and hydrogeology of the Riverlea development area had been undertaken prior to this dewatering investigation, including:

- REM (2008), Aquifer Storage and Recovery Potential for Buckland Park, 30 October 2008
- REM-SKM (2008), Buckland Park EIS Groundwater Investigations, 17 December 2008
- SKM (2009), Further Groundwater Monitoring, Buckland Park Proposal, 6 March 2009
- Golder (2009), Preliminary Acid Sulphate Soil Investigation, Buckland Park, South Australia, Draft Report, 31 March 2009
- AGT (2011), Buckland Parks Drain Model, 4 May 2011.

LBWco carried out a review of the above reports prior to this dewatering investigation. A summary of the key outcomes relating to site geology and hydrogeology is provided in the sections below.

3.1 Geology

The ground surface is relatively flat in the vicinity of the site, with a gentle slope down towards the coast, which is located approximately 3 km west of the planned location of SWL1.

The near surface stratigraphy of the area is comprised of Quaternary sediments of the Pooraka Formation, with the St Kilda and Glanville Formations towards the coast. The Pooraka Formation is described as mottled clay and silt inter-bedded with sand, gravel and thin sandstone layers. The St Kilda formation is characterised by estuarine muds, sands, peats and shelly beds and often contains permeable sand lenses.

These Quaternary sediments overlie the older sediments of the Hindmarsh Clay, which is described as a layered sequence of mottled red-brown sandy clay with sand and gravel lenses.

3.2 Hydrogeology

The REM (Oct 2008) report indicates that four Quaternary aquifers (Q1 to Q4) are generally present in the Northern Adelaide Plains region. The top three (Q1 to Q3) have thicknesses ranging from 3 to 15 m, and can be quite discontinuous with lateral extents often less than 2 km. The Hindmarsh Clay unit encloses these aquifers. Clay generally underlies the Q3 aquifer and forms a confining bed above the Q4 aquifer, which is a sandy, confined aquifer within the Carisbrooke Sand, with an average thickness of about 20 m. The Q4 near Buckland Park (and Riverlea) is interpreted to directly overlie the top Tertiary aquifer (T1), although the Q4 itself thins out towards the coast.

4 Regulatory Framework

4.1 Discharge to the Environment

In South Australia, dewatering wastewater disposal is regulated by the:

- *Environment Protection Act 1993* (EP Act), and
- *Environment Protection (Water Quality) Policy 2015* (WQP).

In accordance with Section 25 of the EP Act, there is a General Environmental Duty (GED) on all persons to '*… take all reasonable and practical measures to prevent or minimise any resulting environmental harm'* resulting from an activity. The GED requires a person to take 'reasonable and practical' actions to prevent further environmental harm from any <u>existing</u> site contamination.

Schedule 1 of the EP Act specifies the threshold for an earthworks drainage licence:

> *"The conduct of earthworks operations in the course of which more than 100 kL of wastewater containing suspended solids in a concentration exceeding 25 mg/L is discharged directly or indirectly to marine waters or inland waters."*

The purpose of the WQP is to protect and maintain beneficial uses of water resources in South Australia by regulating discharges to those water sources. The WQP assigns Environmental Values (EVs) for all inland, surface waters and groundwater. The default EVs for groundwater as set out in the WQP include the following:

- Drinking water for human consumption;
- Primary industries: irrigation and general water uses; livestock drinking water; aquaculture and human consumption of aquatic foods.

The default EVs for public stormwater systems include aquatic ecosystems and recreation and aesthetics.

Collectively, these are the applicable EVs for the context of this dewatering investigation.

Clause 9 of the WQP refers to the GED at section 25 of the EP Act, and requires (in part) that a person must:

- apply the Waste Management Hierarchy
- in the case of waters with an EV of aquatic ecosystems, avoid activating a trigger value published in relevant Water Quality Guidelines
- in the case of waters with an EV of recreation and aesthetics, have regard to NHMRC 2008, *Guidelines for Managing Risks in Recreational Water* (GMRRW).
- follow standards, codes and guidelines prescribed in Schedule 4 of the WQP.

The WQP prescribes Water Quality Guidelines as:

ANZECC 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

In 2018 these guidelines were revised and published online as the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) Water Quality Guidelines (https://www.waterquality.gov.au/anz-guidelines). Nevertheless, the WQP contains a fixed reference to the ANZECC 2000 guidelines as relevant water quality criteria for application in South Australia.

Activation of trigger values for an indicator specified in the Water Quality Guidelines is described at Clause 7 of the WQP and states that for aquatic ecosystems a basis of a 95% level of protection of species must be applied. ANZECC (2000) and ANZG (2018) recommend that 99% level of protection for species be applied for toxicants with a bioaccumulating nature, but no chemicals of this nature were listed for freshwater aquatic ecosystems.

Further guidance on how to meet the requirements of the above is provided in EPA 2021, *Environmental management of dewatering during construction activities.* Water Quality Guideline (June 2021).

4.2 Waste Management Hierarchy

The obligation of a proponent of an activity to apply the waste hierarchy is embedded in the environmental regulatory instruments administered by the EPA. An extract of the hierarchy from EPA (2021) is provided below. These principles are applicable to all dewatering projects.

The hierarchy is as follows:

1 avoidance of the production of waste

2 minimisation of the production of waste

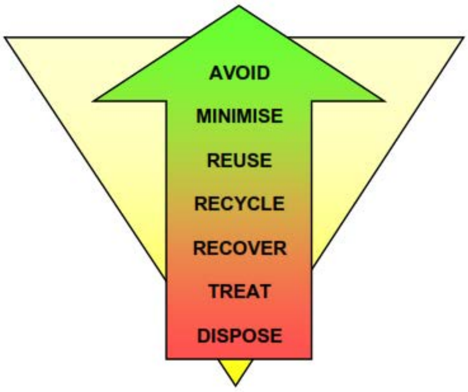
3 reuse of waste

4 recycling of waste

5 recovery of energy and other resources from waste

6 treatment of waste to reduce potentially degrading impacts

7 disposal of waste in an environmentally sound manner.

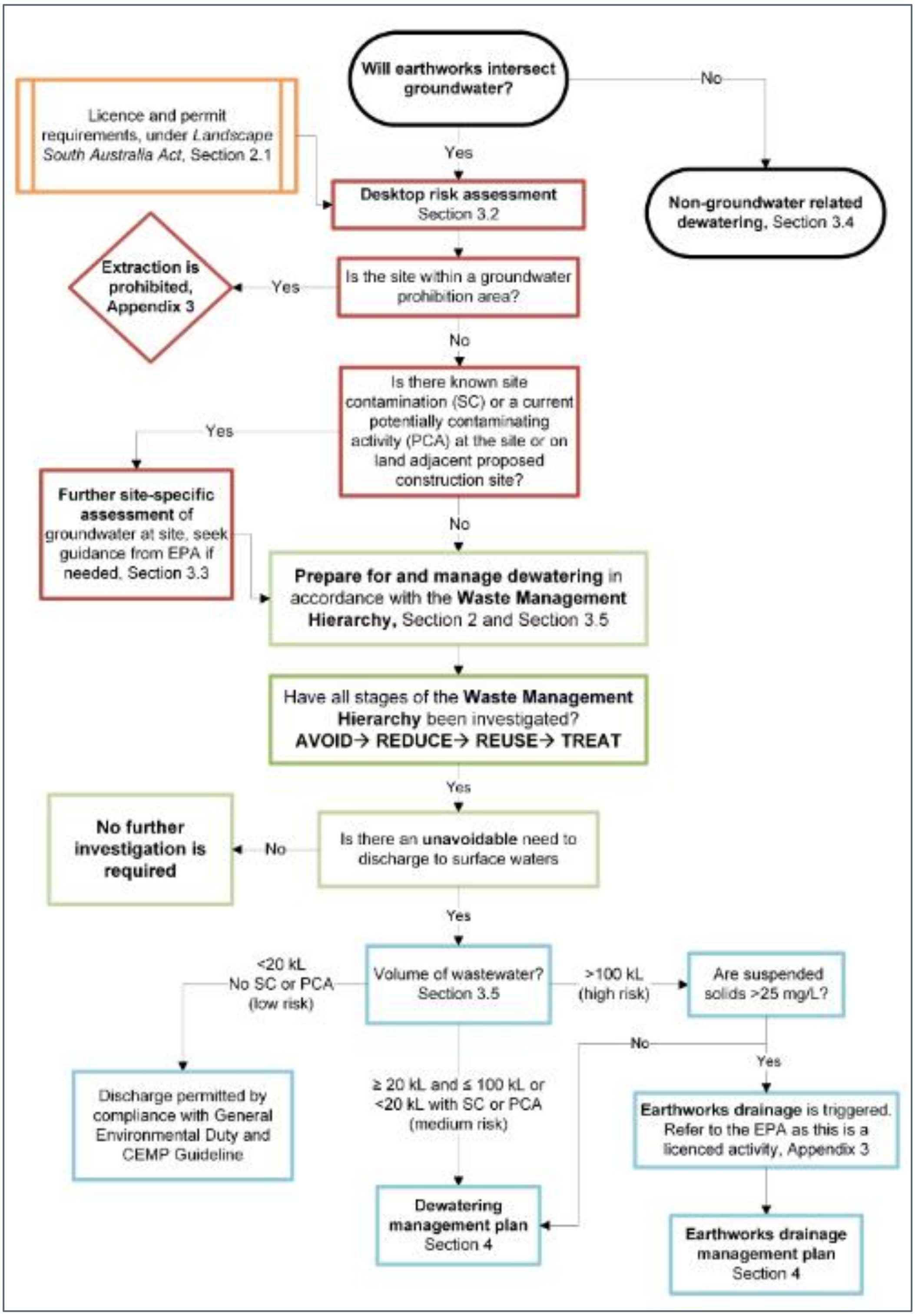


4.3 Discharge to sewer

The flow rate and volume of dewatering wastewater to be managed during construction of SWL1 were expected to be too large for discharge to sewer to be a feasible option for wastewater management. Therefore, no further assessment of this discharge option was provided.

4.4 Dewatering decision-making flowchart

EPA (2021) provides a decision-making flow chart to assist proponents to understand their dewatering requirements and the regulatory controls in place. An extract is provided below.


Will earthworks intersect groundwater?
No
Non-groundwater related dewatering, Section 3.4
Yes
Licence and permit requirements, under Landscape South Australia Act, Section 2.1
Desktop risk assessment Section 3.2
Is the site within a groundwater prohibition area?
Yes
Extraction is prohibited, Appendix 3
No
Is there known site contamination (SC) or a current potentially contaminating activity (PCA) at the site or on land adjacent proposed construction site?
Yes
Further site-specific assessment of groundwater at site, seek guidance from EPA if needed, Section 3.3
No
Prepare for and manage dewatering in accordance with the Waste Management Hierarchy, Section 2 and Section 3.5
Have all stages of the Waste Management Hierarchy been investigated? AVOID→ REDUCE→ REUSE→ TREAT
Yes
Is there an unavoidable need to discharge to surface waters
No
No further investigation is required
Yes
Volume of wastewater? Section 3.5
<20 kL No SC or PCA (low risk)
Discharge permitted by compliance with General Environmental Duty and CEMP Guideline
≥ 20 kL and ≤ 100 kL or <20 kL with SC or PCA (medium risk)
Dewatering management plan Section 4
>100 kL (high risk)
Are suspended solids >25 mg/L?
No
Yes
Earthworks drainage is triggered. Refer to the EPA as this is a licenced activity, Appendix 3
Earthworks drainage management plan Section 4

5 Scope of Work and Methodology

5.1 Guidance Documents

Dewatering investigation works were undertaken with reference to regulatory requirements and/or guidance in the following publications:

- EPA 2019a, Guidelines for the assessment and remediation of site contamination (GAR)
- EPA 2019b, Guidelines for regulatory monitoring and testing – Groundwater sampling
- EPA 2021, Environmental management of dewatering during construction activities
- International Association of Hydrogeologists Australia (IAHA) 2020, Minimum construction requirements for water bores in Australia (4th Edition)
- *Landscape South Australia Act 2019* (SA) and relevant regulations
- National Environment Protection Council (NEPM) 1999, National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM, as amended 2013).

5.2 Soil Bore Investigation

5.2.1 Scope of Work and Rationale

Between 28 and 31 March 2023, 17 soil bores were drilled across the site area to characterise the soil lithology, depth(s) to saturated zone(s) and the presence/thickness of clay aquitard beneath shallow saturated zones. Soil bore locations were selected to assess conditions within the proposed excavation areas, and hydraulically up and down-gradient of the excavation. Soil bores were drilled to depths of between 4.5 m below ground level (mBGL) and 9.0 mBGL.

A soil bore location plan is provided as Figure 2 in Appendix A. The rationale for each location is described in Table 1 below.

Table 1 Soil Bore Location Rationale

Soil Bore	Rationale
SL01, SL02	Upgradient soil bores to the north and east of the dewatering area
SL03-SL06	Soil bores within/adjacent to the proposed dewatering area for SWL1
SL07-SL13	Soil bores within/adjacent to the proposed dewatering area for SWL2
SL14, SL15	Soil bores within the proposed dewatering area for SWL3
SL16, SL17	Soil bores downgradient of the proposed dewatering area

5.2.2 Methodology

The soil bore investigation was undertaken in general accordance with the methodology described in Table 2.

Table 2 Soil Bore Investigation Methodology

Activity	Details
Environment, Health and Safety (EHS) Plan	LBWco prepared a project specific EHS plan to identify hazards that may be encountered in the field and document the appropriate risk mitigation measures to be implemented.
Water Affecting Activity Permits	Permits to drill and backfill soil bores that intersected multiple saturated layers were obtained from DEW prior to commencement of works.
Drilling of soil bores	Between 28 and 31 March 2023, soil bores SL01-SL14 were drilled by experienced environmental driller A&S Drilling under the full-time supervision of LBWco. Soil bores SL15-SL17 were drilled by Williams Drilling and Sampling (WDS) on 31 March 2023. Soil bores were drilled using push-tube methodology and were extended to depths of between 4.5 mBGL at SL05 and 9.0 mBGL at SL06. Soil bore logs are provided in Appendix B.
Soil bore logging	Recovered soils were placed into clean core trays and logged in general accordance with AS1726-2017. Field indicators of contamination (e.g. foreign inclusions, staining, odour) were recorded.
Soil sampling	Soil samples were collected at locations SL13-SL16 as part of the Precinct 3 Preliminary Site Investigation. These results are reported separately and are not discussed further here.
Soil bore abandonment	Following completion of drilling, the saturated zones of boreholes were grouted to restore aquifer conditions and prevent the introduction of vertical connectivity.

5.3 Groundwater Investigation

5.3.1 Scope of Work and Rationale

Groundwater Well Installation

The installation of groundwater wells for use in the dewatering investigation was undertaken in three stages, as follows:

- Stage 1 consisted of a broad groundwater assessment across the Riverlea site, with focus on characterising groundwater conditions within and around the dewatering area. Groundwater well locations, depths and well constructions were refined based on the results of the soil bore investigation.
  - Four wells (SLMW01-P, SLMW04-P, SLMW05-P and SLMW09-P) were installed to target the shallow saturated zone or inferred ‘perched’ water.
  - Seven wells (SLMW01-Q1-SLMW03-Q1, SLMW05-Q1-SLMW08-Q1) were installed to target deeper saturated zones in what was assessed to be the Q1 aquifer.
- Stage 2 consisted of a targeted assessment of groundwater at four locations (SLMW10-SLMW13) in the vicinity of proposed SWL1. Assessment beyond the maximum saltwater lake excavation depth of 0.5 mAHD was required to investigate the potential for intersection/upward leakage from deeper groundwater (Q2 aquifer) and possibility for heave following lake excavation. Nested wells of varying depths were installed at each location to target different saturated zones, as follows:

- ‘A’ wells were installed to target the shallow saturated zone at each drilling location. No shallow saturated zone was present at location SLMW11, so an ‘A’ well was not installed.

- ‘B’ wells were installed to target the second saturated zone at each location, which included several saturated lenses at some locations.

- ‘C’ wells were installed to target the saturated zone at or below the maximum excavation depth of the saltwater lake.

- Stage 3 consisted of the installation of four large diameter (100 mm) wells of varying depths (EX10-EX13) to be used for pump testing. Pump test wells were installed to target the saturated zones that were anticipated to contribute the greatest flows during dewatering, based on results of slug testing in nearby wells (see below).

Groundwater well locations are shown on Figure 3 in Appendix A.

Groundwater Sampling

Two groundwater monitoring events (GMEs) were undertaken as part of the dewatering investigation. The first event was undertaken from 2-8 May 2023 following installation of the wells in Stage 1 with the objective of assessing water quality across, upgradient and downgradient of the development area. The second GME was undertaken from 31 October to 7 November 2023 following Stage 2 well installations and was focussed on water quality in the vicinity of SWL1.

Existing groundwater wells on and offsite were utilised for the GMEs in addition to newly installed wells. A summary of the groundwater monitoring network for the dewatering investigation is provided in Table 3.

Groundwater samples were also recovered from wells EX10, EX12 and EX13 at the completion of pump tests, to provide additional data on likely water quality during dewatering activities. Samples were analysed for total dissolved solids (TDS), heavy metals and nutrients, which were identified as key contaminants of potential concern from the previous groundwater monitoring events.

Aquifer Testing – Slug Tests

Falling and rising slug tests were performed on a subset of monitoring wells within the proposed SWL1 dewatering area, as indicated in Table 3.

Aquifer Testing – Pump Testing

Pump testing was undertaken on three of the four pump test wells, EX10, EX12 and EX13. Pump testing was undertaken between 6 and 19 December 2023.

Hydrographs

In addition to gauging of groundwater levels during the GMEs in 2023, groundwater level data loggers (pressure transducers) were deployed in selected onsite monitoring wells (SLMW01-P, SLMW05-P, SLMW08-Q1 and SLMW13-A) to record groundwater levels over a three-week period in August 2024. Data loggers were programmed to record at three-hour intervals.

Groundwater level data for onsite wells was interrogated together with publicly available level data (waterconnect.sa.gov.au) for selected offsite monitoring wells, to prepare and assess hydrographs representing the shallow groundwater system onsite and within the surrounding area.

Unit numbers of the offsite wells interrogated were 6628-2501, 6628-2515, 6628-19991, 6628-19995 and 6628-19999. These wells were selected based on recorded well completion depths consistent with the shallow groundwater system and to provide a spread of locations around Riverlea Precinct 2 at distances ranging from 1 km to 6 km.

Table 3 Groundwater Monitoring Network

Well ID	DEW Permit No.	Drill Date	Easting GDA20	Northing GDA20	TOC RL (mAHD)	Total Depth (mBTOC)	Base of well RL (mAHD)	Screen Interval (mBGL)	Sampled May-23	Sampled Oct-23	Slug Test
SLMW01-P	439417	18/04/2023	272971.881	6163709.803	9.674	4.727	4.947	2.5 - 4	Y	Y	05.10.23
SLMW01-Q1	439270	17/04/2023	272973.019	6163706.174	9.685	7.943	1.742	5.65 - 7.15	Y	Y	05.10.23
SLMW02-Q1	439269	18/04/2023	272446.646	6163233.766	8.643	8.159	0.484	3 - 7.5	Y	Y	05.10.23
SLMW03-Q1	439272	18/04/2023	272721.032	6163226.168	9.469	7.420	2.049	4 - 6.5	Y	Y	05.10.23
SLMW04-P	439418	20/04/2023	273255.325	6162771.465	8.518	5.423	3.095	3 - 5	Y	Y	05.10.23
SLMW05-P	439413	18/04/2023	271804.955	6162843.62	8.086	7.013	1.073	3.25 - 6.25	Y	Y	N
SLMW05-Q1	439266	17/04/2023	271806.178	6062845.203	8.138	9.949	-1.811	7 - 9	Y	Y	N
SLMW06-Q1	439420	18/04/2023	272522.86	6162784.453	7.27	6.873	0.397	2 - 6.5	Y	Y	05.10.23
SLMW07-Q1	439414	19/04/2023	272105.585	6162180.002	6.51	6.491	0.019	2 - 6	Y	Y	N
SLMW08-Q1	439268	19/04/2023	271652.554	6161771.683	6.426	6.696	-0.27	2 - 6	Y	N	N
SLMW09-P	439994	19/04/2023	270586.501	6161442.812	5.563	3.797	1.766	1 - 3	Y	N	N
SLMW10-A	448912	23/10/2023	272772.577	6163179.029	9.588	7.185	2.403	5.3 - 6.3	-	Y	08.11.23
SLMW10-B	448913	23/10/2023	272774.531	6163178.4	9.559	10.100	-0.541	8.2 - 9.2	-	Y	08.11.23
SLMW10-C	448918	18/10/2023	272776.768	6163177.594	9.591	13.185	-3.594	10 - 13	-	Y	08.11.23
SLMW11-B	448915	23/10/2023	272799.342	6162987.626	9.294	8.780	0.514	5.1 - 7.8	-	Y	08.11.23
SLMW11-C	448919	16/10/2023	272800.36	6162985.507	9.292	13.970	-4.678	10 - 13	-	Y	08.11.23
SLMW12-A	448916	23/10/2023	272727.468	6162776.055	8.31	5.020	3.29	2.5 - 4	-	Y	08.11.23
SLMW12-B	448917	23/10/2023	272728.233	6162773.82	8.312	9.080	-0.768	6.5 - 8	-	Y	08.11.23
SLMW12-C	448920	19/10/2023	272729.249	6162771.629	8.272	12.455	-4.183	10.5 - 13	-	Y	08.11.23
SLMW13-A	448909	24/10/2023	273247.115	6162805.068	8.643	5.340	3.303	3 - 4.5	-	Y	08.11.23
SLMW13-B	448910	24/10/2023	273247.281	6162802.55	8.654	9.540	-0.886	7 - 8.8	-	Y	08.11.23

Well ID	DEW Permit No.	Drill Date	Easting GDA20	Northing GDA20	TOC RL (mAHD)	Total Depth (mBTOC)	Base of well RL (mAHD)	Screen Interval (mBGL)	Sampled May-23	Sampled Oct-23	Slug Test
SLMW13-C	448911	20/10/2023	273247.768	6162800.651	8.582	13.380	-4.798	9.5 - 12.5	-	Y	08.11.23
6528-2628		Unknown	270674.02	6160219.69	3.836	3.947	-0.111	Unknown	Y	N	N
6628-21445		Unknown	-*	-*	-*	7.623	-*	Unknown	Y	N	N
6628-23298		Unknown	272961.817	6164329.647	12.199	5.982	6.217	Unknown	Y	Y	N

mBGL – metres below ground level; mAHD – metres Australian Height Datum; mBTOC – metres below top of casing
*Precise well coordinates and top of casing elevation unknown – not surveyed.

5.3.2 Methodology

The groundwater investigation was undertaken in accordance with the methodology described in Table 4.

Table 4 Groundwater Investigation Methodology

Activity	Details
EHS Plan	LBWco prepared a project specific EHS plan to identify hazards that may be encountered in the field and document the appropriate risk mitigation measures to be implemented.
Drilling of monitoring wells	Permits to install the new groundwater wells were obtained from DEW prior to commencement of works. 18-20 April 2023 Experienced drilling contractor, Underdale Drillers oz (Underdale), was engaged to drill and install wells SLMW01-SLMW09 under the full-time supervision of LBWco. Wells were installed using hollow auger drilling method to the depths indicated in Table 3. At locations SLMW01-Q1 and SLMW05-Q1, 177 mm diameter pre-collars were installed to prevent connection of the perched groundwater and Q1 aquifer. The pre-collars were installed by drilling through the shallow perched groundwater and penetrating the underlying formation by 0.5-1 m. The PVC pre-collar was then installed and the borehole annulus and base were grouted and the grout left to cure for a minimum of 24 hours. Following curing the well was installed by drilling through the pre-collar to the target depth. 16-24 October 2023 Monitoring wells at locations SLMW10-SLMW13 were drilled and installed by Underdale under the full-time supervision of LBWco. Deep monitoring wells SLMW10-C, SLMW11-C, SLMW12-C and SLMW13-C were drilled using a sonic drilling method, to produce a continuous core. At each location, drilling was installed past the maximum excavation depth of the proposed saltwater lake (0.5 mAHD) to investigate the presence of saturated layers in proximity to the base of the excavation. 'A' and 'B' monitoring wells were drilled using hollow augers to provide borehole support and prevent connection of shallow saturated zones. Groundwater well construction logs and DEW permits are provided in Appendix C.
Monitoring well installation	Monitoring wells were constructed using Class 18 PVC casing with screw-threaded joints and slotted screens. At each location, the well annulus was backfilled with a filter pack to 0.5 m above the top of the screen, with a minimum 1 m bentonite seal and then grouted to the surface. Wells were finished above ground level with lockable steel standpipe covers. Soil cuttings from groundwater wells were retained onsite.
Logging of well lithology	Recovered soils were placed into clean core trays for logging. Soil cores were photographed and logged onsite with reference to AS1726-2017. Field indicators of potential contamination (e.g. foreign inclusions, staining, odour) were recorded.
Well development	Following installation, wells were developed by gentle agitation with a steel bailer to remove sediment. Extraction of groundwater was undertaken until the groundwater turbidity was low. As the sonic drilling method required the addition of large volumes of water to the boreholes, wells SLMW10-C, SLMW11-C, SLMW12-C and SLMW13-C were developed using air lift to remove larger volumes of water. Extracted groundwater was disposed to grade on site. Following development, wells were allowed to equilibrate for 7 days prior to groundwater sampling.

Activity	Details
Slug testing	Aquifer testing was undertaken by LBWco on 5 October 2023 and 8 November 2023 at wells indicated in Table 3. On each occasion, following gauging of wells, rising and falling head slug tests were undertaken to enable an estimate of the hydraulic conductivity of the shallow groundwater. Slug testing was undertaken as follows: • Slug testing involved causing the downwards displacement of groundwater in the well by removing water using a disposable bailer, then measuring the response of water level in the well on return to equilibrium conditions. The test was repeated in reverse by adding a known volume of water to the well over a short period of time to cause upwards displacement of groundwater. • Where time permitted, the tests were repeated to provide additional data. • Water level data on 5 October 2023 was recorded down hole via a vented In-situ LevelTROLL pressure transducer with built-in correction for atmospheric pressure. Water level data on 8 November 2023 was recorded via a Levelogger 5 pressure transducer, with simultaneous monitoring of atmospheric pressure via a Barologger 5, which was used to correct water levels with respect to atmospheric pressure. • The testing regimes were performed under the instruction of LBWco's Senior Principal Consultant and the guidance of sub-consultant Principal Hydrogeology (Mr Jonathan Larkin – Hydrogeology Consulting Ltd). • Slug testing data was assessed by the Hydrogeology Consulting Ltd. Aquifer slug testing results are presented in Section 6.5 and Appendix F.
Pump testing	Pump testing was undertaken 6 December 2023 (EX10), 14 December 2023 (EX12) and 18 December 2023 (EX13). The pump testing methodology is described below. At least 24 hours prior to the planned pump test: • Standing water level (SWL) at selected wells was measured and recorded. • At the pump test location, data loggers were deployed in the extraction well and adjacent monitoring wells to record groundwater levels at hourly intervals. • A barometric pressure logger was also deployed to record barometric pressure before the pump test. On the day of pump testing: • Data loggers were retrieved and data from the background monitoring was downloaded. • Loggers were redeployed in the extraction and monitoring wells to record data at every 0.5 cm of pressure head change. Data loggers were deployed to approximately 0.1 m above the bottom of the well casing. • SWL was gauged following deployment of the data loggers. • An electric submersible pump was deployed in the extraction well to 0.5 m above the bottom of the well casing. The pump was secured at this position to prevent movement during the pump test. • A flow meter was connected to the discharge pipe to measure flow rate during the pump test. • A groundwater disposal location (SWL1 excavation) was identified at least 20 m from the extraction and monitoring wells and discharge hose laid out. • SWL was gauged in the extraction and monitoring wells to confirm return to equilibrium prior to commencing the pump test. • A step test was undertaken to determine the maximum sustainable flow rate. Flow rate was varied by adjusting the valve position. SWL in the extraction well was monitored in real time (via the downhole data logger) during the step test to support active flow control while targeting a head of at least 0.5 m of water over the pump intake. Flow rates and water levels in nearby monitoring wells were recorded at regular intervals during the step test. • When apparent steady-state flow rate and SWL conditions were achieved in the extraction well, continuous pumping for up to 6 hours was undertaken. Flow rates and SWLs in nearby wells were monitored and recorded regularly throughout the pump test.

<table>
<tr><th>Activity</th><th>Details</th></tr>
<tr><td></td><td>Due to the relatively low flow rates achievable from pumping of the extraction wells, very small adjustment to pump flow rate resulted in material change to drawdown in the extraction wells. Achieving steady-state between extraction and recharge rate in each well proved to be quite difficult. LBWco made best endeavours to manage pumping flow rate at or near steady-state conditions for each well.
When the pump test was completed, a groundwater sample was collected from the discharge hose and the pump was turned off.
The pump was left in place overnight. Data loggers were also left in the monitoring and extraction wells overnight to monitor aquifer recovery following the test.
On the day following the pump test:
Data loggers were retrieved from the monitoring wells and data downloaded.
Pump was removed from the extraction well.
Data logger was retrieved from the extraction well and data downloaded.</td></tr>
<tr><td>Groundwater sampling</td><td>Following a period of equilibration after monitoring well installation events, LBWco undertook groundwater sampling of the monitoring wells indicated in Table 3 from 3-8 May 2023 and 31 October-2 November 2023. For each event, the sampling methodology adopted was as follows:
SWL was measured and recorded for each well prior to any purging.
Wells were purged and sampled using the low-flow method with QED Micro purging bladder pump, with the exception of well 6628-23298 which was sampled via peristaltic pump due to an obstruction downhole that prevented the QED pump from passing through the casing.
Between 3 and 10 L of groundwater was removed from each well prior to sampling. Water quality parameters were recorded using a calibrated water quality meter and parameter concentrations assessed within a closed flow cell at approximately 1 L intervals. Once water quality parameters had stabilised to within acceptable tolerances (per EPA 2019b) over three consecutive readings (as shown below), a groundwater sample was collected using the low-flow sampling pump.
<table><tr><th>Parameter</th><th>EC</th><th>pH</th><th>Temp(°C)</th><th>DO</th><th>redox</th></tr><tr><td>Acceptable range</td><td>5%</td><td>±0.1</td><td>0.2</td><td>10%</td><td>±10 mv</td></tr></table>
Groundwater samples were collected in bottles supplied by the testing laboratory, including appropriate preservatives where required.
All reusable equipment was thoroughly decontaminated and rinsed between sample locations.
Groundwater gauging and sampling records are presented in Appendix E.
Calibration certificates for the field instruments used during sampling are presented in Appendix D.</td></tr>
<tr><td>Quality control samples</td><td>Three blind-coded intra-laboratory duplicate and two blind-coded interlaboratory duplicate samples were collected to comply with the recommended frequency of ≥ 1 in 20 primary samples and to assess the precision of laboratory results.
One equipment rinse blank sample was prepared per day of sampling to assess the effectiveness of decontamination procedures.
One trip blank sample was also prepared for each batch of samples dispatched to the primary laboratory to assess the potential for cross contamination of samples to have occurred during sample handling and transit.</td></tr>
<tr><td>Chain of custody controls</td><td>All samples were handled and dispatched to the laboratory under LBWco standard protocol.</td></tr>
<tr><td>Laboratory testing at NATA accredited laboratory</td><td>Primary lab – Eurofins
Secondary lab – ALS</td></tr>
</table>

Activity	Details
Groundwater laboratory analysis	Groundwater samples were analysed for: • Petroleum hydrocarbons (TRH/BTEXN) • Organochlorine pesticides (OCP) • Phenolic compounds • Metals and metalloids • Biological oxygen demand • Nutrients – total nitrogen, total kjeldahl nitrogen, NOx, NO_2, NO_3, ammonia, total phosphorus, reactive phosphorus • Cyanide • Sulphate, sulphide and sulphite • TDS • Total suspended solids (TSS)
Hydrographs	Data loggers were deployed in monitoring wells SLMW01-P, SLMW05-P, SLMW08-Q1 and SLMW13-A on 8 August 2024 to record groundwater levels at 3-hour intervals. Prior to deploying the loggers, SWL was measured and recorded for each well. A barometric pressure logger was also deployed to record barometric pressure. On 30 August 2024, SWL was measured and recorded at each well prior to retrieving the data loggers and downloading of the data. Historical data for selected offsite wells within the groundwater modelling domain advised by Hydrogeology Consulting Ltd (HCL)was downloaded from WaterConnect. Monthly rainfall data recorded at the nearest weather station (Edinburgh 023083) was downloaded from the Bureau of Meteorology. Hydrographs for selected onsite and offsite wells within the model domain were produced by LBWco.

5.4 Surface Water Investigation

5.4.1 Scope of Work and Rationale

A surface water quality investigation was undertaken to characterise water quality in a range of settings relevant to the saltwater lakes, including:

- Upstream of the proposed saltwater lakes – Chapman Creek intake for filling of saltwater lakes
- Downstream discharge zone for outflow from the proposed saltwater lakes – Thompson Creek
- Downstream stormwater drains and surface water tributaries flowing into Thompson Creek

Surface water sampling was undertaken by BMT / Water Engineering Projects (WEP) and LBWco at the locations presented on Figure 4 in Appendix A as follows:

- BMT / WEP
  - From March 2022 – May 2023, regular sampling was undertaken at five locations. Upstream[1] monitoring locations BMT-1 (Mouth of Chapman Creek) and BMT-2 (Upper Chapman Creek) were selected to characterise the water quality upstream of the likely intake point for water entering SWL1. Downstream monitoring locations BMT-3 (Offshore),

[1] Chapman Creek is referred to as "upstream" in context of the proposed pumped saltwater from Chapman Creek, into the saltwater lakes, then discharged into Thompson Creek "downstream" of the lakes.

BMT-4 (Channel), BMT-5 (Thompson Creek) and BMT-7 (Inshore Bolivar Outlet)[2] were selected to characterise the potential surface water receiving environment and assess the impact of other activities in the area on surface water quality.

 - Samples were analysed for TSS and nutrients. Analysis for heavy metals was also undertaken on a quarterly basis.

 - Continuous monitoring of water quality parameters was also undertaken from March 2022 to September 2023 at location BMT-6 (Chapman Creek).

- LBWco

 - On 8 November 2023, a surface water sampling event was undertaken by LBWco at locations SW01-SW09. Samples were analysed for a range of chemicals, consistent with the groundwater monitoring suite.

 - Sampling locations were selected to characterise existing surface water quality in the potential Thompson Creek receiving environment.
   SW01 – Riverlea stormwater channel at closed end
   SW02 – Channel flowing into Thompson Creek, eastern side of Park Road
   SW03 – Thompson Creek, exiting P'Petual site
   SW04 – Thompson Creek, eastern side of Park Road, downstream of P'Petual site
   SW05 – Thompson Creek, western side of Thompson Road
   SW06 – Stormwater drain, south of Beagle Hole Road, upstream of Thompson Creek
   SW07 – Thompson Salt Creek
   SW08 – Thompson Salt Creek
   SW09 – Gawler River channel, east of salt pans and upstream of Thompson Salt Creek

5.4.2 Methodology

The surface water assessment was undertaken in accordance with the methodology outlined in Table 5.

Table 5 Surface Water Investigation Methodology

Activity	Details
EHS Plan	LBWco prepared a project specific EHS plan to identify hazards that may be encountered in the field and document the appropriate risk mitigation measures to be implemented.
Surface water sampling	On 8 November 2023, surface water samples were collected from the locations indicated on Figure 4 in Appendix A by an experienced LBWco consultant, using a grab-sampler mounted on an extendable pole. Field water quality parameters were collected using a calibrated water quality meter and are provided in Appendix E.
Decontamination of sampling equipment	Reusable equipment, including the grab sample pole, was thoroughly decontaminated and rinsed between sample locations.
Quality control samples	One intra-laboratory duplicate sample was collected to comply with the recommended frequency of ≥ 1 in 20 primary samples and to assess the precision of laboratory results. One equipment rinse blank sample was prepared per day of sampling to assess the effectiveness of decontamination procedures.

[2] Sample location BMT-7 Inshore Bolivar Outlet is located approximately 700 m downstream of the point at which the Bolivar Outlet discharges to the environment. At this point, water is a mixture of water from Thompson Cree, the Bolivar Outlet and seawater. Results therefore are not reflective of the chemical condition of Bolivar Outlet discharge water.

Activity	Details
	One trip blank sample was also prepared for each batch of samples dispatched to the primary laboratory to assess the potential for cross contamination of samples to have occurred during sample handling and transit.
Chain of custody controls	All samples were handled and dispatched to the laboratory under LBWco standard protocol.
Laboratory testing at NATA accredited laboratory	Primary lab – Eurofins
Groundwater laboratory analysis	Groundwater samples were analysed for: • TRH/BTEXN • OCP • Phenolic compounds • Metals and metalloids • Biological oxygen demand • Nutrients – total nitrogen, total kjeldahl nitrogen, NOx, NO_2, NO_3, ammonia, total phosphorus, reactive phosphorus • Cyanide • Sulphate, sulphide and sulphite • TDS • TSS

6 Results

6.1 Drilling and Well Installation

A summary of the drilling and well installation information is provided in Table 3. Further details of the well installations are provided in the well construction logs in Appendix C.

6.2 Soil Lithology

Observations made during the soil bore investigation indicated that natural soils across the site generally comprised dark brown or grey-brown clay interbedded with bands of more permeable material such as sandy clays, clayey sands, sandy gravels and sands, ranging in thickness from 0.1 m to 2.7 m. Saturated zones were generally observed within the permeable lenses.

One or more saturated zones were observed at each of the drilling locations. Where multiple saturated zones were observed, these zones were generally separated by moderate-high plasticity clays.

LBWco did not observed evidence of contamination (i.e. staining, odour) during the soil bore or well installation works and there were no indications of potential for acid sulphate soils.

A series of photos of the core recovered from sonic drilling at location SLMW13 are presented below. Each section represents a 1.5 m depth interval of drilling. The significant depth of clay, with intermittent thin bands of more permeable materials is evident in the photographs.


SLMW13
4.0 → 5.5
19/10/2023 15:44


19/10/2023 16:05
SLMW13
5.5 → 7.0


SLMW13
8.5 → 10.0
20/10/2023 09:24


SLMW13
10.0 → 11.5
20/10/2023 09:58


SLMW13
11.5 → 13.0
20/10/2023 11:08


SLMW13
13.0 → 14.5

6.3 Groundwater Elevations and Flow Direction

SWL measurements were recorded as metres below top of casing (mBTOC) and are presented in Table 6. Survey data for top of casing (TOC) relative level (RL) elevations, presented with the logs in Appendix C, was then used to calculate groundwater RLs in metres Australian Height Datum.

Groundwater elevation contours were calculated for the May and October 2023 GME data and are presented on Figures 5a and 5b in Appendix A. Groundwater flow is perpendicular to the elevation contours and was interpreted to be to the southwest, towards Gulf St Vincent.

Where nested wells were installed, i.e. locations SLMW01, SLMW05 and SLMW10-SLMW13, groundwater elevations were observed to have equilibrated between wells, indicating that wells are likely to be in hydraulic continuity on a wide (lateral) scale, despite the vertical separation evident at individual locations.

6.3.1 Hydrographs

Hydrographs were generated using groundwater elevation data from the onsite and offsite wells. The output is provided below as Plate 1.

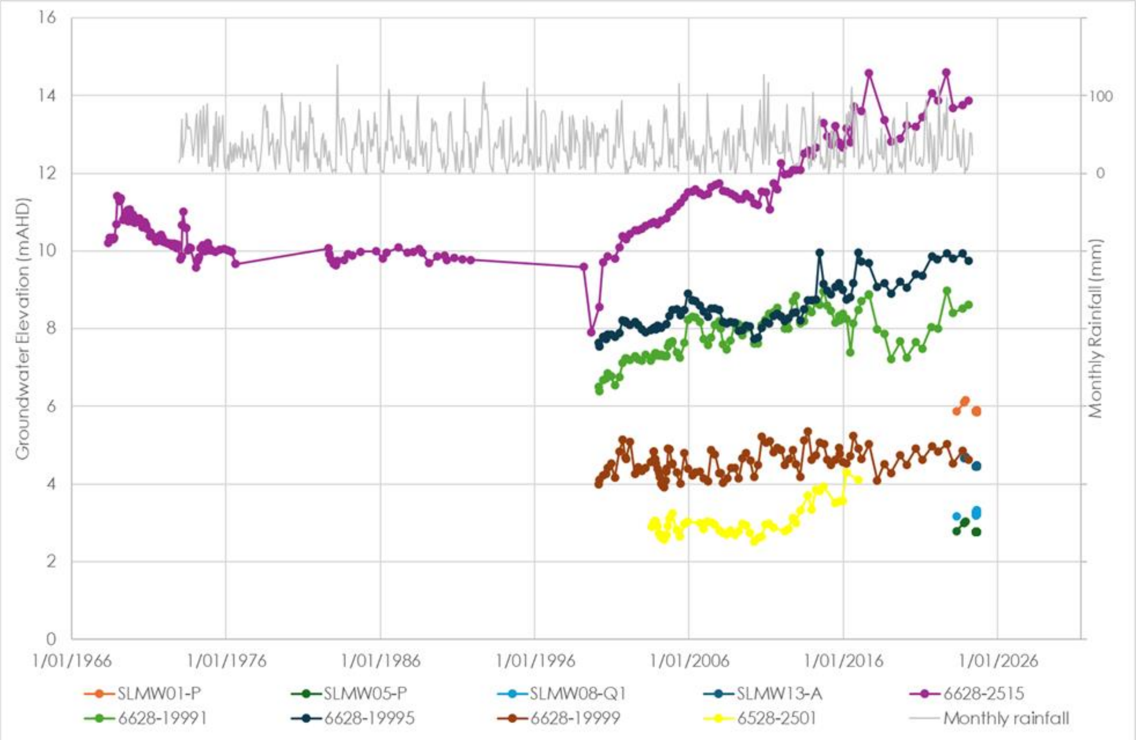


Plate 1 Groundwater level hydrographs

Table 6 Summary of Groundwater Elevations and Water Quality Parameters

Well ID	Date	SWL (mBTOC)	Groundwater RL (mAHD)	Conductivity (µS/cm)	pH	DO (mg/L)	Temperature (°C)	Redox (mV)
SLMW01-P	5/5/23	3.808	5.866	6134	7.42	0.56	14.7	119.4
	1/11/23	3.575	6.099	9468	7.24	0.1	19.4	41
SLMW01-Q1	5/5/23	3.803	5.882	5720	7.29	9.35	14.6	109.9
	1/11/23	3.562	6.123	9102	6.88	0.89	19.9	49
SLMW02-Q1	5/5/23	4.624	4.019	6069	7.25	0.27	16.2	138.5
	1/11/23	4.334	4.309	9099	7.07	0.46	19	90.2
SLMW03-Q1	3/5/23	5.226	4.243	4484	7.66	13.44	15.2	143.6
	1/11/23	4.980	4.489	13042	7.06	0.84	19.2	97.6
SLMW04-P	8/5/23	3.888	4.630	5470	7.55	3.53	14.9	136.1
	2/11/23	3.880	4.638	8496	7.31	0.94	18.3	138.8
SLMW05-P	5/5/23	5.292	2.794	6163	7.52	6.81	14.7	121.7
	1/11/23	5.080	3.006	9990	7.41	4.3	17.4	131.6
SLMW05-Q1	5/5/23	5.366	2.772	8423	7.22	0.77	14.9	132.8
	1/11/23	5.145	2.993	13305	6.99	1.46	18.1	48.8
SLMW06-Q1	3/5/23	3.891	3.379	4683	7.73	15.01	16.3	129.9
	1/11/23	3.575	3.695	11157	7.4	1.35	18.2	84
SLMW07-Q1	3/5/23	3.191	3.319	8663	7.67	7.98	15.8	129.7
	1/11/23	3.070	3.440	14756	7.61	5.8	17.5	118.9
SLMW08-Q1	4/5/23	3.264	3.162	9621	7.38	8.41	16.4	90.9
SLMW09-P	4/5/23	3.042	2.521	2464	7.39	2.83	16.4	-91.03
SLMW10-A	2/11/23	5.117	4.471	9291	7.5	1.36	19.6	108.4

Well ID	Date	SWL (mBTOC)	Groundwater RL (mAHD)	Conductivity (µS/cm)	pH	DO (mg/L)	Temperature (°C)	Redox (mV)
SLMW10-B	2/11/23	5.085	4.474	9016	7.37	0.12	19.9	10.4
SLMW10-C	2/11/23	5.114	4.477	9591	7.19	0.4	20	63.1
SLMW11-B	2/11/23	5.179	4.115	9007	7.48	3.9	19.7	106.1
SLMW11-C	2/11/23	5.184	4.108	8826	7.18	0.99	19.7	79.5
SLMW12-A	31/10/23	4.480	3.830	13560	7.44	4.2	18.9	86.4
SLMW12-B	31/10/23	4.479	3.833	14058	7.24	5.11	19.2	20.3
SLMW12-C	31/10/23	4.458	3.814	15228	7.09	3.71	19.8	45.5
SLMW13-A	2/11/23	3.980	4.663	8804	7.35	0.98	19.2	124.8
SLMW13-B	2/11/23	3.935	4.719	8220	7.35	3.55	19.4	107.4
SLMW13-C	2/11/23	3.915	4.667	10109	6.99	2.52	20.3	93
6528-2628	4/5/23	1.647	2.189	79779	6.65	8.6	16.2	124.6
6628-21445	8/5/23	6.167	-*	11427	7.91	3.43	15.2	-223.8
6628-23298	5/5/23	5.552	6.647	6106	6.79	1.37	14.5	-93.1
	7/11/23	5.450	6.749	7765	4.95	0.1	20.9	-93.1

* Precise well coordinates and top of casing elevation unknown – not surveyed.

6.4 Water Quality Parameters

6.4.1 Groundwater

Stabilised water quality parameters measured immediately prior to sampling are summarised in Table 6. Sampling records are provided in Appendix E.

Key observations made in relation to water quality readings were as follows:

- Electrical conductivity (EC) onsite ranged from 2,464 µS/cm at SLMW09-P on 4 May 2023 to 15,228 µS/cm at SLMW12-C on 31 October 2023. EC measured at offsite well 6528-2628 was 79,779 µS/cm.
- pH ranged from 4.95 at 6628-23298 on 7 November 2023 to 7.91 at 6628-21445 on 8 May 2023.
- Dissolved oxygen (DO) ranged from 0.1 mg/L at SLMW01-P on 1 November 2023 to 15.01 mg/L at SLMW06-Q1 on 3 May 2023.
- Redox ranged from -223.8 mV at 6628-21445 on 8 May 2023 to 143.6 mV at SLMW03-Q1 on 3 May 2023.

Where nested wells were installed, differences in field water quality parameters between saturated zones, in particular DO and redox, indicated that some stratification of water had occurred and that there was unlikely to be vertical connection between the water bearing zones at these locations.

6.4.2 Surface Water

Water quality parameters measured prior to sampling are provided in Appendix E. Key observations made in relation to water quality readings were as follows:

- EC ranged from 5,741 µS/cm at SW02 to 71,456 µS/cm at SW09.
- pH ranged from 4.75 at SW08 to 5.17 at SW07.
- DO ranged from 2.41 mg/L at SW03 to 16.29 mg/L at SW06.
- Redox ranged from 94.0 mV at SW08 to 160.8 mV at SW09.

6.5 Aquifer Testing

Analysis of slug and pump testing data was undertaken by Hydrogeology Consulting. The field data and analysis outputs are provided in Appendices F and G.

6.5.1 Slug Testing

The hydraulic conductivity (k) and transmissivity (m^2/d) at each well was estimated using the Bouwer and Rice method. Both rising and falling head tests were used to estimate the hydraulic conductivity values as review of the data indicated that curve outputs matched reasonably well.

The estimated k values are presented in Table 7 and output from individual tests is presented in Appendix F.

Table 7 Summary of Slug Testing Results

Location	Min. Hydraulic Conductivity (m/d)	Max. Hydraulic Conductivity (m/d)	Average Hydraulic Conductivity (m/d)	Transmissivity (m^2/d)
SLMW01-P	2.2	4.5	3.3	3.0
SLMW01-Q1	3.5	6.2	4.4	4.8
SLMW02-Q1	1.3	14.0	7.4	22.0
SLMW03-Q1	0.5	3.4	1.8	3.5
SLMW04-P	9.0	27.0	14.0	28.0
SLMW06-Q1	6.5	11.0	14.0	27.0
SLMW10-A	15	19	16	9.8
SLMW10-B	7.3	8.3	7.6	9.9
SLMW10-C	3.0	3.0	3.0	7.5
SLMW11-B	2.8	3.9	3.7	10
SLMW11-C	6.1	6.8	6.3	6.3
SLMW12-A	0.7	0.7	0.7	0.84
SLMW12-B	6.5	8.5	7.5	6.0
SLMW12-C	0.6	0.7	0.65	0.52
SLMW13-A	9.7	12.0	11.0	17.0
SLMW13-B	1.0	1.3	1.2	0.35
SLMW13-C	0.8	0.9	0.85	2.55

The following observations are made relating to the results of slug testing:

- In some areas a shallow, unconfined permeable sandy zone is present, particularly in the vicinity of wells SLMW13-A and SLMW04-P. The hydraulic conductivity of this unit appears to be approximately 20 m/d. This unit is within the proposed excavation depth of SWL1.
- A confined permeable zone comprised of mainly sandy clay and clayey sand was intersected at wells SLMW10-B, SLMW11-B and SLMW12-B. The hydraulic conductivity of this unit appears to be in the order of 4 m/d to 8 m/d. This unit is partially within the proposed excavation depth of SWL1.
- At location SLMW10, a permeable zone within the depth range 10.6-13.0 mBGL is present which may have an influence on water flows during dewatering, depending on the connectivity with shallower units.
- At locations SLMW12 and SLMW13, results indicated that permeable zones beneath the maximum excavation depth would be unlikely to contribute to flows during dewatering.

6.5.2 Pump Testing

The results of pump testing were used to estimate transmissivity values, using the Bouwer and Rice(B&R), Jacob and Theis recovery methods. A summary of estimated transmissivity rates is provided in Table 8 and outputs from the individual tests, analysed by HCL for LBWco, are provided in Appendix G.

Table 8 Summary of Pump Testing Results – Transmissivity Estimates (m^2/day)

Location	Well	Slug Test (B&R)		Confined Conditions		Unconfined Conditions		Average
		By Unit	Total	Jacob	Theis Recovery	Jacob	Theis Recovery	
EX10	EX10	-	-	-	31	-	31	34
	SLMW10-A	9.6	27	33	37	33	37	
	SLMW10-B	9.9		33	35	3	37	
	SLMW10-C	7.5		-	-	-	-	
EX12	EX12	-	-	-	20	-	20	22
	SLMW12-A	0.84	7	18	21	20	22	
	SLMW12-B	6.0		21	28	24	31	
	SLMW12-C	0.52		-	-	-	-	
EX13	EX13	-	-	-	35	-	35	45
	SLMW13-A	17.6	21	48	50	50	53	
	SLMW13-B	0.4		-	-	-	-	
	SLMW13-C	2.55		-	-	-	-	

7 Assessment of Environmental Values of Groundwater

An assessment of the environmental values (EVs) of groundwater onsite was undertaken in accordance with the process set out in EPA (2019) *Guideline for the assessment and remediation of site contamination* (GAR). The EVs assessment was relevant to groundwater in the shallow saturated zones within the range of the SWL1 excavation depth only. The assessment is presented below.

Plate 2 Steps 1 to 3 to determine EVs of groundwater at a site (EPA 2019)[3]

7.1 Step 1: Determination of Prescribed EVs of groundwater using the EPP-WQ

Clause 3, schedule 1 of the *Environment Protection (Water Quality) Policy 2015* prescribes EVs of groundwater in TDS concentration ranges.

Table 9 Environmental Values Relative to TDS

Environmental Value	EPP-WQ Specified TDS Range (mg/L)	Measured TDS in Groundwater	EV Relevant for consideration based on TDS?
Drinking water for human consumption	<1,200	860 mg/L (SLMW05-P) to 10,000 mg/L (SLMW07-Q1)	No*
Primary industry – irrigation and general use	<3,000		Yes
Primary industry – livestock drinking water	<13,000		Yes
Primary industry – aquaculture	<13,000		Yes

*Concentrations of TDS below the threshold for drinking water were reported at wells SLMW05-P and SLMW13-C in the November 2023 GME. However, the extensive data set for monitoring wells at Riverlea demonstrated these low salinity results were isolated pockets and not representative of shallow groundwater quality across the site, which is typically of moderate to high salinity. Drinking water for human consumption is not a realistic EV for onsite shallow groundwater.

Therefore, the following prescribed EVs are relevant for assessment of groundwater based on the onsite TDS concentrations:

- Primary industry – irrigation and general uses
- Primary industry – livestock drinking water
- Primary industry – aquaculture.

7.2 Step 2: Application of a buffer distance for the protection of surface waters

As recommended in the GAR, a buffer distance of 2 km was adopted for the consideration of surface water impacts within the assessment of EVs of groundwater.

[3] Step 4 relates to determining whether harm to groundwater that is not trivial exists. It is not related to determination of EVs.

Table 10 Environmental Values Relative to Surface Waters

EV	Notes	EV relevant within 2 km buffer zone?
Aquatic Ecosystems (freshwater)	The Gawler River passes through/along the northern site boundary, approximately 1 km north of the proposed saltwater lake area. A portion of Thompson Creek runs through a portion of the site. Both creeks are ephemeral and therefore not permanently connected to the shallow groundwater system. Seasonal connection may exist.	Yes
Aquatic Ecosystems (marine water)	None identified within 2 km of the SWL1 area, but Gulf St Vincent is located only a short further distance downgradient of the site and potential dewatering wastewater discharge to the stormwater system onsite would eventually enter the marine environment.	Yes
Recreation and aesthetics	Potentially relevant for surface water discharge environment, as per marine water.	Yes

Based on consideration of Table 10, aquatic freshwater ecosystems, aquatic marine water ecosystems and recreation are relevant EVs for assessment of shallow groundwater onsite in the context of the dewatering investigation.

7.3 Step 3: Review of groundwater data using WaterConnect

Two WaterConnect searches were undertaken by LBWco on 21 and 22 November 2023 as described below. The output of these searches is provided in Appendix E.

1. A search was undertaken for a 2 km radius extending from the proposed location of SWL1 in accordance with the process recommended in the GAR.

2. As there is a potential for discharge of dewatering wastewater to the stormwater system, which discharges to Thompson Creek downstream, a second WaterConnect search was undertaken to identify potential groundwater users who could be impacted by the activity in the downstream area.

Table 11 summarises the findings of the WaterConnect searches relative to various registered uses per Table 3 of EPA (2019). In determining relevant EVs, consideration was given to shallow groundwater only to a maximum depth of 10 mBGL, which exceeds the maximum depth of the proposed saltwater lakes.

Table 11 Application of WaterConnect data to determine EVs

Registered Use	Notes	EV relevant based on registered users within 2 km buffer zone?	EV relevant based on registered users within potential discharge area?
Domestic	No domestic use was identified for shallow groundwater within 2 km of the site or in the potential receiving area.	No	No
Town Water Supply	No town water supply bores were identified within 2 km of the site or in the potential receiving area.	No	No
Recreation / aesthetics	There were no bores listed for recreational purposes.	No	No

Registered Use	Notes	EV relevant based on registered users within 2 km buffer zone?	EV relevant based on registered users within potential discharge area?
Industrial (general industry)	There were no shallow groundwater bores listed for industrial purpose.	No	No
Primary industry (irrigation)	One bore (6628-2392) east of the potential receiving area was listed as being used for the purpose of irrigation. This bore was drilled in 1964 at Beagle Hole Road, approximately 600 m east of Thompson Salt Creek and was unlikely to receive dewatering wastewater discharge to Thompson Creek. The depth and current status of this bore are unknown.	No	No

Other factors may apply to the consideration of EVs, for which data was not available or which LBWco was not aware of at the time of preparing the above assessment. These factors alone, or in combination with other factors, may lead to a different outcome.

Based on the above assessment, the following EVs were determined to be applicable for assessment of onsite groundwater, based on application of prescribed EVs set via the EPP-WQ or in the context of current or realistic potential future uses for groundwater in the vicinity of the site:

- Recreation and aesthetics
- Aquatic ecosystems (freshwater)
- Aquatic ecosystems (marine water)
- Primary industries – irrigation and general uses
- Primary industries – livestock drinking water
- Primary industries – aquaculture.

7.4 Application of EPA Recognised Criteria

With respect to the identified EVs, the relevant EPA recognised criteria are listed in Table 12. References are listed in order of the hierarchy of application regarding each EV, as recommended in the GAR.

Table 12 EPA Recognised Criteria References

EV	EPA Recognised Criteria
Recreation and aesthetics	National Health and Medical Research Council 2008, Guidelines for Managing Risks in Recreational Water
Aquatic ecosystems (freshwater)	Australian and New Zealand Governments 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018)
Aquatic ecosystems (marine water)	ANZG 2018
Primary industries – irrigation	ANZG 2018
Primary industries – livestock drinking water	ANZG 2018

8 Laboratory Analytical Results

8.1 Comparison with Water Quality Criteria

8.1.1 Groundwater

A chemical summary table presenting comparison of analytical results with the EPA recognised criteria listed in Table 12 is presented in Appendix J. A high-level summary of exceedances of the criteria is presented below.

Total Dissolved Solids

Concentrations of TDS exceeded the EPP-WQ Drinking water environmental value criteria of 1,200 mg/L in all but two samples. The maximum TDS concentration (6528-2628: 99,000 mg/L) also exceeded the Livestock drinking water criteria of 13,000 mg/L.

Nutrients

- Concentrations of nitrate and nitrite exceeded the Marine water criteria of 0.05 mg/L in 34 of the 38 primary samples analysed.
- Concentrations of total nitrogen ranged from 0.3 mg/L (SLMW10-A) to 28.2 mg/L (SLMW01-Q1) and exceeded the Irrigation criteria of 5 mg/L in 14 of the 38 primary samples analysed.

Metals

- Concentrations of boron ranged from 400 µg/L at 6629-23298 to 11,000 µg/L at 6528-2628. Each of the groundwater samples analysed exceeded the Freshwater criteria of 370 µg/L, with the majority of samples (36) also exceeding the Irrigation criteria of 500 µg/L. 11 samples also exceeded the Livestock criteria of 5,000 µg/L.
- Hexavalent chromium was reported in two samples analysed in the May 2023 monitoring event, at concentrations exceeding the Marine criteria of 4.4 µg/L (SLMW05-P: 12 µg/L and SLMW05-Q1: 5 µg/L). LBWco did not consider these results to be representative of actual groundwater conditions due to no evidence for a source of Cr(VI) at that location and absence of Cr(VI) for all other groundwater samples onsite. The results were inferred to be in error. Repeat sampling and testing in November 2023 demonstrated Cr(VI) concentrations below laboratory limit of reporting (LOR) for these wells.
- Five exceedances of the Marine water criteria for cobalt (1 µg/L) were reported, with a maximum concentration of 5 µg/L at SLMW09-P.
- Concentrations of copper were reported as ranging from 2 µg/L at multiple locations to 48 µg/L at 6528-2628, with 16 exceedances of the Freshwater (1.4 µg/L) and Marine water (1.3 µg/L) criteria.
- Concentrations of molybdenum exceeding the Livestock criteria of 10 µg/L were reported at SLMW06-Q1 (21 µg/L) and SLMW07-Q1 (28 µg/L).
- Concentrations of nickel exceeding the Freshwater criteria of 11 µg/L were reported in 13 samples, with a maximum concentration of 45 µg/L at SLMW09-P.
- Concentrations of selenium ranged from <1 µg/L at multiple locations to 93 µg/L at SLMW13-B. Of the 38 primary samples analysed, concentrations in 24 samples exceeded the Freshwater criteria (11 µg/L), with 19 exceedances of the Livestock and Irrigation criteria (both 20 µg/L).
- Reported concentrations of zinc ranged from <5 µg/L at multiple locations to 27 µg/L at 6528-2628. Eight exceedances of the Freshwater criteria (8 µg/L) were reported and two exceedances of the Marine water criteria (15 µg/L).

Total Recoverable Hydrocarbons

A concentration of total recoverable hydrocarbons (TRH) Fraction 3 (>C_{16}-C_{34}) of 200 µg/L was reported at SLMW03-Q1 in November 2023. Following silica gel clean-up, the TRH F3 fraction in this sample was below the LOR.

Concentrations of TRH in the remaining samples were reported as below the laboratory LOR.

Other

Concentrations of OCP, phenols and halogenated benzene were reported as below the laboratory LOR in the samples analysed.

Assessment of Background Concentrations and Site Contamination of Groundwater

Due to the widespread distribution of concentrations of nutrients and various dissolved metals in shallow groundwater at the Riverlea site it is not possible to determine that any singular concentration measured has been caused by the addition of a chemical substance from a human activity, resulting in a concentration above background. Therefore, it is not possible to determine that nutrient and dissolved metals concentrations in shallow groundwater constitute site contamination with respect to groundwater.

LBWco considers that the range of concentrations of nutrients and dissolved metals in the shallow groundwater onsite are representative of ambient background conditions typical for the shallow groundwater within the region including Riverlea.

8.1.2 Surface Water

For the dewatering assessment exercise, analysis of surface water testing results focussed on characterisation of the downstream aquatic ecosystem, which may be a receiving environment for dewatering wastewater if required to be discharged via the stormwater system at Riverlea. Included in the table in Appendix J is a comparison of onsite groundwater testing data with downstream surface water quality data and the ANZG 2018 Freshwater and Marine water 95% species protection trigger levels.

In general, concentrations of target analytes in onsite groundwater were within the range of concentrations measured within downstream surface water. Exceptions to this were:

- The maximum concentration of TSS in onsite groundwater was 9,800 mg/L at SLMW05-P, reported in May 2023. This exceeded the maximum concentration of TSS in downstream surface water of 540 mg/L at SW09.
- The maximum concentration of nitrite in groundwater (1.6 mg/L) marginally exceeded the maximum concentration reported in downstream surface water (0.79 mg/L).
- The maximum concentration of cobalt in groundwater (5 µg/L) marginally exceeded the maximum surface water concentration of 2 µg/L.

8.2 Data Quality Assessment

A quality control / quality assurance (QC/QA) validation assessment was completed to assess the suitability of data for use in this dewatering investigation. As part of this, the relative percentage difference (RPD) for a pair of duplicate concentrations was calculated using the formula:

$$\text{RPD (\%)} = 100(x_1 - x_2) / [(x_1 + x_2)/2]$$

where x_1, x_2 = duplicate results.

According to the ASC NEPM,

- typical RPD values for soil are in the range ±30%
- an RPD within the range was considered to show acceptable agreement and, conversely, data was considered to have relatively poor agreement where an RPD was outside this range.

Generally, higher RPD values occur for organic compounds than for metals and where low concentrations of an analyte are recorded. Where one or more samples within a duplicate pair reported a concentration less than five times the LOR, the duplicate pair was considered to demonstrate acceptable precision where the difference between two samples was less than twice the LOR, irrespective of the calculated RPD.

The results of internal quality control procedures are provided within the laboratory certificates of analysis (Appendix K). The acceptance criterion for internal laboratory replicates was set at an RPD of 30%. Laboratory recoveries should be in the range of 50% to 150%.

Table 13 indicates conformance to specific QA/QC requirements for water sample analysis. See Appendix J for QA/QC tables.

Table 13 Data Validation

Aspect	Compliant	Comment	Acceptable
Chain of custody documentation completed	Yes	Samples were transported under strict LBWco chain of custody procedures.	Yes
Samples delivered to laboratory within sample holding times and with correct preservative	Mostly	Samples were delivered to the laboratory in laboratory-supplied containers and within hold times, with the exception of pH (0-hour hold time) for all samples.	Yes
Analyses NATA accredited	Yes	Eurofins and ALS were NATA accredited for the analysis performed.	
Field duplicate frequency acceptable and RPDs within ±30%?	Yes	Two inter-laboratory and three intra-laboratory duplicates were analysed for 38 primary samples. This was compliant with the minimum duplicate ratio of 1 inter-laboratory and 1 intra-laboratory duplicate per 20 primary samples. Of the 331 duplicate pairs, 262 demonstrated an RPD less than or equal to 30%, or otherwise demonstrated acceptable precision. Some of the RPD values >30% were due to detections at or below the LOR, which causes small concentration differences to have relatively high RPDs.	Yes
Equipment rinse blank frequency of at least one per day and concentrations below LOR	Mostly	An equipment rinse blank sample was collected and analysed for heavy metals and TRH for each day of groundwater and surface water sampling. Concentrations of analytes were below the laboratory LOR with the exception of concentrations of copper, lead, nickel and zinc in the sample collected during the GME on 31 October 2023. Concentrations of copper, nickel and zinc in samples collected on 31 October 2023 were within the range of site data, while lead concentrations were below the laboratory LOR. These detections were considered not to impact interpretation of results.	

Aspect	Compliant	Comment	Acceptable
Trip blank frequency of at least one per batch	Yes	A trip blank sample accompanied each batch of water samples to the primary laboratory.	Yes
Trip blank samples contained concentrations below the LOR	Yes	Trip blank samples were analysed for volatile hydrocarbons and results were below the LOR for each sample, demonstrating that samples were not influenced by volatile chemicals during storage or transit to the laboratory.	Yes
Acceptable laboratory QC results	Yes	Field duplicates, laboratory control spikes and matrix spikes were considered acceptable for >95% of laboratory QC analyses.	Yes

Quality control data collected during this investigation indicated that the majority of QC results were within acceptable limits. Accordingly, LBWco considered that the data quality was acceptable for the purposes of this assessment.

9 Discussion

9.1 Hydrogeological Modelling

The following two questions were required to be answered to address the objectives of this dewatering investigation and inform regulatory approval considerations for the taking of the shallow groundwater:

- What pumping flow rate is required to provide control of groundwater to the level required to construct SWL1?
- What is the estimated volume of groundwater to be pumped to facilitate construction of SWL1?

To investigate and provide a robust approach to answering these questions, an updated hydrogeological model of the site and surrounds was prepared by Hydrogeology Consulting Ltd (HCL) for LBWco. A full report detailing the modelling inputs, assumptions and results is provided in Appendix H.

Outcomes of the modelling work are summarised and/or derived below.

9.2 Dewatering Flow and Volume Estimation

A preliminary proposal for lake excavation and dewatering sequencing was outlined by Walker, in which SWL1 is to be excavated in stages via five compartments (bays) separated by coffer dams (refer section 2). Dewatering flow modelling was undertaken by HCL, based on the proposed sequencing to estimate dewatering flow rates that may be required during excavation and construction works at SWL1.

For one scenario of SWL1 design and construction that was under consideration, a sixth bay within SWL1 (instead of SWL2) was assessed in the dewatering modelling for SWL1. The dewatering modelling methodology and calculations in the HCL report in Appendix H were prepared for Bay 6, but Walker's current design for SWL1 was confirmed at time of reporting to include only Bays 1-5 as shown in section 2.

The inclusion of Bay 6 in the dewatering modelling calculations at this time represents degree of conservatism as it is no longer expected that dewatering of this bay will be required for SWL1.

Key conclusions of the dewatering modelling by HCL were:

- Dewatering using wells that are relatively widely spaced appears unlikely to achieve the required drawdown of groundwater levels.
- Dewatering using wellpoints (whether installed horizontally or vertically), appears more likely to be able to achieve the required dewatering. An engineering assessment is recommended to check the feasibility and practicability of dewatering the site using wellpoints, taking into account geotechnical and engineering considerations as well as cost and the availability of appropriate equipment and experienced contractors.
- If wellpoints are used, the modelling indicates that wellpoints will be needed within the footprint area of the lake, as well as around its edges. It is assumed that the pumps used to extract water from the wellpoints would be located outside the edges of the lake footprint. This may allow wellpoints to remain in place during and after the lake has been constructed. Given the dimensions of the bays, multiple pumps will likely be needed, each connected to a wellpoint line.
- The modelling suggests that the required dewatering for Bay 1 may be achieved after approximately one month of pumping. A similar pumping time is likely to be needed for each subsequent bay to achieve the required drawdown before construction.

- Leakage of pumped water from the location of SWL2 back into the groundwater appears unlikely to interfere significantly with SWL1 dewatering. However, if dewatering of the western part of the SWL1 is to be undertaken at the same time as storage of pumped water in the footprint of SWL2, it may be advisable to create a temporary coffer dam within the SWL2 footprint in order to keep the stored water further away from SWL1.

- The simulated total pumping volume for the provisionally estimated 147 days of dewatering for construction of SWL1 is approximately 436,000 m^3. More than half of this is simply the water to be removed from pore spaces within the soil beneath the lake footprint.

- The contour for 0.1 m drawdown is simulated to be within 500 m of SWL1 at the end of pumping and about 850 m from SWL1 at 1 year after cessation of pumping. The modelled recovery of groundwater levels after cessation of pumping is quite slow (more than 1 year) but may be faster if there is significant groundwater recharge.

- A simulation that incorporated 90 days of additional pumping, such as could occur due to a delay in construction during active dewatering of Bays 1-4 concurrently, increased the volume pumped by approximately 126,000 m^3 (an average increase of 1,400 m^3/d) bringing the total to 554,000 m^3.

- The results of the modelling depend on various factors, particularly the hydraulic conductivity distribution. The model was constructed so that the transmissivity in the vicinity of SWL1 matches the average determined from the pumping tests conducted in December 2023.

- In some respects, the modelling is conservative (for example, the assumption that the vertical hydraulic conductivity is the same as horizontal). Actual pumping requirements may therefore be below those simulated (although higher pumping rates are also possible).

- When dewatering starts, it is recommended that good records be kept of pumping times, rates and volumes and of groundwater levels in the vicinity of the lake, so that expectations and plans for later stages can be adapted if needed.

9.3 Onsite Management of Dewatering Wastewater

Walker advised LBWco that it intends to manage dewatering wastewater onsite through storage in the partially excavated SWL2 and connected stormwater channel, and the use of dewatering wastewater for construction activities, including dust control and moisture conditioning of soils prior to compaction.

Walker advised that the storage capacity of the partially excavated SWL2 will be approximately 231,750 m^3.

A contingency storage of up to 68,500 m^3 is expected to be available by the time of SWL1 construction, via excavation progress for other channels within Precinct 2, providing for up to approximately 300,000 m^3 of onsite storage capacity.

If higher than expected flows are experienced during dewatering, contingency measures for alternate dewatering wastewater management may be considered, including discharge to the surface water environment where this can be appropriately managed in accordance with the general environmental duty under the EP Act – refer to section 9.5 for comparison of groundwater quality testing data and surface water quality testing data.

The storage assessment has not considered the influence of infiltration of dewatering wastewater into the subsurface while stored in SWL2, or the impact of rainfall. Storage loss to infiltration is likely to exceed storage gain to rainfall, so excluding these aspects was a conservative approach for the assessment of the dewatering wastewater storage balance. These aspects can be considered within the development of a detailed Dewatering Management Plan as the project progresses.

9.4 Modelling of Dewatering Management for Construction

The total volume of dewatering wastewater requiring management during construction of SWL1 was estimated based on the proposed sequencing, anticipated construction timeframes for bulk excavations and liner construction[4], and the modelled dewatering flowrates.

A polymer liner construction scenario was adopted for the dewatering management modelling, as this liner system is expected to have a longer construction period than a clay liner system. The dewatering timeframe would therefore be longer for the polymer liner construction and a more conservative scenario for dewatering management.

For each bay of SWL1, the general sequence of works will be:

- Commence dewatering;
- Once groundwater levels are confirmed to be at or below 0.5 mAHD, commence bulk excavation;
- Following bulk excavation, install the polymer liner;
- Upon completion of liner installation to a bay and associated QA/QC checks, install and fill the Aquadam (coffer dam) with stored dewatering wastewater;
- Fill the completed bay with dewatering wastewater to 70% of the volume of the lined bay, to prevent lift of the liner resulting from upward pressure of groundwater;
- Turn off dewatering for the bay.

To allow for a continuous integrated program of excavation and liner construction for SWL1, it will be necessary for dewatering to be undertaken on multiple bays simultaneously throughout the construction period. Dewatering timeframes and volumes will be dependent on the sequence and delivery of construction activities and site characteristics at time of the works. For the purpose of this initial assessment, rates for excavation, pumping and liner construction were based on advice from Walker on what was reasonably achievable within a construction delivery program.

Key parameters used to estimate dewatering volumes are summarised in Table 14 below. Outputs from the dewatering storage modelling are provided in Appendix L.

Table 14 Summary of Dewatering Volume Calculation Parameters

Parameter	Adopted Values	Comment / Justification
Dewatering		
Timeframe for initial dewatering to 0.5 mAHD	30 days per bay	Based on initial outcomes of dewatering modelling and approximately equal size of bays to be dewatered.
Daily dewatering flow rates	Variable, refer to Table 15 below.	Daily dewatering flow rates have been adopted based on the outcomes of dewatering modelling work. Flow rates vary for each bay throughout the dewatering period, with higher flow rates expected at the commencement of dewatering before the system reaches a steady state.

[4] Geotest 2024, *Construction Methodology SLW1, Walker Corporation – Riverlea Salt Water Lake Liner Design & Construction,* June 2024.

Parameter	Adopted Values	Comment / Justification
Construction		
Bulk excavation rate	1,800 m^3/day/excavator 3 excavators = 5,400 m^3/day	The rate of excavation can be increased or decreased by varying the number of excavators and supporting machines. To estimate dewatering volumes, modelling was undertaken for a scenario using 3 excavators. The number of excavators is a key limiting factor affecting the timeframe, and therefore volume, of dewatering required to complete SWL1 construction.
Liner installation rate	1,500 m^2 per day	Advised by liner company – Geotest. The liner installation rate used for dewatering volume calculations was based on installation of a synthetic liner. Installation of a synthetic liner would be a longer process than installation of a clay liner and was therefore considered a conservative approach for modelling of dewatering volumes.
Work days per week	Monday-Saturday	For both excavations and liner installation, it has been assumed that works will be undertaken 6 days per week. Dewatering will be continuous throughout the construction period so calculations account for 7 days of dewatering per working week.
Pumping rates to transfer dewatered groundwater to completed bays in SWL1 Pumping rates to fill Aquadams (coffer dams)	Bays 10,000 m^3/day Aquadams 1,500 m^3/day	Based on advice from Walker regarding the pumps that are available and likely to be used to fill the coffer dams and SWL1 bays. The pumping rate(s) achievable for filling the Aquadams and completed bays is a key factor that influences the required dewatering duration for each bay.
Changeover between bays	7 days	It has been assumed that dewatering for individual bays can be turned off after at least 1 day of pumping dewatering wastewater into a completed lined bay, to a maximum of 7 days before the bay has been filled to 70% of the excavation volume. This timing considers allowance of sufficient time to secure the liner before groundwater rebounds to place upward pressure against the liner.
Management of dewatering wastewater		
Storage areas	SWL2 +Channels 90% – 300,000 m^3 SWL1 lined Bays: Bay 1 – 62,280 m^3 Bay 2 – 68 220 m^3 Bay 3 – 87,840 m^3 Bay 4 – 53,640 m^3 Bay 5 – 59,940 m^3 Bay 6 – 39,600 m^3 SWL1 total 371,520 m^3 SWL1 70% total 260,064 m^3 TOTAL 560,064 m^3	Storage areas proposed by Walker include the partially excavated areas of future Saltwater Lake 2 (SWL2) and feeder channels and the six individual bays of SWL1 that need to be filled after each stage of liner completion and prior to turning off the dewatering system. Dewatering wastewater will initially be pumped to SWL2 + Channels for storage. After the completion of the liner in Bay 1, dewatering wastewater will be preferentially used to fill the coffer dam and Bay 1 of SWL1, to maximise storage capacity. As additional bays of SWL1 are completed, these areas and coffer dams will also be used to store dewatering wastewater. To prevent upward lift of the liner from groundwater pressure and maintain reasonable freeboard within the lined lake area, it has been assumed that completed bays will need to be filled to 70% of the capacity of the lined bays.

Parameter	Adopted Values	Comment / Justification
Earthworks demand for water	640 m³/day	Onsite demand for water including moisture conditioning of soils for compaction and dust suppression across the site.
Pan evaporation rate	Spring – 500 mm/90 days / 220 m³/day Summer – 800 mm/90 days / 350 m³/day	Pan evaporation rates were adopted from the Bureau of Meteorology website, assuming that dewatering activities occurred throughout spring and summer months. A correction factor of 0.75 was applied to evaporation rates to account for lower evaporation from ponded areas relative to pan measurements. 50% of the surface area of SWL2 was applied for the calculations, assuming that the storage is on average 50% full and conservatively excluding surface area of the channels. Evaporation losses from completed and 70% filled bays of SWL1 were conservatively assumed to equal rainfall gains and were not included in the dewatering wastewater balance assessment.

Table 15 Modelled dewatering volumes

Period	Start Day	End Day	No. of Days	Bays Being Pumped	Total Volume Pumped (m^3)	Average daily pumping rate (m^3/day)
1	0	10	10	1	57.466	5,747
2	10	21	11	1,2	75,321	6,847
3	21	51	30	1, 2, 3	100,684	3,356
4	51	65	14	1, 2, 3, 4	54,299	3,879
5	65	81	16	2, 3, 4	27,510	1,719
6	81	84	3	2, 3, 4, 5	18,059	6,020
7	84	101	17	3, 4, 5	38,947	2,291
8	101	109	8	3, 4, 5, 6	21,552	2,694
9	109	123	14	4, 5, 6	21,821	1,559
10	123	139	16	5, 6	17,038	1,065
11	139	147	8	6	3,147	393
		TOTAL	147	-	435,844	-

The modelling for dewatering wastewater management for the estimated construction period indicated the following:

- For the modelled scenario, a total dewatering volume of 435,844 m^3 was predicted across a construction program of 147 days.
- It was predicted that it would be possible to manage dewatering wastewater through onsite storage and reuse.

The use of multiple conservative assumptions within the hydrogeological modelling and dewatering management modelling were anticipated to have overestimated the dewatering flow rates relative to the rates that will actually be observed onsite during the works. This opinion was informed by evidence of the variable saturated zones and permeabilities observed within the SWL1 investigation area and by absence of groundwater at several test pit excavations undertaken by Walker within the footprint of SWL2.

9.5 Contingency Plan – Disposal of Dewatering Wastewater

Modelling of groundwater flows and onsite storage capacity was undertaken to assess the potential impacts of a requirement to dewater the excavation for a longer period than initially estimated. Modelling was conservatively undertaken assuming that the delay occurred while Bays 1 to 4 were being simultaneously dewatered, thereby simulating the 'worst-case' scenario. A delay of 90 days was modelled, representing an extension of time of approximately 60% of the construction program adopted for the dewatering modelling.

Dewatering modelling undertaken by HCL (refer Appendix H) indicated that an additional 126,000 m^3 of dewatering wastewater would be generated across this period. Despite the additional volume of water that would be extracted in this scenario, drawdown at registered bores in the vicinity of SWL1 was modelled as <1 mm, indicating that there is very low risk of the additional groundwater extraction causing adverse impacts to existing groundwater users.

Modelling of the onsite storage and reuse of dewatering wastewater in this scenario (refer Appendix L) indicated that additional dewatering wastewater volume could still be managed through onsite storage and reuse in this scenario, leaving approximately 10% of the total onsite capacity unused.

For the purpose of this assessment, it was assumed that dewatering of Bays 1 to 4 would continue throughout the delay period and that construction demand for water reuse would also continue. In reality, a delay of this length would likely trigger a review of the dewatering activity to identify appropriate actions to be taken. If the volume of groundwater expected to be extracted during the delay period were to exceed the volume required to dewater to the target elevation, it is likely that a decision would be taken to stop dewatering at one or more bays during the delay period.

In the unlikely event that onsite storage and reuse capacity is exceeded, it may be necessary to dispose of dewatering wastewater to the offsite surface water environment. In this scenario, consideration must be given to whether discharge could cause environmental harm in the receiving environment.

The likely receiving environment for surface water discharge would be Thompson Creek, which passes through the site and flows southwest before discharging to the marine environment. Thompson Creek is a highly modified, degraded freshwater aquatic ecosystem that receives numerous discharges from sites in the local area. Thompson Creek receives stormwater flows from the Riverlea development.

Comparison of groundwater and surface water monitoring data sets identified that concentrations of target analytes in onsite groundwater were generally within the range of concentrations measured within downstream surface water. The quality of groundwater that may be discharged to the surface water environment was therefore considered to be equivalent to or exceeding that of Thompson Creek.

Provided that dewatering wastewater was managed and monitored to demonstrate that TSS concentrations were <500 mg/L at the point of discharge, it is LBWco's opinion that discharge to Thompson Creek would not cause environmental harm in the receiving environment.

If TSS was >500 mg/L on average and the discharge volume was > 100 kL, an earthworks drainage licence from the EPA would be needed.

10 Risk Assessment for Dewatering

To support Walker's EIS amendment for Riverlea Precinct 2 and the proposed saltwater lakes, two key questions relating to potential for environmental impact of the dewatering activity were considered:

- Will the extraction of groundwater for construction of SWL1 have an unacceptable adverse impact on any current human activities reliant on the shallow groundwater, or on the natural environment, onsite or in the vicinity of the site?

- Can the dewatering wastewater produced from the construction of SWL1 be managed in accordance with the waste hierarchy and meet the general environmental duty obligations under s25 of the EP Act?

Multiple aspects of the dewatering process could cause or contribute to impacts relevant to the questions above. Accordingly, a semi-quantitative assessment of risks and contingency measures would be an appropriate means to answer these questions.

A risk assessment based on methodology presented in AS/NZS ISO31000:2018 – Risk Management, was undertaken to characterise risks posed by the hazards arising from the proposed dewatering activities. The process is semi-quantitative and incorporated the views and judgement of LBWco, HCL, Walker and several other technical advisers to Walker.

A risk ranking (low, medium, high, extreme) is assessed for each potential hazard identified, based on subjective ratings in terms of 'likelihood' of an adverse event occurring and a range of potential 'consequence' outcomes of an event.

Adopted descriptors for the 'likelihood' and 'consequence' components of the risk assessment for the proposed dewatering activity are presented in Tables 16 and 17, respectively. Consequence descriptors should be read as AND/OR statements.

Table 16 Likelihood Descriptor Matrix

Level	Descriptor	Comments
1	Virtually impossible	Has almost never occurred elsewhere in similar situations, is conceivable but not anticipated to occur within the project timeframe.
2	Unlikely	Has occurred a few times elsewhere in similar situations.
3	Possible	An occasional occurrence elsewhere in similar situations. May occur within a year.
4	Likely	A regular occurrence elsewhere in similar situations. Likely to occur within weeks to months.
5	Virtually certain	A very frequent occurrence elsewhere in similar situations. Expected to occur within days to weeks, or ongoing.

Table 17 Consequence Descriptor Matrix

Category	Level	Environmental/ Socio-economic	Community/Reputational	Legal
A	Negligible effect	Very short-term effects within the project area. Recovery will occur within days. No ecological or socio-economic consequences.	No media, regulator or community interest.	Minor non-compliance and/or breach of regulation. No legal consequences.
B	Minor effect	Short-term effects within the project area. Recovery will occur within weeks. Minor ecological or socio-economic consequences. No changes to biodiversity or ecological function.	Local media coverage. Some interest by regulator(s) and local NGOs. One or two community complaints.	Breach of regulation with investigation or report to authority with possible prosecution and fine.
C	Moderate effect	Medium-term effects within the project area. Recovery likely to occur within months to a year. Moderate ecological or socio-economic consequences. Local changes to biodiversity, but no changes to ecological function.	State media coverage. Investigation by regulator(s)and NGOs. Persistent community complaints.	Breach of regulation with litigation and moderate fine. Involvement of senior management.
D	Major effect	Long-term effects, potentially extending beyond the project area. Recovery is likely to take years and complete recovery may not occur. Major ecological or socio-economic consequences. Significant local changes to biodiversity and measurable changes to ecological function.	National media coverage. Detailed investigation by regulator(s). Long term community unrest and outrage significantly impacting business.	Major breach of regulation with litigation and substantial fine. Possible suspension of operating licence.
E	Disastrous effect	Very long-term effects extending beyond the project area. Recovery is likely to take decades and complete recovery may not occur. Severe ecological or socio-economic consequences. Loss of biodiversity on a regional scale, and significant loss of ecological function.	International media coverage. Extensive investigation by regulator(s) involving government minister(s). Complete loss of trust by affected community threatening the continued viability of the business.	Major litigation or prosecution with very substantial fines. Possible cancellation of operating licence.

Table 18 presents the matrix for assessing risk based on the combination of consequence and likelihood. It was used to establish the overall risk level associated with a particular aspect of the dewatering activity before any control measure was applied, which identifies the level of potential risk.

The risk matrix shows risk levels from 'Low' to 'Extreme' and identifies where controls are required to mitigate potential impacts.

Walker is committed to implementing appropriate controls to manage and mitigate risks during the dewatering works. Detailed development of controls will be undertaken through the detailed design phase of the project and documented in a comprehensive Dewatering Management Plan (DMP).

Table 18 Risk Ranking Matrix

			Likelihood				
			1 Virtually Impossible	2 Unlikely	3 Possible	4 Likely	5 Virtually Certain
Consequence	1	Negligible effect	1	2	3	4	5
	2	Minor effect	2	4	6	8	10
	3	Moderate effect	3	6	9	12	15
	4	Major effect	4	8	12	16	20
	5	Disastrous effect	5	10	15	20	25

≥ 0	Low Risk	Low risks will be maintained under review. Simple controls expected to be sufficient.
≥ 5	Medium Risk	Medium risks require appropriate management planning and controls that can be readily implemented as part of routine operations.
≥ 10	High Risk	High risks demand comprehensive management planning and controls to avoid an impact where possible and to support rapid response.
≥ 15	Extreme Risk	Extreme risks demand comprehensive management planning and controls to avoid an impact where possible and to support rapid response. Operations should not proceed, or must cease if already commenced, if the risk cannot be effectively controlled.

The risk assessment based on the methodology outlined above is summarised in Table 19.

While it is too early in the project planning process to prepare the detailed DMP, high level commentary on potential controls for risk mitigation is provided in the risk assessment in Table 19. The level of risk associated with each potential impact was re-evaluated on consideration of potential controls, which determined the level of 'residual' risk.

Table 19 Risk Assessment

Item	Hazard (Environmental Aspect)	Potential impact – no mitigation	Consequence	Likelihood	Potential risk level	Comments on Assessment Findings and Mitigation measures	Consequence	Likelihood	Residual risk level – with controls
Extraction of Groundwater to Dewater for Lake Construction									
1	Higher flow rate than predicted is required to control GW to target level	Total take of groundwater exceeds allocation, and Take exceeds capacity for storage/reuse onsite (see Item 6)	Moderate	Possible	Medium	Allocation is yet to be determined. The approach to the modelling of dewatering flows and total volume of extraction has been conservative. The discontinuous nature of water bearing strata onsite suggest that the total take of groundwater is more likely to be less than has been modelled. The DMP will include a requirement to meter the groundwater flow and track progress against the allocation. Any need to revise the allocation should be identified well in advance of reaching the limit.	Minor	Unlikely	Low
2	Zone of influence and drawdown at nearby bores is greater than estimated	Access to the shallow groundwater by another registered user becomes unavailable due to excessive dewatering drawdown. Impacts such as failures of crop/stock production, through to business failure.	Moderate	Possible	Medium	The groundwater assessment and modelling indicated no registered users of the shallow groundwater within 2 km of the proposed saltwater lakes, and predicted drawdown was <1 mm at ~500 m from the edge of SWL1. No unacceptable impacts on existing users are predicted (refer Figure 7a and 7b). The DMP will include regular monitoring of drawdown during the dewatering works and trigger response actions if greater than expected drawdown is evident.	Minor	Unlikely	Low

Item	Hazard (Environmental Aspect)	Potential impact – no mitigation	Consequence	Likelihood	Potential risk level	Comments on Assessment Findings and Mitigation measures	Consequence	Likelihood	Residual risk level – with controls
3	Dewatering causes ground level subsidence	Irreversible or extensive damage to the shallow aquifer system occurs due to subsidence, causing serious environmental harm and damage to property and public infrastructure.	Major	Possible	High	The DMP will include a requirement to implement a monitoring plan for ground subsidence and control measures relative to findings. Control measures may include reducing areas of lake construction works and dewatering to single bays at a time, to minimise the time that an area is subject to dewatering. Lithology observed onsite was predominantly hard, medium to high plasticity clay, which did not appear to have high compressibility. Modelling predicts groundwater level recovery to near equilibrium within a year of ceasing dewatering pumping at SWL.	Moderate	Unlikely	Medium
4	Offsite plume of groundwater contamination is mobilised into the site or the zone of influence	Severely contaminated groundwater is mobilised into the zone of influence of dewatering, and human or environmental receptors are exposed, causing demonstrable harm to human health or the environment. Harm to health is severe, including risk to life or causing serious illness requiring treatment in hospital.	Major	Possible	High	No plumes of site contamination in the shallow groundwater are known onsite or within the surrounding area. The previous s83A notification to EPA for Riverlea precinct 1 was considered by LBWco to be an unrealistic interpretation of the definition of site contamination. No other s83A notifications are evident in the EPA Public Register and no clusters of monitoring/investigation wells are evident in WaterConnect. There is a very low probability that: currently unknown site contamination of groundwater exists; will be mobilised by the dewatering works; and results in exposure of a human or ecological receptor.	Minor	Unlikely	Low

Item	Hazard (Environmental Aspect)	Potential impact – no mitigation	Consequence	Likelihood	Potential risk level	Comments on Assessment Findings and Mitigation measures	Consequence	Likelihood	Residual risk level – with controls
						The DMP will include a requirement for a monitoring plan for groundwater quality and trigger response actions if change in water quality indicates that a source of site contamination is present within the zone of influence of dewatering.			
Dewatering Wastewater Storage, Reuse and Disposal									
5	Large body of water present onsite for an extended period of time may become stagnant	Deterioration of water quality over time renders the stored water unsuitable for planned reuse applications onsite and unsuitable for discharge to the stormwater system	Moderate	Possible	Medium	The DMP will include requirements for the active management and monitoring of water quality in any open storages onsite to maintain suitability for the proposed uses and to avoid creating a problematic waste liability. Decisions on reuse or disposal of stored dewatering wastewater will be informed by water quality testing.	Minor	Unlikely	Low
6	Dewatering flow required for groundwater control results in onsite capacity for storage and reuse being exceeded. Could occur due to difference between modelled and actual conditions, storm events causing flooding of onsite storages, or works delay once dewatering is active.	Dewatering wastewater that cannot be stored or reused onsite must be discharged to the stormwater system, resulting in discharge to Thompson's Creek and ultimately the Gulf St Vincent. Extensive harm to the receiving environment and/or damage to stormwater infrastructure occurs due to high flow from dewatering wastewater pumping and potential poor	Major	Possible	High	Dewatering flow modelling indicates the predicted total volume of pumped groundwater can be stored and reused onsite, with a reasonable margin of safety in the onsite capacity. Contingency modelling for an additional 90 days of dewatering due to a potential unforeseen project delay indicated total volume extracted would be within the onsite capacity. Flow will be minimised through optimising pumping control of groundwater. Erosion controls will be designed and implemented for the discharge point. Contingency planning for water treatment prior to disposal will be included in the DMP. Treatment will	Moderate	Unlikely	Medium

Item	Hazard (Environmental Aspect)	Potential impact – no mitigation	Consequence	Likelihood	Potential risk level	Comments on Assessment Findings and Mitigation measures	Consequence	Likelihood	Residual risk level – with controls
		water quality of wastewater.				principally address the requirement for total suspended solids to be <500 mg/L in any discharge to the stormwater system. Chemical testing of groundwater onsite has demonstrated that groundwater quality is equivalent or better than the quality of water in Thompson's creek. A monitoring program to assess and demonstrate the water quality of the dewatering wastewater is suitable for discharge will be included in the DMP. With controls, damage to the receiving environment may include a trivial amount of scour and/or localised vegetation loss in a very small area near the discharge. No repair works beyond routine maintenance are anticipated.			

It is important to note that the assessment, modelling and risk assessment works presented above were principally focussed on SWL1. As the construction of SWL1, SWL2 and SWL3 will be a staged process, with time steps of approximately 5 years to each of the subsequent lakes, it is proposed that detailed investigations and dewatering management planning for SWL2 and SWL3 will be undertaken closer to the time required for further design and approvals.

It is anticipated at this time that the investigations and DMPs for SWL2 and SWL3 will be largely consistent with the approach proposed for SWL1. The staging will provide an opportunity to apply the learnings from the construction of SWL1 to improve the approach to the approvals and management planning for the future lake projects.

An important difference anticipated for the construction of SWL3 is the expected absence of access to a large volume onsite storage for dewatering wastewater, as no subsequent lake excavation is planned. Some elements of the future stormwater management system may provide for onsite storage capacity for dewatering wastewater, but it is too early in the process to confirm this. A larger proportion of dewatering wastewater produced during SWL3 construction may need to be disposed offsite. Accordingly, it will be important to undertake further assessment of groundwater quality and management of the disposal process when planning for SWL3.

11 Conclusions and Recommendations

Substantial environmental investigations of soil, groundwater and surface water were undertaken for Walker by LBWco and others to assess conditions onsite and in downgradient aquatic ecosystems for a range of purposes. This report, together with hydrogeological modelling by HCL, focussed on characterising the requirements for construction dewatering for the saltwater lakes proposed within the revised masterplan for Precinct 2 at Riverlea.

LBWco concluded the following:

- Dewatering during construction of SWL1 will be required and the wastewater produced by dewatering must be reused or disposed appropriately.
- Options under consideration by Walker for the lake lining include clay and a synthetic polymer system. Assessing the merits of either lining system was not addressed in this report, but the longer construction timeframe for a synthetic liner was adopted for dewatering modelling purposes. Based on the proposed construction methodology and hydrogeological modelling of dewatering flows, it was estimated that:
  - Dewatering during construction of SWL1 would likely be required for a period of 147 days
  - The volume of dewatering wastewater generated would be approximately 436,000 m^3.
- The modelling was conservative, so actual dewatering pumping requirements may be below those simulated. Higher pumping rates are also possible at times where preferential flows may occur through more permeable strata.
- Modelling of drawdown during and after dewatering activities indicated low risk of unacceptable impact to nearby registered users of shallow groundwater from the dewatering activity. There are no registered users of shallow groundwater within 2 km of the proposed saltwater lakes locations.
- Based on the likely onsite storage capacity and projected onsite demand for water during construction activities, it was predicted that all dewatering wastewater from SWL1 can be managed onsite through onsite storage and reuse.
  - Contingency modelling undertaken for an additional 90 days of dewatering, simulating a potential unforeseen project delay, indicated the total volume of groundwater extracted would still be within the onsite capacity.
  - In the unlikely event that onsite storage and reuse capacity is exceeded, it may be necessary to dispose dewatering wastewater offsite to Thompson Creek. Comparison of groundwater and surface water data indicated that discharge to Thompson Creek would not cause environmental harm in the receiving environment, provided that flow and suspended solids were managed appropriately.
- Modelling simulated several different approaches to groundwater extraction for dewatering of SWL1. To achieve the necessary control of groundwater across the full width of the lake, a series of horizontal well points at regular spacings are likely to be needed through the base of the lake. A network of extraction bores will also be needed around the perimeter of the lake.

LBWco recommends that a comprehensive Dewatering Management Plan (DMP) be prepared as part of the detail design process and part of the Construction Environmental Management Plan (CEMP) for the project. The DMP should be agreed by the key stakeholders relevant to the proposed activity.

The information in this report is subject to the limitations expressed in Section 12. The reader should make themselves aware of the limitations and how they relate to the conclusions provided above.

12 Limitations

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between Walker Buckland Park Developments Pty Ltd (Walker) and LBW co Pty Ltd (LBWco) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, LBWco has relied upon data, surveys, analyses, designs, plans and other information provided by Walker and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, LBWco has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. LBWco will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to LBWco.

Environmental Conclusions

In accordance with the scope of services, LBWco has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Walker Buckland Park Developments Pty Ltd

The report has been prepared for the benefit of Walker and no other party. LBWco assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of LBWco or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

LBWco will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

Appendix A

Figures

FIGURE 1
Site Location Plan

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd

Legend

- Site boundary
- Watercourses
- Coastline

Department for Infrastructure and Transport (DIT), 7 February 2023, Roads (shp), data.sa.gov.au/data/dataset/roads, downloaded 10 February 2023. DIT, 8 February 2023, Generalised Land Use 2021 (shp), data.sa.gov.au/data/dataset/land-use-generalised, downloaded 10 February 2023, adjusted by LBWco. Department for Environment and Water (DEW), 2 July 2014, Watercourses in South Australia (shapefile), data.sa.gov.au/data/dataset/watercourses-in-south-australia, downloaded August 2022.

DELIVERING ENVIRONMENTAL SOLUTIONS

N

0 1 2 km

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com (May 2024)

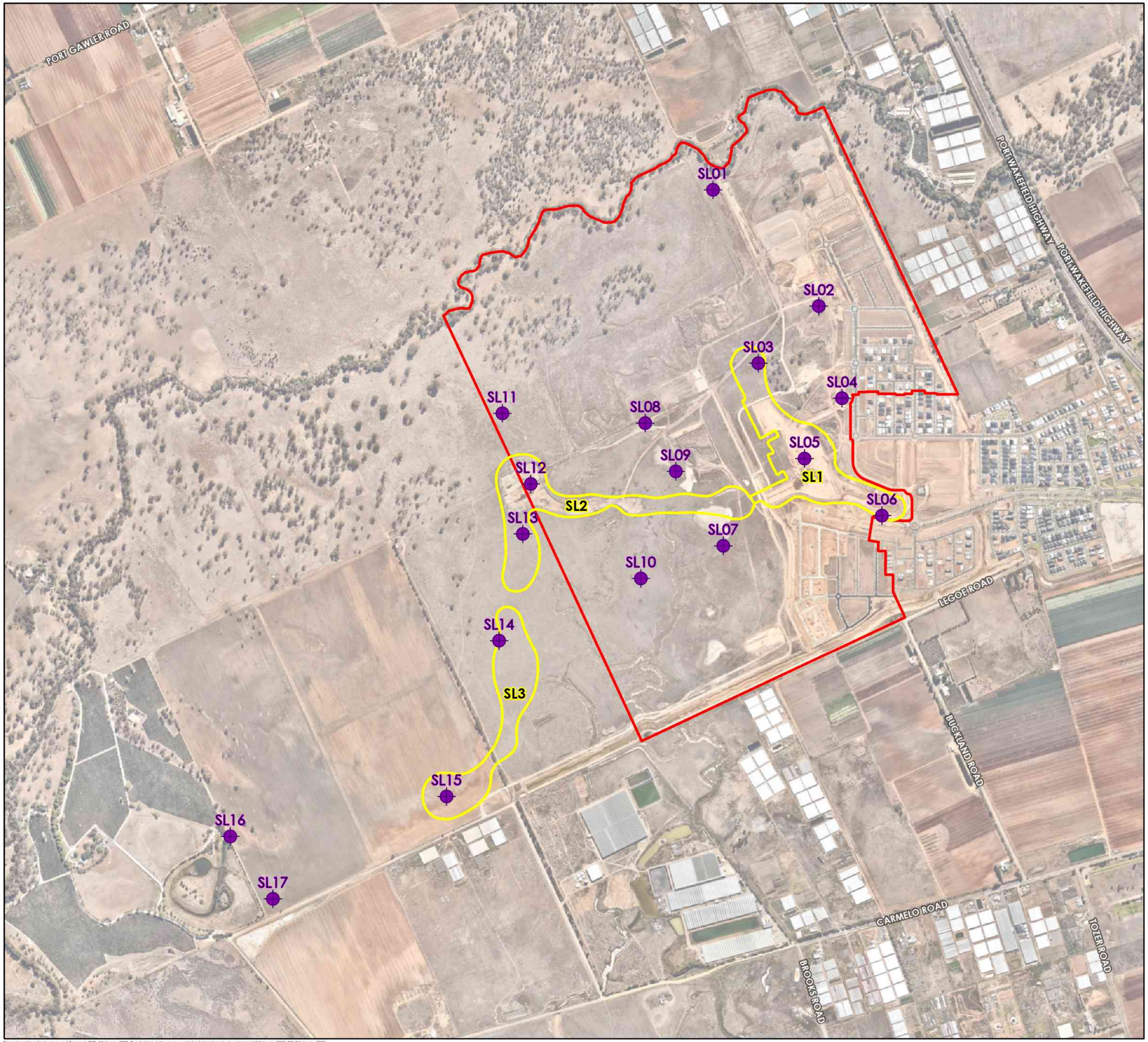
Job No	231445-01	Scale at A3:	1:45,000
Drawn	JC	Rev	DRAFT
Approved	JB	Date	1/10/2024

FIGURE 2
Soil Bore Location Plan

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd



Legend

- Site boundary
- Extent of proposed saltwater lakes
- Soil bore - March 2023

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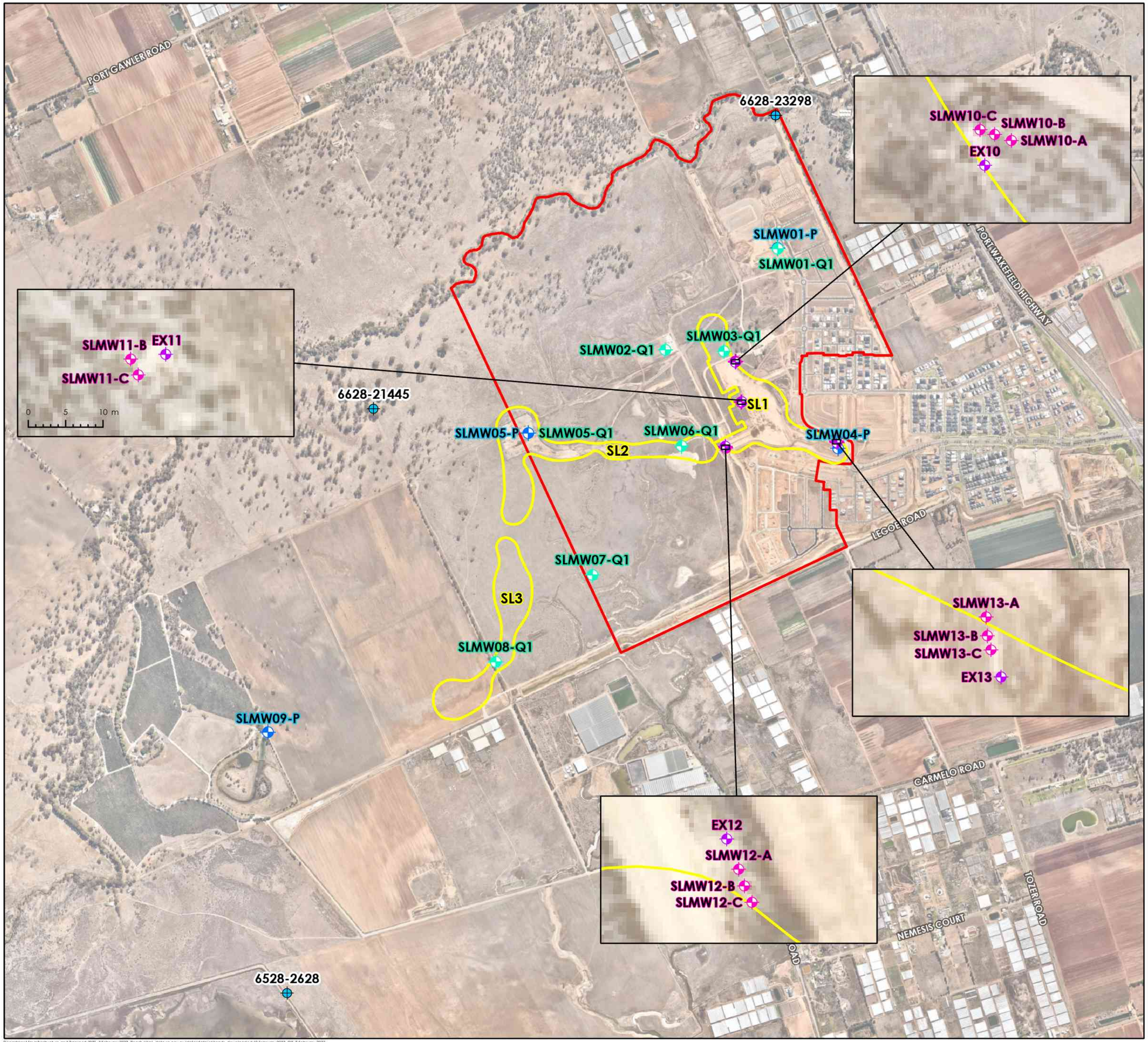
N

0 400 800 m

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com (May 2024)

Job No	231445-01	Scale at A3:	1:15,000
Drawn	JC	Rev	DRAFT
Approved	JB	Date	1/10/2024



Department for Infrastructure and Transport (DIT), 7 February 2023. Roads (shp). data.sa.gov.au/data/dataset/roads, downloaded 10 February 2023. DIT, 8 February 2023.

FIGURE 3

Groundwater Monitoring Well Location Plan

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd

Legend

- Site boundary
- Extent of proposed saltwater lakes
- Existing well
- Nested monitoring well (A, B, C)
- Pump testing well
- Monitoring well - perched zone
- Monitoring well - Q1 aquifer

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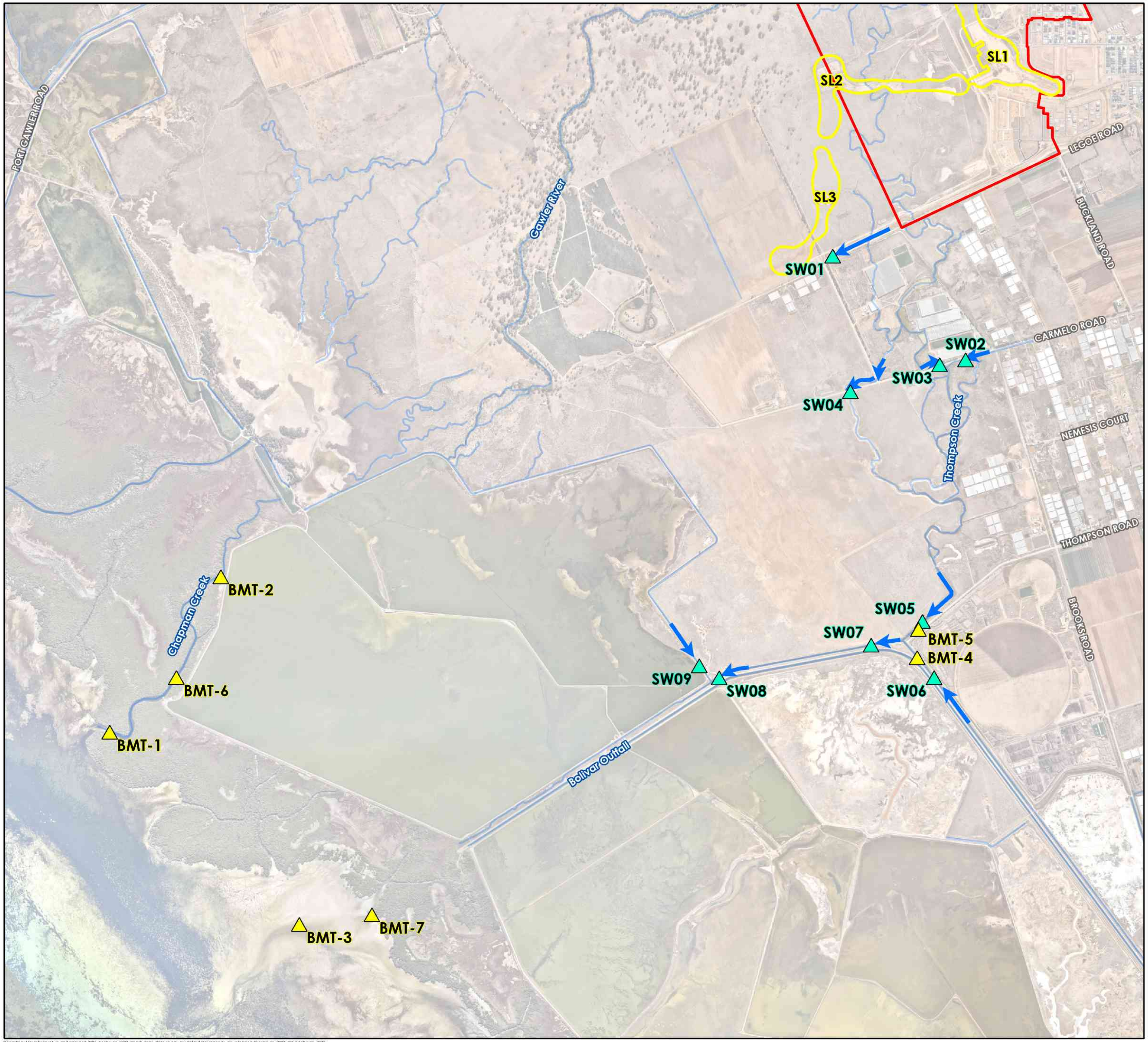
N	0 0.5 1 km		
	Spatial Reference: GDA2020 MGA Zone 54		
	Source: Nearmap.com (May 2024)		
Job No	231445-01	Scale at A3:	1:17,500
Drawn	JC	Rev	DRAFT
Approved	JB	Date	1/10/2024

FIGURE 4
Surface Water Sampling Locations

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd



Department for Infrastructure and Transport (DIT), 7 February 2023. Roads (shp). data.sa.gov.au/data/dataset/roads. downloaded 10 February 2023. DIT, 8 February 2023.

Legend

- Site boundary
- Watercourses
- Extent of proposed saltwater lakes
- Surface water sampling location (LBWco 2023)
- Surface water sampling location (BMT 2022)
- Direction of surface water flow

Location ID	Easting	Northing
BMT-1	266940.01	6158445.71
BMT-2	267683.65	6159486.79
BMT-3	268208.34	6157160.58
BMT-4	272342.04	6158943.80
BMT-5	272350.91	6159134.16
BMT-6	267385.92	6158810.85
BMT-7	268694.24	6157224.63
SW01	271777.24	6161631.89
SW02	272666.08	6160937.76
SW03	272492.68	6160904.33
SW04	271895.48	6160724.63
SW05	272377.59	6159187.89
SW06	272455.75	6158810.29
SW07	272034.35	6159029.07
SW08	271017.84	6158808.86
SW09	270884.65	6158889.62

DELIVERING ENVIRONMENTAL SOLUTIONS

N

0 0.5 1 1.5km

Spatial Reference: GDA2020 MGA Zone 54

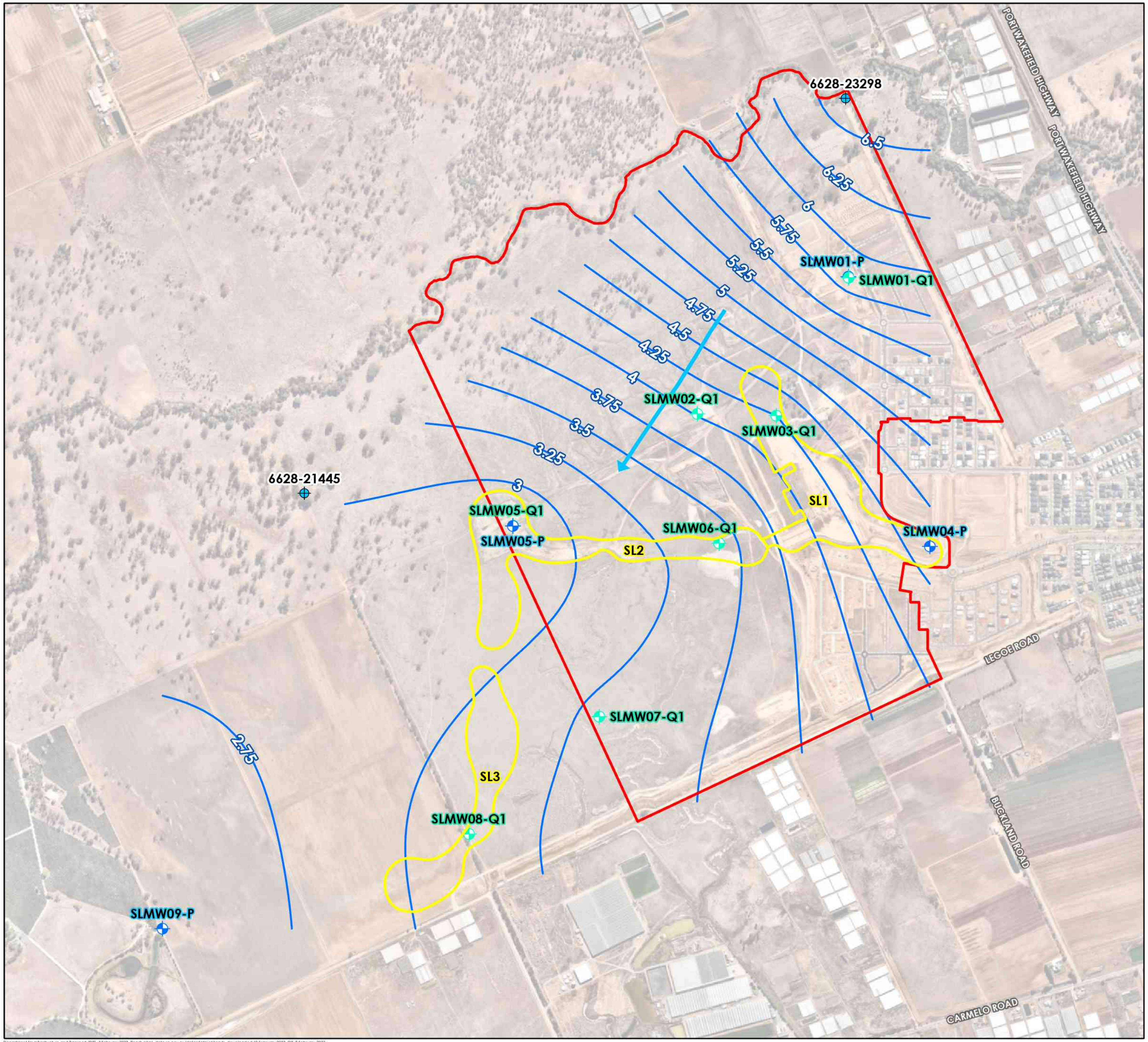
Source: Nearmap.com (May 2024)

Job No	231445-01	Scale at A3:	1:25,000
Drawn	JC	Rev	DRAFT
Approved	JB	Date	1/10/2024

FIGURE 5A

Groundwater Elevation Contours 2 May 2023

Site:	Riverlea Development - Precinct 2
Project:	Dewatering Investigation
Client:	Walker Buckland Park Developments Pty Ltd



Department for Infrastructure and Transport (DIT), 7 February 2023. Roads (shp), data.sa.gov.au/data/dataset/roads, downloaded 10 February 2023. DIT, 8 February 2023.

Legend

- Site boundary
- Extent of proposed saltwater lakes
- Existing well
- Monitoring well - perched zone
- Monitoring well - Q1 aquifer
- Interpreted groundwater elevation contour - mAHD, 2 May 2023
- Inferred groundwater flow direction

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N

0 0.25 0.5 0.75 km

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com 1(6 Sep 2023)

Job No	231445-01	Scale at A3:	1:13,000
Drawn	TO	Rev	DRAFT
Approved	JB	Date	1/10/2024

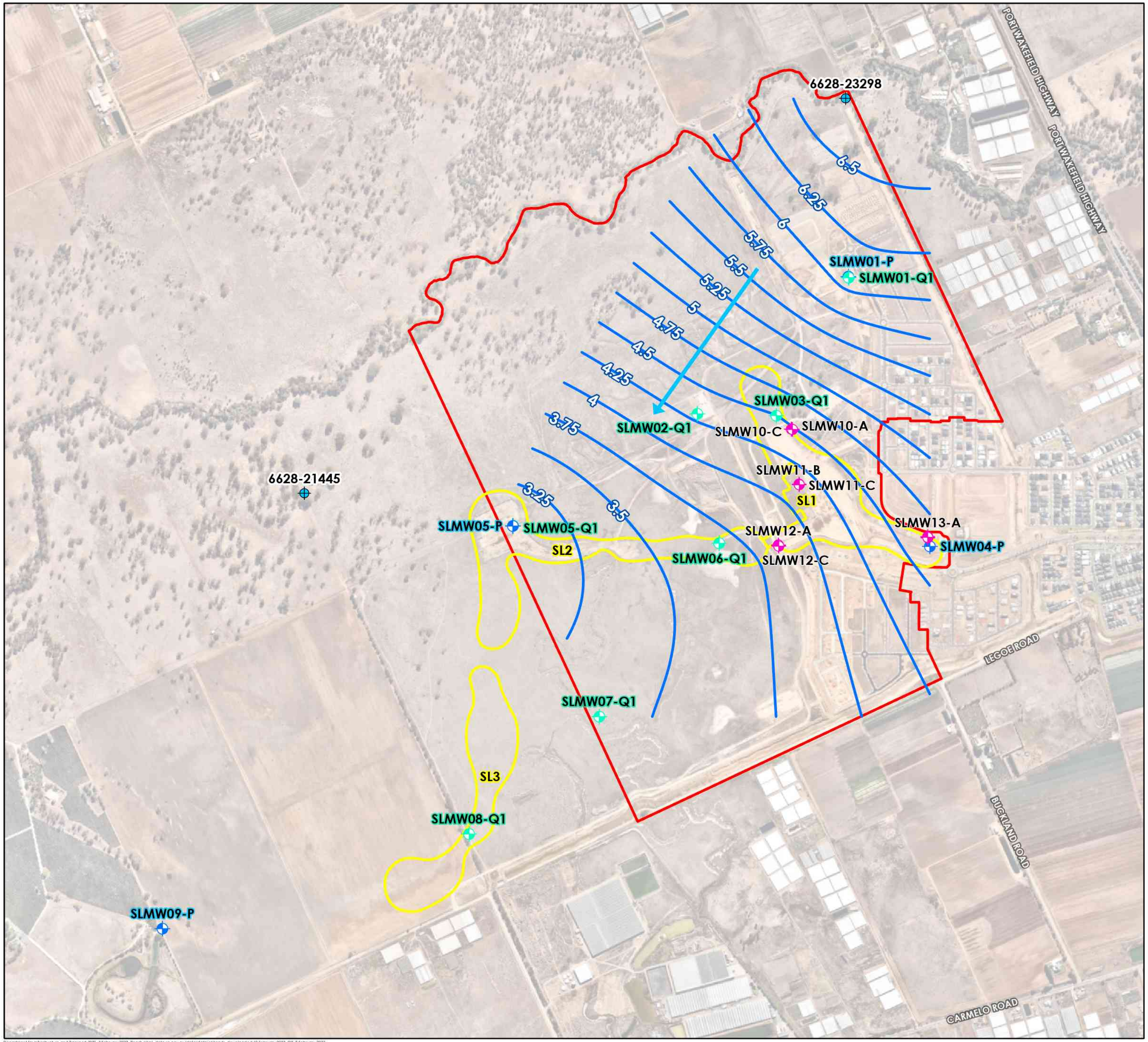
FIGURE 5B

Groundwater Elevation Contours 31 Oct 2023

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd



Legend

- Site boundary
- Extent of proposed saltwater lakes
- Existing well
- Nested Wells (A, B, C)
- Perched
- Q1 aquifer
- Interpreted groundwater elevation contour - mAHD, 31 October 2023
- Inferred groundwater flow direction

lbw co | DELIVERING ENVIRONMENTAL SOLUTIONS

N

0 0.25 0.5 0.75 km

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com 1(6 Sep 2023)

Job No	231445-01	Scale at A3:	1:13,000
Drawn	TO	Rev	DRAFT
Approved	JB	Date	1/10/2024

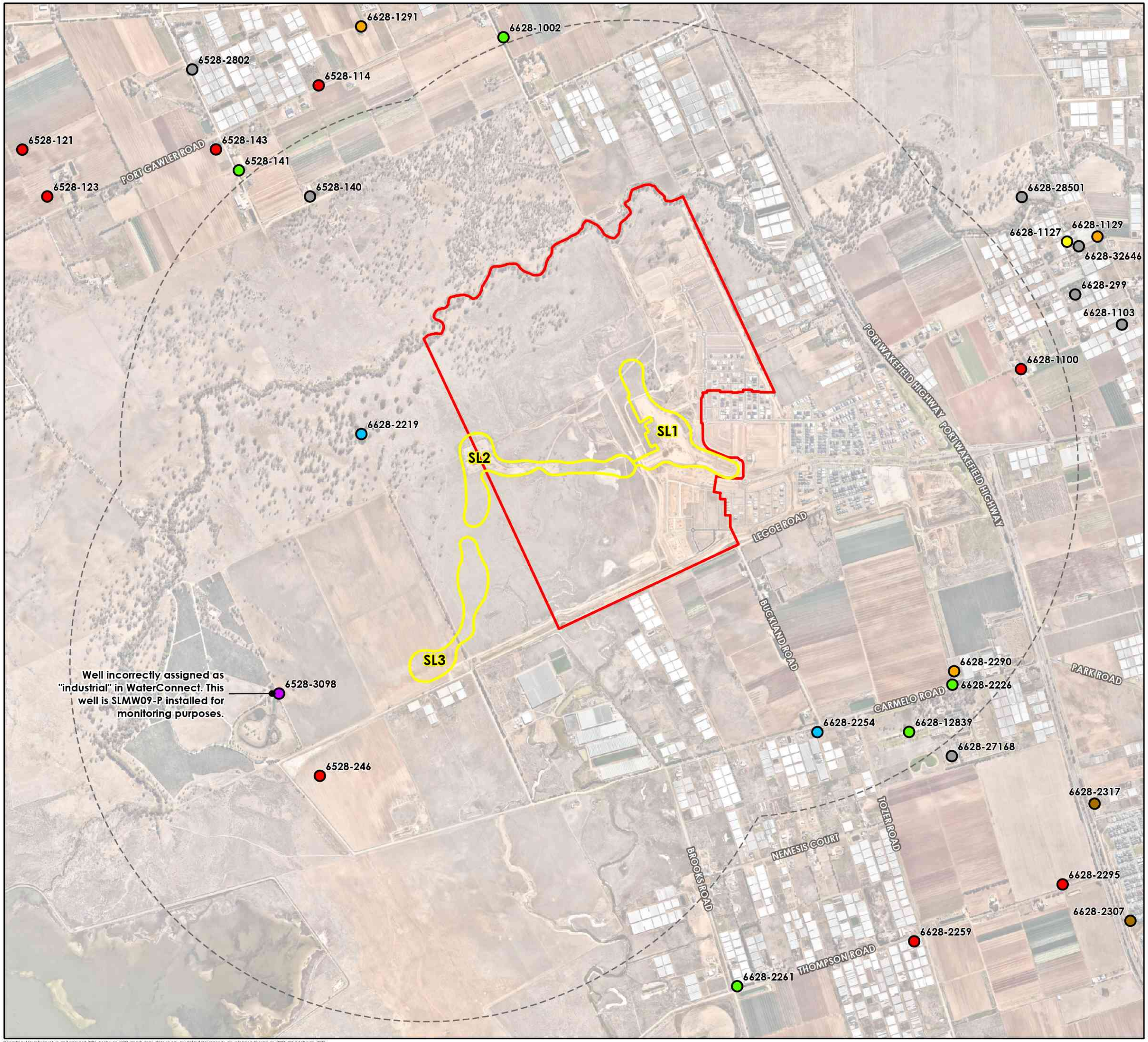


FIGURE 6

Shallow Groundwater Wells

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd

Legend

- Site boundary
- Extent of proposed saltwater lakes
- 2 km from saltwater lakes

Shallow groundwater wells

- Domestic/irrigation/stock
- Irrigation
- Irrigation/stock
- Stock
- Drainage
- Industrial
- Observation
- Unknown

lbw co DELIVERING ENVIRONMENTAL SOLUTIONS

N

0 0.5 1 km

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com (May 2024)

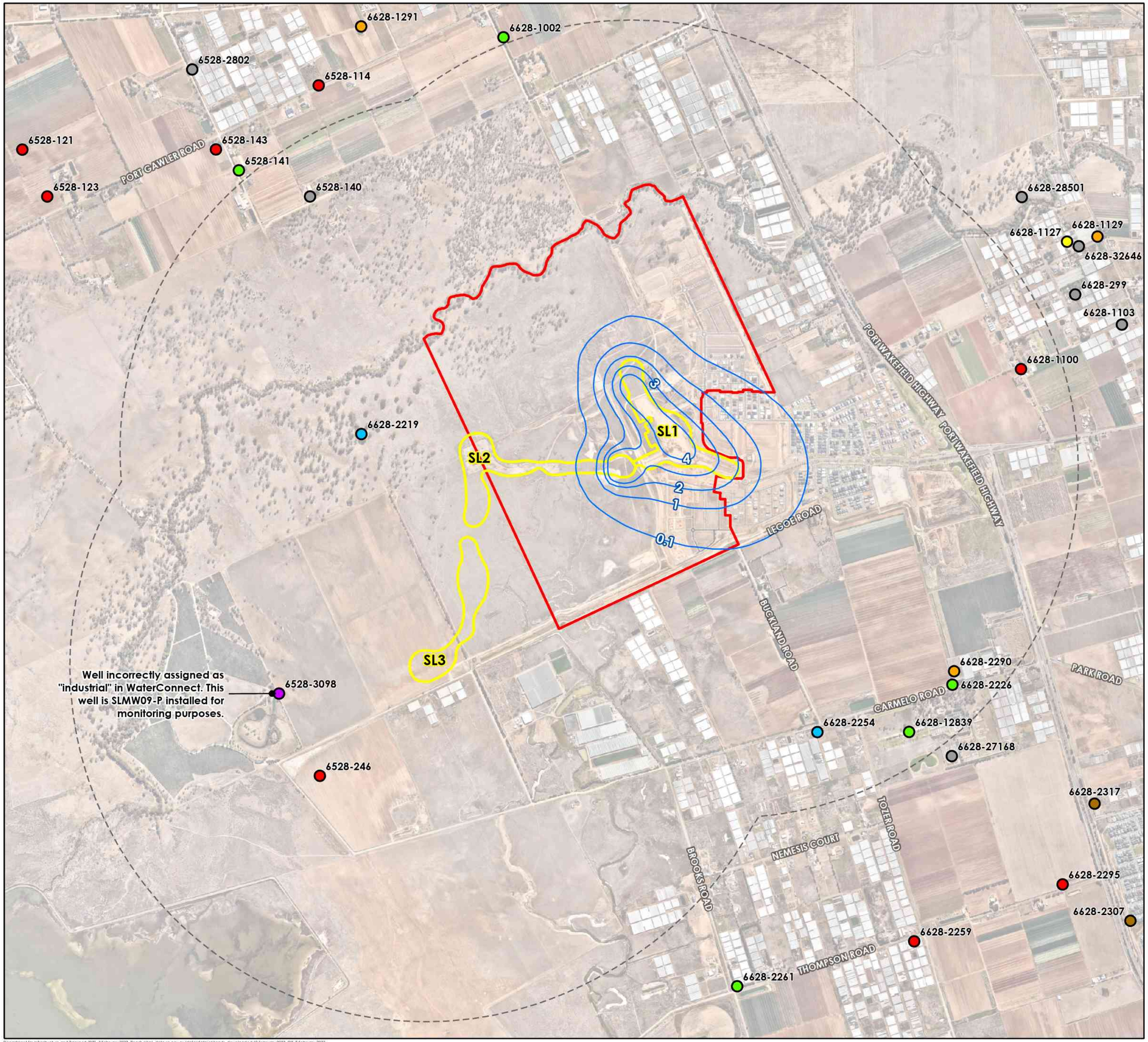
Job No	231445-01	Scale at A3:	1:22,000
Drawn	TO, JC	Rev	DRAFT
Approved	JB	Date	1/10/2024

FIGURE 7A
Modelled Groundwater Drawdown at End of Pumping

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd



Legend

- Site boundary
- Extent of proposed saltwater lakes
- 2 km from saltwater lakes

Shallow groundwater wells

- Domestic/irrigation/stock
- Irrigation
- Irrigation/stock
- Stock
- Drainage
- Industrial
- Observation
- Unknown

Groundwater drawdown relative to modelled potentiometric surface at end of pumping (147 days)

- Drawdown (m)

lbw co DELIVERING ENVIRONMENTAL SOLUTIONS

N

0 0.5 1 km

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com (May 2024)

Job No	231445-01	Scale at A3:	1:22,000
Drawn	TO, JC	Rev	DRAFT
Approved	JB	Date	1/10/2024

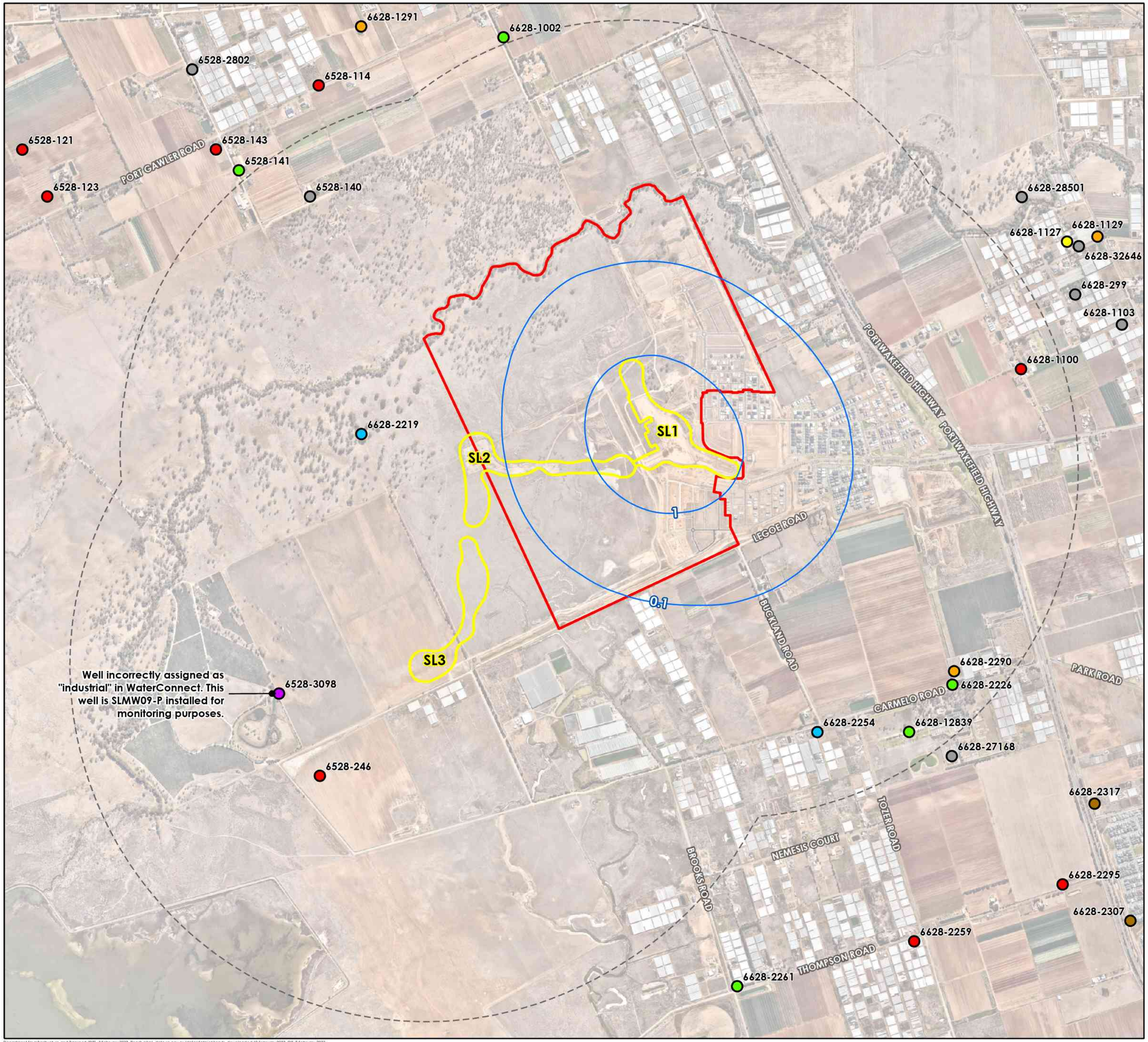
FIGURE 7B

Modelled Groundwater Drawdown One Year After Pumping

Site: Riverlea Development - Precinct 2

Project: Dewatering Investigation

Client: Walker Buckland Park Developments Pty Ltd



Legend

- Site boundary
- Extent of proposed saltwater lakes
- 2 km from saltwater lakes

Shallow groundwater wells

- Domestic/irrigation/stock
- Irrigation
- Irrigation/stock
- Stock
- Drainage
- Industrial
- Observation
- Unknown

Groundwater drawdown relative to modelled potentiometric surface one year after pumping (517 days)

- Drawdown (m)

lbw co DELIVERING ENVIRONMENTAL SOLUTIONS

N

0 0.5 1 km

Spatial Reference: GDA2020 MGA Zone 54

Source: Nearmap.com (May 2024)

Job No	231445-01	Scale at A3:	1:22,000
Drawn	TO, JC	Rev	DRAFT
Approved	JB	Date	1/10/2024

Department for Infrastructure and Transport (DIT), 7 February 2023. Roads (shp), data.sa.gov.au/data/dataset/roads, downloaded 10 February 2023. DIT, 8 February 2023.

Appendix B

Soil Bore Logs

SOIL BORE SL01

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invest.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 29/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 7.000

COORDINATES -34.640445, 138.518256
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0 – 1.5					SANDY CLAY: very dark brown, low plasticity	D	
1.5 – 3.8					CLAY: dark brown, trace gravel	D	
3.8 – 5.7					CLAY: grey-brown, moderate-high plasticity	SM	
5.7 – 5.8					CLAYEY SAND: grey-brown, medium	Wet	
5.8 – 6.1					CLAY: grey-brown, moderate-high plasticity	SM	
6.1 – 7.0					CLAY: grey-brown, moderate-high plasticity	SM	
7.0					Termination Depth at:7.000 m		

SOIL BORE SL02

PROJECT NUMBER 231445-01	**DRILLING DATE** 29/03/2023	**COORDINATES** -34.644743, 138.522759
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 7.500	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0.0–0.55					SANDY CLAY: very dark brown, low plasticity	D	
0.55–2.6					SANDY CLAY: brown-orange, low plasticity, trace gravel	D	
2.6–3.8					CLAYEY SAND: grey-brown -orange, moderate plasticity	Wet	
3.8–4.2					CLAY: grey-brown, moderate-high plasticity	M	
4.2–6.45					CLAY: grey-brown, moderate-high plasticity	SM	
6.45–6.5					CLAYEY SAND: grey-brown, medium	M	
6.5–7.5					CLAY: grey-brown, moderate-high plasticity	D	
7.5					Termination Depth at: 7.500 m		

Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

SOIL BORE SL03

PROJECT NUMBER 231445-01	**DRILLING DATE** 29/03/2023	**COORDINATES** -34.646753, 138.520052
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 6.750	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
					SILT: very dark brown, low plasticity	D	
0.5					CLAYEY SAND: pale brown-orange, medium	D	
1 – 2.5					SANDY CLAY: brown-orange, low-moderate plasticity	D	
					CLAY: light brown, low-moderate plasticity	SM	
3					CLAY: grey-brown, moderate plasticity	M	
3.5					CLAY: grey-brown, moderate plasticity	D	
					SANDY CLAY: brown, low-moderate plasticity	VM	
4 – 5					CLAY: grey-brown, moderate-high plasticity	D	
5.5					SANDY CLAY: grey-brown, moderate plasticity	Wet	
6					CLAY: grey-brown, moderate-high plasticity	SM	
					CLAYEY SAND: grey-brown, medium	Wet	
6.5					CLAY: grey-brown -orange, moderate plasticity	SM	
7 – 8.5					Termination Depth at: 6.750 m		

SOIL BORE SL04

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invest.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 28/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Pushtube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 6.000

COORDINATES -34.648098, 138.523695
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
					FILL: silt, grey, fine	D	
					CLAY: dark brown, low plasticity	D	
0.5							
					CLAY: brown-orange, low-moderate plasticity, trace gravel	D	
1							
1.5							
2							
					CLAY: grey-brown, moderate plasticity, soft	SM	
2.5							
					CLAYEY SAND: grey-brown	VM	
					CLAY: grey-brown, moderate-high plasticity	SM	
3					CLAY: grey-brown, moderate-high plasticity	M	
3.5							
					CLAYEY SAND: grey-brown, medium	VM	
4							
					CLAY: grey-brown, moderate-high plasticity	M	
4.5					CLAY: grey-brown, moderate-high plasticity	Wet	
5							
5.5					CLAY: grey-brown, moderate-high plasticity	SM	
6					Termination Depth at:6.000 m		
6.5							
7							
7.5							
8							
8.5							

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SOIL BORE SL05

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invest.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 28/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 4.500

COORDINATES -34.650357, 138.521972
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0.5					CLAY: pale brown, low-moderate plasticity	D	
1 1.5					CLAY: grey-brown, moderate plasticity	D	
2					CLAY: grey-brown, moderate plasticity	SM	
2.5 3					CLAY: grey-brown, moderate plasticity	M	
3.5					SANDY CLAY: grey-brown, moderate-high plasticity, with gravel	Wet	
4 4.5					CLAY: grey-brown, moderate plasticity	M	
5 5.5 6 6.5 7 7.5 8 8.5					Termination Depth at:4.500 m		

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SOIL BORE SL06

PROJECT NUMBER 231445-01	**DRILLING DATE** 28/03/2023	**COORDINATES** -34.652437, 138.525375
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 9.000	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0–0.6					SILT: very dark brown, low plasticity	SM	
0.6–3.1					SANDY CLAY: dark brown-orange, moderate plasticity	D	
3.1–3.8					CLAYEY SAND: grey-brown, medium to coarse	M	
3.8–4.9					CLAYEY SAND: grey-brown	Wet	
4.9–9					CLAY: grey-brown, moderate-high plasticity	SM	Calcrete gravel lense (approx. 7.1–7.25)
9					Termination Depth at:9.000 m		

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SOIL BORE SL07

PROJECT NUMBER 231445-01	**DRILLING DATE** 31/03/2023	**COORDINATES** -34.652437, 138.525375
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 7.000	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0.0					CLAY: very dark brown, low plasticity	D	
0.6					CLAY: brown-orange, low plasticity	D	
1.4					CLAY: grey-brown, moderate plasticity, trace gravel	M	
2.5					CLAYEY SAND: grey-brown, medium to coarse	Wet	
2.6					CLAY: grey-brown, moderate-high plasticity	M	
2.8					SAND: grey, medium to coarse	Wet	
3.6					SANDY GRAVEL: brown-orange, medium to coarse	Wet	
5.3					CLAY: grey-brown, moderate-high plasticity	SM	
6.2					CLAYEY SAND: grey-brown, medium	Wet	
6.3					CLAY: grey-brown, moderate-high plasticity	SM	
7					Termination Depth at: 7.000 m		

Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

SOIL BORE SL08

PROJECT NUMBER 231445-01	**DRILLING DATE** 29/03/2023	**COORDINATES** -34.648815, 138.515084
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 7.500	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0.0					SANDY CLAY: very dark brown, low plasticity	D	
0.5					SAND: grey-brown	D	
0.9					SANDY CLAY: dark brown-orange, low plasticity, trace gravel	D	
2.8					CLAY: grey-brown, moderate plasticity	D	
3.1					SANDY CLAY: grey-brown, moderate plasticity	M	
3.3					CLAY: grey-brown, moderate-high plasticity	SM	
3.8					CLAY: grey-brown, moderate-high plasticity	M	
4.6					CLAYEY SAND: grey-brown, medium	Wet	
5.2					CLAY: grey-brown, moderate-high plasticity	M	
5.8					CLAY: grey-brown, moderate-high plasticity	D	
7.5					Termination Depth at: 7.500 m		

SOIL BORE SL09

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invest.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 31/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 7.500

COORDINATES -34.650555, 138.516321
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0.0–0.7					CLAY: very dark brown, low plasticity	D	
0.7–1.5					CLAY: brown-orange, moderate plasticity	D	
1.5–3.4					CLAY: grey-brown, moderate-high plasticity	D	
3.4–4.1					CLAY: grey-brown, moderate-high plasticity	M	
4.1–5.65					CLAY: grey-brown, moderate-high plasticity	D	
5.65–6.6					SANDY CLAY: moderate plasticity	Wet	
6.6–6.7					CLAYEY SAND: grey-brown, medium	S	
6.7–7.5					CLAY: grey-brown, moderate-high plasticity	D	
7.5					Termination Depth at: 7.500 m		

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SOIL BORE SL10

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invset.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 31/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 8.250

COORDINATES -34.654429, 138.514678
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0–0.7 (0.5)					CLAY: very dark brown, low plasticity	D	
0.7–1.6 (1, 1.5)					CLAY: grey-brown, moderate-high plasticity	D	
1.6–3.2 (2, 2.5, 3)					CLAY: brown-orange, moderate-high plasticity, trace gravel	D	
3.2–8.25 (3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8)					CLAY: grey-brown, moderate-high plasticity	SM Wet SM Wet M	
8.5					Termination Depth at: 8.250 m		

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SOIL BORE SL11

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invest.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 31/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 6.000

COORDINATES -34.648376, 138.508781
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
					CLAY: dark brown, low plasticity	D	
					CLAY: brown-orange, moderate plasticity, trace gravel	D	
					SANDY GRAVEL: brown-orange, medium to coarse, with clay	SM	
					SANDY GRAVEL: brown-orange, medium to coarse	Wet	
					CLAY: grey-brown, moderate-high plasticity	SM	
					Termination Depth at: 6.000 m		

Depth scale (mBGL): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

SOIL BORE SL12

PROJECT NUMBER 231445-01	**DRILLING DATE** 30/03/2023	**COORDINATES** -34.650921, 138.509920
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 6.750	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
					SANDY CLAY: very dark brown, low plasticity	D	
0.5					CLAY: very dark brown, moderate plasticity, trace gravel	D	
1							
1.5							
2					CLAY: brown-orange, low-moderate plasticity	D	
2.5							
3					CLAY: grey-brown, moderate-high plasticity	SM	
3.5							
4					CLAYEY SAND: grey-brown, medium	Wet	
					CLAY: grey-brown, moderate-high plasticity	SM	
4.5							
5							
5.5					CLAY: grey-brown, moderate-high plasticity	M	
					CLAYEY SAND: grey-brown, medium, low plasticity	Wet	
					CLAY: grey-brown, moderate-high plasticity	SM	
6							
6.5							
7					Termination Depth at: 6.750 m		
7.5							
8							
8.5							

SOIL BORE SL13

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Invest.
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 30/03/2023
DRILLING COMPANY A&S Drilling
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 8.250

COORDINATES -34.652714, 138.509560
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY MF
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0	SB109-01				CLAY: very dark brown	D	
0.5	SB109-02						
1	SB109-03						
1.5	SB109-04				GRAVELLY SAND: brown-orange, medium to coarse	SM	
	SB109-05				CLAY: dark brown-orange, moderate plasticity	D	
2.5	SB109-06						
3.5	SB109-07				CLAY: grey-brown, moderate-high plasticity	D	
4					CLAY: grey-brown, moderate plasticity	M	
4.5	SB109-08				CLAYEY SAND: grey-brown, medium	Wet	
4.6					CLAY: grey-brown, moderate-high plasticity	SM	
8.2					CLAYEY SAND: grey-brown, medium	Wet	
8.25					Termination Depth at: 8.250 m		

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SOIL BORE SL14

PROJECT NUMBER 231445-01	**DRILLING DATE** 30/03/2023	**COORDINATES** -34.656502, 138.508369
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** A&S Drilling	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** MF
	DRILLING METHOD Push Tube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 8.250	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0	SB117-01	SB117-09			CLAY: very dark brown, low plasticity	D	
0.5	SB117-02						
1	SB117-03				SANDY GRAVEL: brown-orange, medium to coarse	D	
1.5	SB117-04				CLAY: grey-brown, moderate-high plasticity	D	
2	SB117-05				SANDY CLAY: brown-orange, low plasticity	D	
2.5	SB117-06				CLAY: grey-brown, moderate-high plasticity	D	
3							
3.5	SB117-07						
4							
4.5	SB117-08						
5							
5.5							
6							
6.5							
7							
7.5							
8					CLAYEY SAND: grey-brown, medium	Wet	
					CLAY: grey-brown, moderate-high plasticity	D	
8.5					Termination Depth at: 8.250 m		

SOIL BORE SL15

PROJECT NUMBER 231445-01	**DRILLING DATE** 31/03/2023	**COORDINATES** -34.662392, 138.505865
PROJECT NAME Riverlea Dewatering Invest.	**DRILLING COMPANY** WDS	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Geoprobe	**LOGGED BY** Gaetano Garfi
	DRILLING METHOD Pushtube	**CHECKED BY** TO
	BOREHOLE DIAMETER (mm) 50	
	TOTAL DEPTH (mBGL) 4.80	

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0	SL15-01		0		CLAYEY SAND: pale orange -brown, with rootlets, trace rock fragments	SM	
0.6	SL15-02				CLAY: grey-brown, moderate plasticity, stiff	SM	
1.0	SL15-03				SAND: red-brown	SM	
1.25					SANDY CLAY: tan -grey, low plasticity	D	
1.4					CLAY: red-brown, moderate plasticity, stiff	SM	
1.8	SL15-0				CLAY: tan -grey, moderate-high plasticity, stiff	VM	
2.45					CLAY: red-brown, low-moderate plasticity, stiff	SM	
2.65	SL15-05				CLAY: tan -grey, moderate plasticity, stiff	SM	
3.5					SAND: pale brown, fine to coarse, very loose	S	
3.6	SL15-06				No core retrieval due to wet sample and bore collapsing		No core retrieval due to wet sample and bore collapsing.
4.3					SAND: pale brown, fine to coarse, very loose	S	
4.5	SL15-07	SL15-08			CLAY: brown grey, moderate plasticity, very stiff		
4.8					Termination Depth at:4.80 m		

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SOIL BORE SL16

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Saltwater Lakes Dewa
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 31/03/2023 09:43AM
DRILLING COMPANY WDS
DRILL RIG Geoprobe
DRILLING METHOD Pushtube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 6.0

COORDINATES -34.663338, 138.496403
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY Gaetano Garfi
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0	SL16-01	SL16-12	0		CLAYEY SAND: brown, fine, loose, with clay	SM	
			0				
0.5	SL16-02				SANDY CLAY: brown -red, low plasticity, stiff	D	
	SL16-03		0.1		SILTY SAND: brown -red, fine, loose		
1	SL16-04				SANDY CLAY: tan -brown, low-moderate plasticity, soft to stiff	D	
			0.2				
1.5					CLAYEY SAND: pale tan -brown, fine to medium, loose to medium dense	SM	
	SL16-05		0.1				
2					SANDY CLAY: red-brown, moderate plasticity, soft	wet	
2.5	SL16-06		0.1		SANDY CLAY: pale tan -grey, moderate-high plasticity, soft to stiff	VM	
3	SL16-07		0.2		SANDY CLAY: grey-brown, moderate plasticity, soft to stiff, with rock fragments	VM	
					SAND: pale brown, fine to coarse, very loose	S	
3.5	SL16-08		0.1				Lost core from 3.6 m to 4.4. Hole collapsed. Caving from wet layer at 2.4 m
4	SL16-09						
4.5			0.1		SANDY CLAY: tan -brown, moderate plasticity, stiff	VM	
5							
5.5	SL16-10						
	SL16-11		0.1				
6					Termination Depth at: 6.0 m		
6.5							
7							
7.5							
8							
8.5							

SOIL BORE SL17

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Saltwater Lakes Dewa
ADDRESS Precincts 2 & 3, Riverlea Park

DRILLING DATE 31/03/2023 11:27AM
DRILLING COMPANY WDS
DRILL RIG Geoprobe
DRILLING METHOD Pushtube
BOREHOLE DIAMETER (mm) 50
TOTAL DEPTH (mBGL) 5.80

COORDINATES -34.665686, 138.498226
COORD SYSTEM GDA2020_MGA_zone_54
LOGGED BY Gaetano Garfi
CHECKED BY TO

COMMENTS

Depth (mBGL)	Samples	Duplicate	PID (ppm)	Graphic Log	Material Description	Moisture	Additional Observations
0			0		SANDY CLAY: grey, low plasticity, stiff, with rootlets	D	
0.5 – 1					GRAVELLY CLAY: brown, low plasticity, stiff to very stiff, with rock fragments	D	
1.5					CLAYEY SAND: tan -brown, medium dense to dense	SM	Wet layer at 1.55 m.
2 – 2.5					CLAY: grey-brown, moderate plasticity, stiff, with rock fragments, trace calcareous inclusions	M	Rock inclusions at bottom of layer
3					SANDY CLAY: red-brown, moderate-high plasticity	VM	
3.5					SANDY CLAY: pale tan -red, moderate plasticity, soft to stiff	M	
4							Lost core from 3.6 to 4.2
4.5					CLAYEY SAND: pale tan -grey, fine to medium, loose to medium dense, with rock fragments, with calcareous inclusions	wet	
5					No core retrieval due to sample wash out and bore collapsing		
5.5					SANDY CLAY: grey-brown, moderate plasticity, stiff to very stiff, trace rock fragments	M	Refusal at 5.8 m very hard clay. Sample lost from 4.8 to 5.0.
6 – 8.5					Termination Depth at:5.80 m		

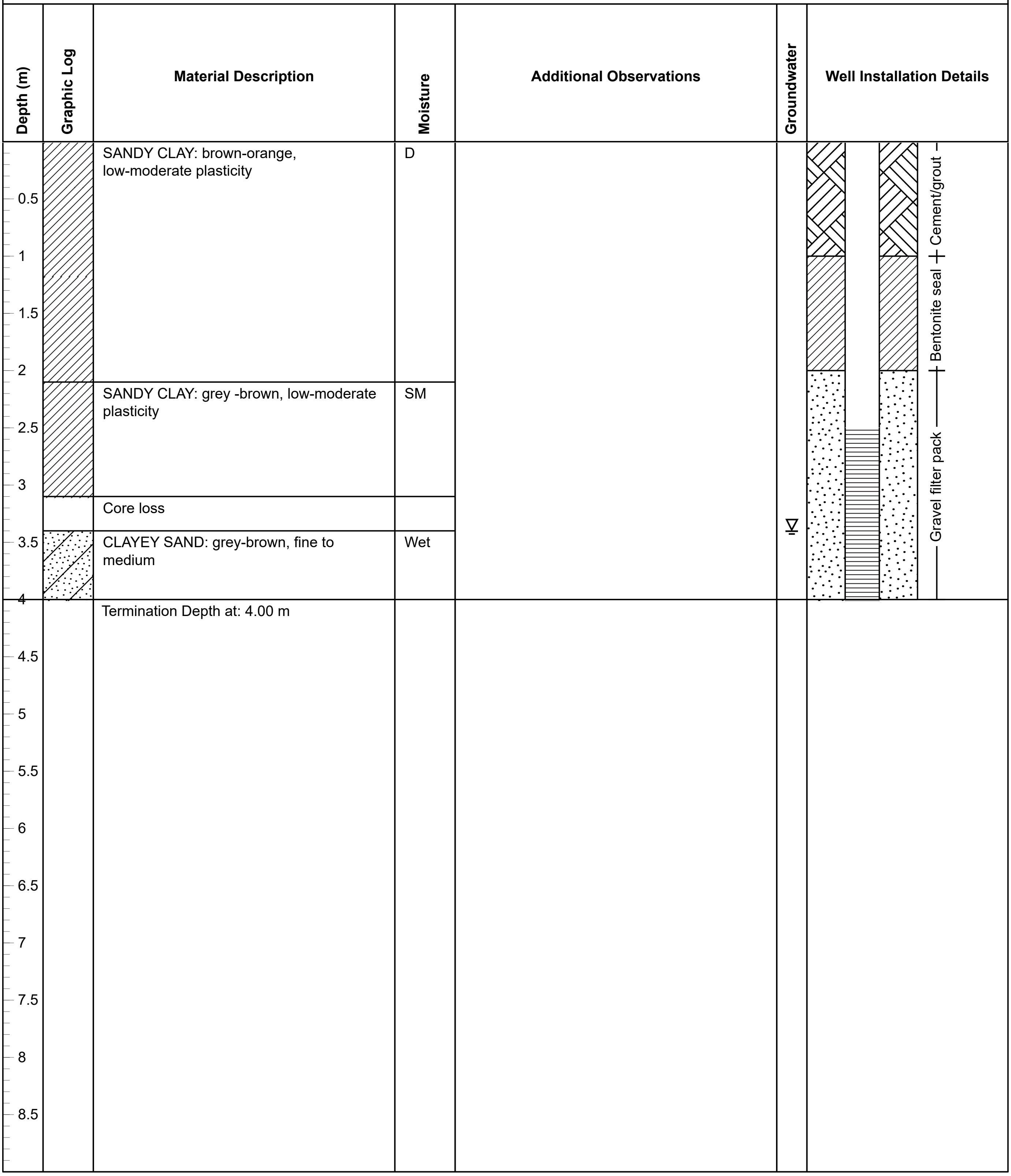
Appendix C

Groundwater Well Logs and Well Construction Permits

GROUNDWATER MONITORING WELL : SLMW01-P

PROJECT NUMBER 231445-01	**DRILLING DATE** 18/04/2023	**COORDINATES** 272971.881, 6163709.803
PROJECT NAME Riverlea Dewatering Assessmer	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Mark 4	**GROUND ELEVATION (mAHD)** 8.818
PERMIT NO. 439417	**DRILLING METHOD** Hollow Auger	**TOC (mAHD)** 9.674
	BOREHOLE DIAMETER (mm) 145	**LOGGED BY** Gaetano Garfi
	TOTAL DEPTH (mBGL) 4.00	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS



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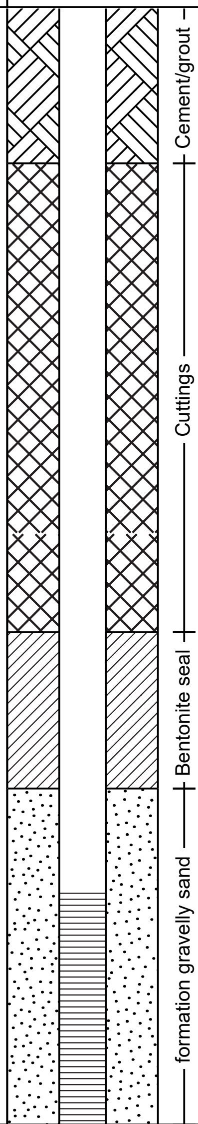
GROUNDWATER MONITORING WELL : SLMW01-Q1

PROJECT NUMBER 231445-01	**DRILLING DATE** 17/04/2023	**COORDINATES** 272973.019, 6163706.174
PROJECT NAME Riverlea Dewatering Assessmer	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Mark 4	**GROUND ELEVATION (mAHD)** 8.867
PERMIT NO. 439270	**DRILLING METHOD** Hollow Auger	**TOC (mAHD)** 9.685
	BOREHOLE DIAMETER (mm) 145	**LOGGED BY** Matt Fitzgerald
	TOTAL DEPTH (mBGL) 7.15	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0.0–3.0		SANDY CLAY: brown-orange, low-moderate plasticity	D	177 mm pre-collar installed to 5.0 m.		Cement/grout (0–1.0)
3.0–5.5		CLAY: grey-brown, moderate plasticity	M			Cuttings (1.0–4.0); Bentonite seal (4.0–5.0)
5.5–6.6		SANDY GRAVEL: grey-brown, fine to coarse	Wet		∇ (~5.5)	formation gravelly sand (5.0–7.15)
6.6–7.15		CLAY: grey-brown, moderate plasticity	Wet			
		Termination Depth at: 7.15 m				



Depth scale (m): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

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GROUNDWATER MONITORING WELL : SLMW02-Q1

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Assessmer
ADDRESS Precincts 2 & 3, Riverlea Park
PERMIT NO. 439269

DRILLING DATE 18/04/2023
DRILLING COMPANY Underdale Drillers
DRILL RIG Mark 4
DRILLING METHOD Hollow Auger
BOREHOLE DIAMETER (mm) 145
TOTAL DEPTH (mBGL) 7.50

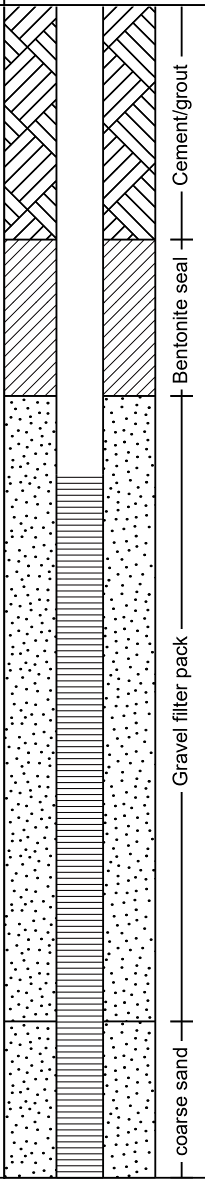
COORDINATES 272446.646, 6163233.766
COORD SYSTEM GDA1994_MGA_zone_54
GROUND ELEVATION (mAHD) 7.711
TOC (mAHD) 8.643
LOGGED BY Gaetano Garfi
CHECKED BY TO

CASING DIAMETER (mm) 50
CASING PVC
SCREEN PVC (Class 18)

COMMENTS

Depth (m)	Material Description	Moisture	Additional Observations	Groundwater
0 – 0.5	SANDY CLAY: dark grey-brown, moderate plasticity	SM		
0.5 – 2	GRAVELLY SAND: pale orange -brown, fine to coarse	SM		
2 – 4	SANDY CLAY: grey-brown, low-moderate plasticity	SM		
4 – 7	SAND: pale tan -orange, medium to coarse	Wet		▽ (approx. 4.0)
7 – 7.5	SANDY CLAY: grey-brown, low-moderate plasticity	M		
7.5	Termination Depth at: 7.50 m			

Well Installation Details



Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

GROUNDWATER MONITORING WELL : SLMW03-Q1

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Assessmer
ADDRESS Precincts 2 & 3, Riverlea Park
PERMIT NO. 439272

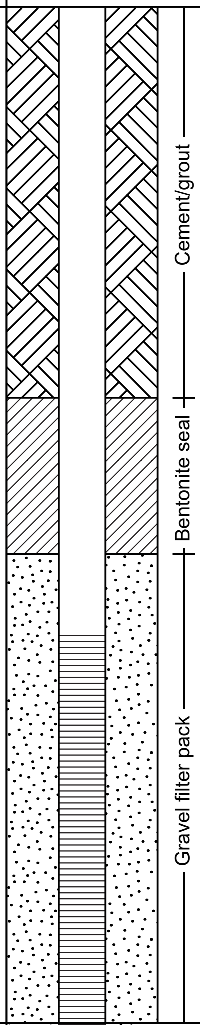
DRILLING DATE 18/04/2023
DRILLING COMPANY Underdale Drillers
DRILL RIG Mark 4
DRILLING METHOD Hollow Auger
BOREHOLE DIAMETER (mm) 145
TOTAL DEPTH (mBGL) 6.50

COORDINATES 272721.032, 6163226.168
COORD SYSTEM GDA1994_MGA_zone_54
GROUND ELEVATION (mAHD) 8.661
TOC (mAHD) 9.469
LOGGED BY Gaetano Garfi
CHECKED BY TO

CASING DIAMETER (mm) 50 **CASING** PVC **SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Material Description	Moisture	Additional Observations
0–1.0	SANDY SILT: brown, very soft	D	
1.0–3.0	GRAVELLY SAND: pale tan -brown, fine to coarse, with rock fragments and calcareous inclusions	SM	
3.0–3.75	CLAYEY SAND: brown-orange, fine to coarse	M	Moisture increasing from 3.0 m.
3.75–4.0	SANDY CLAY: grey-brown, low plasticity	SM	
4.0–4.6	Core loss		
4.6–5.0	SAND: grey-brown, coarse	VM	
5.0–5.5	Core loss		No recovery - very wet drilling
5.5–6.0	CLAYEY SAND: grey-brown, fine to medium, moderate-high plasticity	Wet	
6.0–6.5	SANDY CLAY: grey -brown, moderate-high plasticity	M	
6.5	Termination Depth at:6.50 m		



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GROUNDWATER MONITORING WELL : SLMW04-P

PROJECT NUMBER 231445-01	**DRILLING DATE** 20/04/2023	**COORDINATES** 273255.325, 6162771.465
PROJECT NAME Riverlea Dewatering Assessmer	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Mark 4	**GROUND ELEVATION (mAHD)** 7.688
PERMIT NO. 439418	**DRILLING METHOD** Hollow Auger	**TOC (mAHD)** 8.518
	BOREHOLE DIAMETER (mm) 145	**LOGGED BY** Gaetano Garfi
	TOTAL DEPTH (mBGL) 5.00	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0.0–0.2	FILL (REWORKED NATURAL): clayey sand, pale tan, fine to medium	D			Cement/grout (0–1.5)
0.2–1.0	CLAYEY SAND: brown, fine to medium	D			
1.0–2.0	SANDY CLAY: tan -brown, low-moderate plasticity	SM			Bentonite seal (1.5–2.5)
2.0–2.8	SANDY CLAY: pale tan -brown, low-moderate plasticity, trace calcareous inclusions, trace gravel	SM			Gravel filter pack (2.5–5.0)
2.8–3.25	CLAYEY SAND: grey-brown, fine	SM			Screen (3.0–5.0)
3.25–3.6	SAND: grey-brown, fine to medium	VM			
3.6–4.0	CLAYEY SAND: grey-brown, fine	M		▽ (~4.0)	
4.0–4.5	SAND: grey-brown, fine	Wet			
4.5–4.75	SAND: grey -orange, medium to coarse	Wet			
4.75–5.0	CLAY: grey-brown, moderate plasticity	SM			
5.0	Termination Depth at: 5.00 m				

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GROUNDWATER MONITORING WELL : SLMW05-P

DELIVERING ENVIRONMENTAL SOLUTIONS

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Assessmer
ADDRESS Precincts 2 & 3, Riverlea Park
PERMIT NO. 439413

DRILLING DATE 18/04/2023
DRILLING COMPANY Underdale Drillers
DRILL RIG Mark 4
DRILLING METHOD Hollow Auger
BOREHOLE DIAMETER (mm) 145
TOTAL DEPTH (mBGL) 6.25

COORDINATES 271804.955, 6162843.62
COORD SYSTEM GDA1994_MGA_zone_54
GROUND ELEVATION (mAHD) 7.103
TOC (mAHD) 8.086
LOGGED BY Gaetano Garfi
CHECKED BY TO

CASING DIAMETER (mm) 50
CASING PVC (Class 18)
SCREEN PVC (Class 18)

COMMENTS

Depth (m)	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0–2	CLAY: very dark brown, low-moderate plasticity	SM			Cement/grout
2–2.5	CLAY: brown -grey, moderate plasticity	SM			Bentonite seal
2.5–3	SANDY CLAY: brown-orange, low plasticity	SM			Gravel filter pack
3–4.1	CLAYEY SAND: brown-orange -grey, fine	SM		▽ (~4.0)	Gravel filter pack
4.1–4.6	Core loss				Gravel filter pack
4.6–4.85	CLAYEY SAND: brown-orange -grey, fine to medium	M			Gravel filter pack
4.85–5.2	SANDY CLAY: brown-orange -grey, low-moderate plasticity	SM			Gravel filter pack
5.2–5.6	CLAYEY SAND: grey-brown, fine to medium	M			Gravel filter pack
5.6–6.25	SANDY CLAY: grey-brown, low-moderate plasticity	SM			Gravel filter pack
6.25	Termination Depth at: 6.25 m				

Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

GROUNDWATER MONITORING WELL : SLMW05-Q1

PROJECT NUMBER 231445-01	**DRILLING DATE** 17/04/2023	**COORDINATES** 271806.178, 6062845.203
PROJECT NAME Riverlea Dewatering Assessmer	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Mark 4	**GROUND ELEVATION (mAHD)** 7.008
PERMIT NO. 439266	**DRILLING METHOD** Hollow Auger	**TOC (mAHD)** 8.138
	BOREHOLE DIAMETER (mm) 145	**LOGGED BY** Matt Fitzgerald
	TOTAL DEPTH (mBGL) 8.50	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0.0–2.0		CLAY: very dark brown, low-moderate plasticity	D	177 mm pre-collar installed to 7 m.		Cement/grout (0–1.0)
2.0–5.0		SANDY CLAY: brown-orange, low plasticity	D			Cuttings (1.0–5.5)
5.0–6.0		SANDY CLAY: light brown, low-moderate plasticity	M		⊻ (~5.5)	Bentonite seal (5.5–6.5)
6.0–7.15		CLAY: grey-brown, moderate-high plasticity	M			Gravel filter pack (6.5–9.0)
7.0–7.25		SANDY GRAVEL: grey -brown, fine to coarse	Wet			
7.25–7.75		CLAY: grey, low-moderate plasticity	SM			
7.65–7.8		SAND: grey, fine	VM			
7.8–9.0		SANDY CLAY: grey-brown, moderate plasticity, trace calcareous inclusions	SM			
9.0		Termination Depth at: 9.00 m				

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GROUNDWATER MONITORING WELL : SLMW06-Q1

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Assessmer
ADDRESS Precincts 2 & 3, Riverlea Park
PERMIT NO. 439420

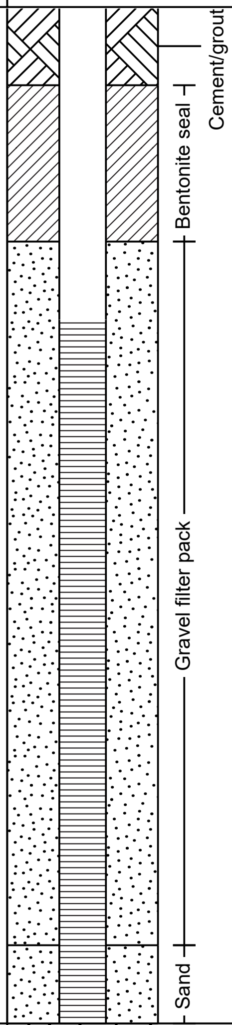
DRILLING DATE 18/04/2023
DRILLING COMPANY Underdale Drillers
DRILL RIG Mark 4
DRILLING METHOD Hollow Auger
BOREHOLE DIAMETER (mm) 145
TOTAL DEPTH (mBGL) 6.50

COORDINATES 272522.86, 6162784.453
COORD SYSTEM GDA1994_MGA_zone_54
GROUND ELEVATION (mAHD) 6.355
TOC (mAHD) 7.270
LOGGED BY Gaetano Garfi
CHECKED BY TO

CASING DIAMETER (mm) 50
CASING PVC
SCREEN PVC (Class 18)

COMMENTS

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0–0.3		SILTY SAND: dark brown, fine	D			
0.3–1.0		GRAVELLY SAND: red-brown, fine to coarse, with rock fragments	D			
1.0–2.0		CLAYEY SAND: red-brown, fine to medium	SM			
2.0–3.0		CLAYEY SAND: pale tan -brown, fine to coarse	M			
3.0–5.9		SAND: tan -brown, medium to coarse	Wet		▽ (~2.95)	
5.9–6.0		SILTY CLAY: grey-brown, low-moderate plasticity	SM			
6.0–6.3		Core loss				
6.3–6.5		SANDY CLAY: grey-brown, moderate plasticity	SM			
		Termination Depth at: 6.50 m				



Depth scale (m): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

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GROUNDWATER MONITORING WELL : SLMW07-Q1

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Assessmer
ADDRESS Precincts 2 & 3, Riverlea Park
PERMIT NO. 439414

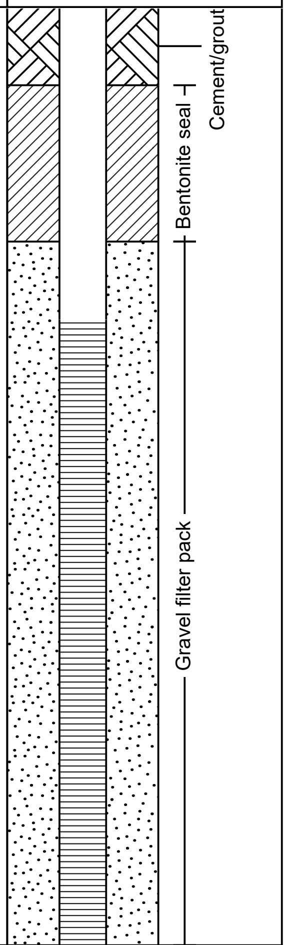
DRILLING DATE 19/04/2023
DRILLING COMPANY Underdale Drillers
DRILL RIG Mark 4
DRILLING METHOD Hollow Auger
BOREHOLE DIAMETER (mm) 145
TOTAL DEPTH (mBGL) 6.00

COORDINATES 272105.585, 6162180.002
COORD SYSTEM GDA1994_MGA_zone_54
GROUND ELEVATION (mAHD) 5.662
TOC (mAHD) 6.510
LOGGED BY Gaetano Garfi
CHECKED BY TO

CASING DIAMETER (mm) 50 **CASING** PVC (Class 18) **SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0–0.5		CLAYEY SAND: very dark brown, fine to medium	D			
0.5–3		SANDY CLAY: dark grey, low-moderate plasticity, with gravel	SM		∇ (approx. 3.0)	
3–4.4		SAND: pale brown, fine to medium	Wet			
4.4–6		SANDY CLAY: red-brown -grey, low-moderate plasticity	SM			
6		Termination Depth at: 6.00 m				



Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

GROUNDWATER MONITORING WELL : SLMW08-Q1

DELIVERING ENVIRONMENTAL SOLUTIONS

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Dewatering Assessmer
ADDRESS Precincts 2 & 3, Riverlea Park
PERMIT NO. 439268

DRILLING DATE 19/04/2023
DRILLING COMPANY Underdale Drillers
DRILL RIG Mark 4
DRILLING METHOD Hollow Auger
BOREHOLE DIAMETER (mm) 145
TOTAL DEPTH (mBGL) 6.00

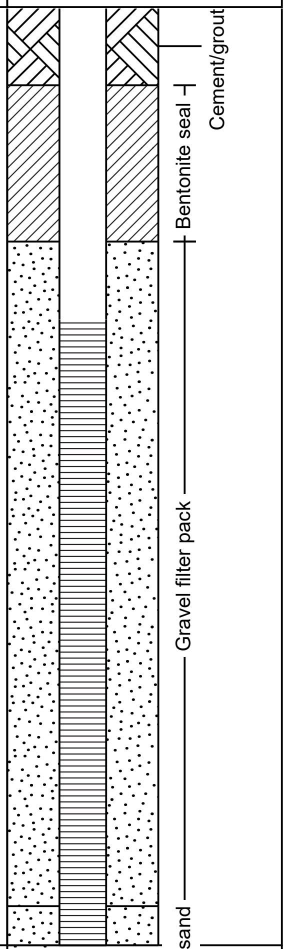
COORDINATES 271652.554, 6161771.683
COORD SYSTEM GDA1994_MGA_zone_54
GROUND ELEVATION (mAHD) 5.636
TOC (mAHD) 6.426
LOGGED BY Gaetano Garfi
CHECKED BY TO

CASING DIAMETER (mm) 50 **CASING** PVC **SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Material Description	Moisture	Additional Observations	Groundwater
0.0–1.0	GRAVELLY SAND: brown-orange, medium to coarse	SM		
1.0–2.0	SANDY CLAY: red-brown, low-moderate plasticity	SM		
2.0–3.0	SANDY CLAY: tan -orange, moderate plasticity	M		∇ (approx. 3.0)
3.0–3.25	GRAVELLY CLAY: pale grey-brown, low-moderate plasticity	VM		
3.25–3.55	CLAYEY SAND: pale grey-brown, fine to medium	Wet		
3.55–3.8	SAND: pale orange -grey, coarse	Wet		
3.8–4.0	CLAY: grey-brown, moderate-high plasticity	M		
4.0–4.5	SAND: pale orange -grey, coarse	Wet		
4.5–5.1	CLAY: grey-brown, moderate-high plasticity	M		
5.1–6.0	SANDY CLAY: red-brown -grey, moderate plasticity	SM		
6.00	Termination Depth at: 6.00 m			

Well Installation Details



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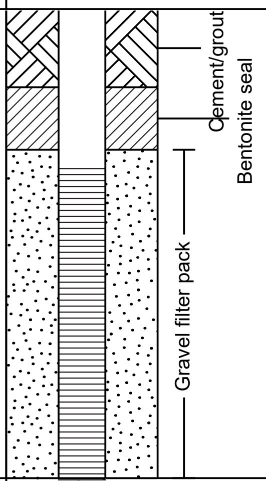
GROUNDWATER MONITORING WELL : SLMW09-P

PROJECT NUMBER 231445-01	**DRILLING DATE** 19/04/2023	**COORDINATES** 270586.501, 6161442.812
PROJECT NAME Riverlea Dewatering Assessmer	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Mark 4	**GROUND ELEVATION (mAHD)** 4.918
PERMIT NO. 439994	**DRILLING METHOD** Hollow Auger	**TOC (mAHD)** 5.563
	BOREHOLE DIAMETER (mm) 145	**LOGGED BY** Gaetano Garfi
	TOTAL DEPTH (mBGL) 3.00	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0.0–1.35		CLAYEY SAND: red-brown, fine to medium	D			
1.35–2.5		CLAYEY SAND: pale tan, low plasticity, with rock fragments, trace calcareous inclusions	VM		∇ (approx. 1.5)	
2.5–3.0		CLAY: pale grey-brown, moderate plasticity	SM			
3		Termination Depth at: 3.00 m				



Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

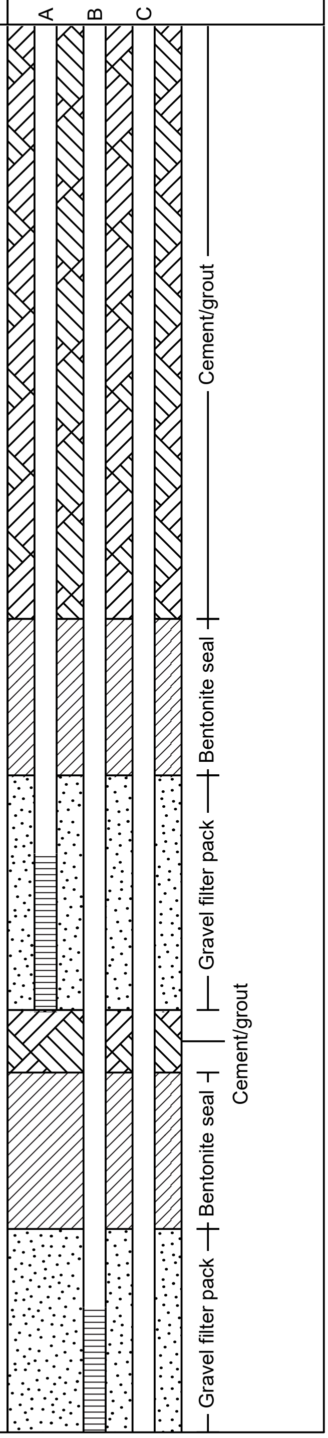
GROUNDWATER MONITORING WELL : SLMW10

PROJECT NUMBER 231445-01	**DRILLING DATE** 17/10/2023 12:53PM	**COORDINATES** 272772.577, 6163179.029
PROJECT NAME Riverlea Saltwater Lakes Dewat	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Sonic Rig	**GROUND ELEVATION (mAHD)** 8.68
PERMIT NO. A - 448912, B - 448913, C - 448918	**DRILLING METHOD** Sonic drilling/hollow auger	**TOC (mAHD)** A: 9.588, B: 9.559, C: 9.591
	BOREHOLE DIAMETER (mm) 100	**LOGGED BY** Antonio Brito
	TOTAL DEPTH (mBGL) 13.00	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Material Description	Moisture	Additional Observations
	SAND: pale brown, fine to medium, loose	D	
0.5	SAND: pale brown-orange, fine to medium, medium dense, trace clay	D	
1, 1.5	GRAVELLY SAND: light brown, medium to coarse, very loose	D	
2, 2.5, 3, 3.5	CLAY: pale brown, low-moderate plasticity, soft, trace gravel	M	
4	GRAVELLY CLAY: pale yellow-brown, low-moderate plasticity, soft, trace sand	M	
4.5	SANDY CLAY: pale yellow-brown with light brown mottling, moderate plasticity, soft	M	
	CLAY: pale yellow-brown with light brown mottling, moderate-high plasticity, stiff	M	
5	SANDY CLAY: pale yellow-brown with light grey mottling, moderate plasticity, soft, trace calcareous inclusions	M	
5.5	CLAY: pale yellow-brown with light brown mottling, moderate-high plasticity, stiff, trace calcareous inclusions	M / VM	
6	SANDY CLAY: pale yellow-brown, low plasticity, soft	VM	
6.5	GRAVELLY CLAY: pale yellow-brown, low plasticity, soft, with sand	SM	Consistency increase with depth.
	CLAY: pale yellow-brown with light grey mottling, low-moderate plasticity, soft to stiff, with sand, with gravel		
7	SAND: pale yellow-brown, medium to coarse, loose, uniform	VM	
7.5	CLAY: pale brown -grey, moderate-high plasticity, stiff	SM	
8	SAND: pale brown -grey, fine to medium, very loose	M	
8.5	GRAVELLY CLAY: light yellow-brown with white mottling, low-moderate plasticity, soft, with sand	wet	

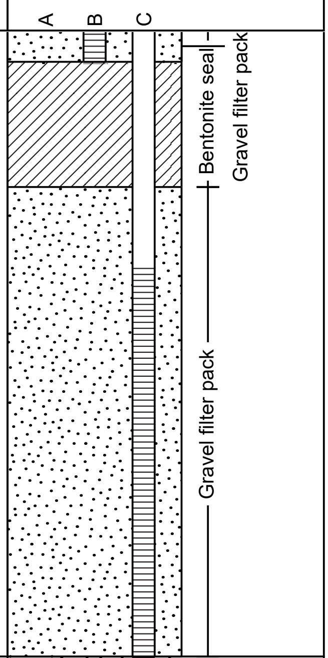
Well Installation Details



GROUNDWATER MONITORING WELL : SLMW10

Depth (m)	Material Description	Moisture	Additional Observations	Groundwater
9.5	CLAY: pale yellow-brown with light brown mottling, moderate-high plasticity, stiff to hard, trace calcareous inclusions	M	Consistency increases with depth	
10	SAND: pale brown -grey, fine to medium, very loose	VM		
10.5	CLAY: pale yellow-brown with light brown mottling, moderate-high plasticity, stiff to hard, trace calcareous inclusions	M	Consistency increases with depth	
11	SAND: pale brown -grey, fine to medium, very loose, uniform	M		
11.5	SAND: pale brown with grey mottling, fine to medium, very loose, uniform	VM		
13	Termination Depth at: 13.00 m			

Well Installation Details



GROUNDWATER MONITORING WELL : SLMW11

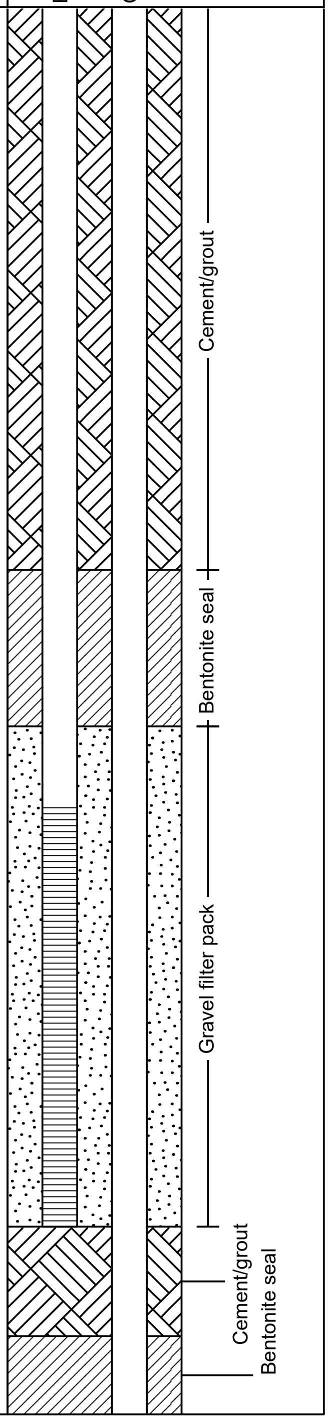
PROJECT NUMBER 231445-01	**DRILLING DATE** 16/10/2023 10:31AM -	**COORDINATES** 272799.342, 6162987.626
PROJECT NAME Riverlea Saltwater Lakes Dewat	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Sonic Rig	**GROUND ELEVATION (mAHD)** 8.2
PERMIT NO. B - 448915, C - 448919	**DRILLING METHOD** Sonic drilling/hollow auger	**TOC (mAHD)** B: 9.294, C: 9.292
	BOREHOLE DIAMETER (mm) 100	**LOGGED BY** Antonio Brito
	TOTAL DEPTH (mBGL) 13.50	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Material Description	Moisture	Additional Observations
SAND: pale brown, fine to medium, loose	D	
SAND: pale brown-orange, fine to medium, medium dense, trace clay	D	
SAND: fine to coarse, loose, with gravel, trace clay	D	
SANDY CLAY: pale brown, low plasticity, soft, trace gravel	D	
CLAY: pale brown, moderate-high plasticity, stiff, trace sand	SM	
CLAYEY SAND: pale brown, fine to medium	M	
CLAY: light brown with grey mottling, moderate-high plasticity, very stiff	M	
CLAYEY SAND: pale brown -grey, fine to medium, loose	M	Moisture increases with depth
CLAY: pale yellow-brown with grey mottling, moderate-high plasticity, stiff, with sand	M	
SANDY CLAY: light yellow-brown, low-moderate plasticity, soft, trace gravel	M	
CLAY: pale brown with grey mottling, low-moderate plasticity, soft	M	
SAND: pale grey with light brown mottling, fine to medium, loose	M	
SANDY CLAY: pale grey-brown, low-moderate plasticity, soft, trace gravel	M	Pocket of gravelly sand 7.45 to 7.65
CLAY: pale yellow-brown, high plasticity, hard	D	
CLAY: pale brown with grey mottling, high plasticity, hard, trace gravel	D	Small pockets of gravelly sand.

Depth (m): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5

Well Installation Details



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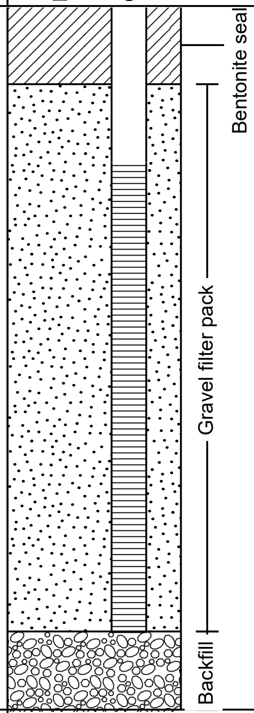
GROUNDWATER MONITORING WELL : SLMW11

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
9 – 11.3			Wet			
11.3 – 12.0		CLAY: pale brown with grey mottling, high plasticity, hard, with calcareous inclusions	D	calcareous rocks inclusions.		
12.0 – 13.5		SANDY CLAY: pale brown with grey mottling, high plasticity, hard, trace gravel	Wet	Pockets of gravelly sand. Saturated zone 12.5 to 13.0 m		
13.5		Termination Depth at: 13.50 m				

Depth scale (m): 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20

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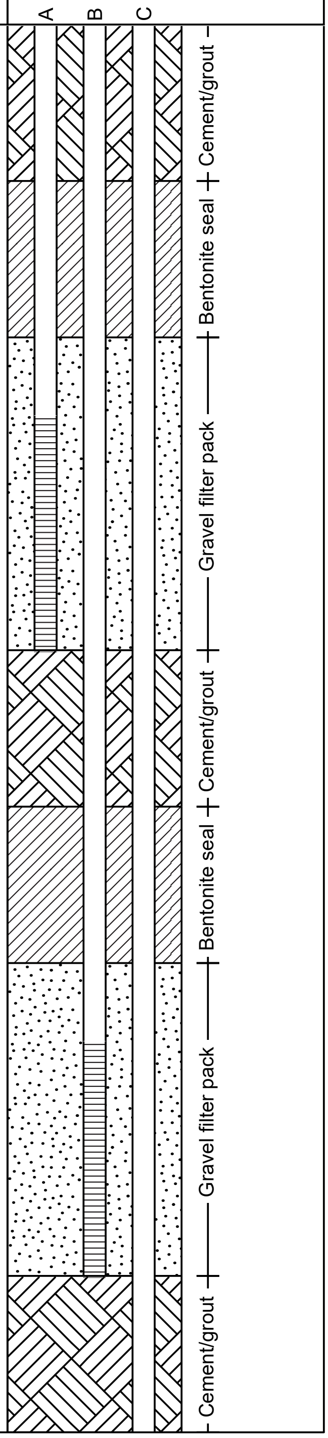
GROUNDWATER MONITORING WELL : SLMW12

PROJECT NUMBER 231445-01	**DRILLING DATE** 19/10/2023 11:32AM -	**COORDINATES** 272727.468, 6162776.055
PROJECT NAME Riverlea Saltwater Lakes Dewat	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precincts 2 & 3, Riverlea Park	**DRILL RIG** Sonic Rig	**GROUND ELEVATION (mAHD)** 7.31
PERMIT NO. A - 448916, B - 448917, C - 448920	**DRILLING METHOD** Sonic drilling/hollow auger	**TOC (mAHD)** A: 8.310, B: 8.312, C: 8.272
	BOREHOLE DIAMETER (mm) 100	**LOGGED BY** Antonio Brito
	TOTAL DEPTH (mBGL) 11.500	**CHECKED BY** TO
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

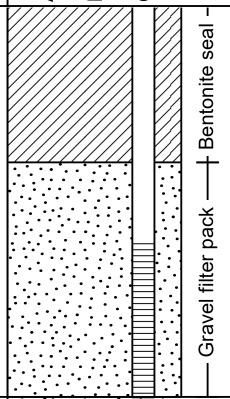
Depth (m)	Material Description	Moisture	Additional Observations
0	SAND: pale brown, fine to medium, loose, trace clay	D	
	SILTY SAND: pale yellow-brown, fine to medium, loose, trace clay	D	
1	CLAY: pale brown with light brown mottling, moderate plasticity, stiff, trace calcareous inclusions	D	
2	CLAY: brown with grey mottling, moderate plasticity, stiff, trace calcareous inclusions, trace gravel	D	
3	SANDY CLAY: brown, low-moderate plasticity, soft	M	
	CLAY: brown with grey mottling, moderate plasticity, stiff, trace calcareous inclusions, trace gravel	D	
	SANDY CLAY: brown, low-moderate plasticity, soft	M	
5	CLAY: brown with grey mottling, moderate-high plasticity, stiff to hard	D	
	SANDY CLAY: pale yellow-brown with grey mottling, low-moderate plasticity, soft, with gravel, trace calcareous inclusions	M	
	SAND: pale yellow-brown, medium, loose, uniform, trace clay	VM	Moisture content increases with depth.
7	CLAY: brown with grey mottling, moderate plasticity, stiff, trace calcareous inclusions, trace gravel	M	
	SANDY CLAY: pale yellow-brown with grey mottling, low-moderate plasticity, soft, with gravel, trace calcareous inclusions	VM	
8	CLAY: yellow-brown with light grey mottling, moderate plasticity, stiff to hard, trace calcareous inclusions, trace gravel	M	Consistency increases with depth
	GRAVELLY CLAY: pale yellow, low-moderate		

Well Installation Details



produced by ESlog.ESdat.net on 21 Nov 2023

GROUNDWATER MONITORING WELL : SLMW12

Depth (m)	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
9		plasticity, stiff	S			
9.5 – 10.5		CLAY: yellow-brown with light grey mottling, moderate plasticity, stiff to hard, trace calcareous inclusions, trace gravel	M	Consistency increases with depth		
		SANDY CLAY: pale brown, moderate plasticity, soft to stiff	Wet			
11 – 11.5		SANDY CLAY: yellow-brown with light grey mottling, moderate plasticity, stiff	VM			
11.5		Termination Depth at: 11.50 m				

Depth scale: 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20

GROUNDWATER MONITORING WELL : SLMW13

PROJECT NUMBER 231445-01	**DRILLING DATE** 19/10/2023 01:22PM -	**COORDINATES** 273247.115, 6162805.068
PROJECT NAME Riverlea Saltwater Lakes Dewat	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA1994_MGA_zone_54
ADDRESS Precinct 2, Riverlea Park	**DRILL RIG** Sonic Rig	**GROUND ELEVATION (mAHD)** 7.8
PERMIT NO. A - 448909, B - 448910, C - 448911	**DRILLING METHOD** Sonic drilling/hollow auger	**TOC (mAHD)** A: 8.643, B: 8.654, C: 8.582
	BOREHOLE DIAMETER (mm) 100	**LOGGED BY** Antonio Brito
	TOTAL DEPTH (mBGL) 14.50	**CHECKED BY** TO

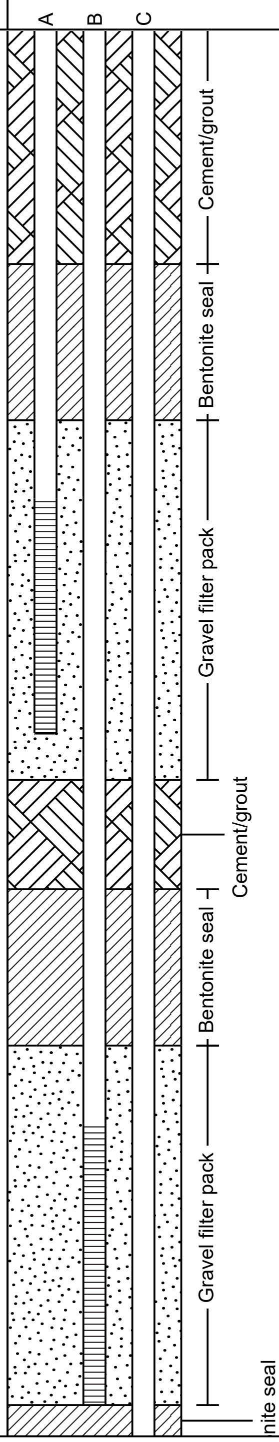
CASING DIAMETER (mm) 50	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9

Material Description	Moisture	Additional Observations
SILTY SAND: dark brown, fine to medium, dense	D	
SANDY CLAY: brown-orange, low-moderate plasticity, stiff	SM	
CLAY: yellow-brown with light brown mottling, moderate-high plasticity, stiff, trace sand	SM	
SANDY CLAY: yellow-brown with grey mottling, moderate-high plasticity, soft	SM	Potential saturated zone between 3.25 to 3.4 mBGL.
SAND: yellow-brown, fine to medium, loose	Wet	
SANDY CLAY: yellow-brown, low plasticity, soft	VM	
CLAY: grey with light brown mottling, moderate-high plasticity, stiff to hard, trace sand	SM	Consistency increases with depth.
GRAVELLY CLAY: pale yellow with light brown mottling, low plasticity, very soft		
CLAY: grey with light brown mottling, moderate-high plasticity, stiff to hard, trace calcareous inclusions, with sand, trace suspected	SM	Consistency increases with depth.
SANDY CLAY: yellow-brown, low plasticity, soft	M	
GRAVELLY CLAY: pale yellow with light brown mottling, low plasticity, very soft	VM	
CLAY: grey with light brown mottling, moderate-high plasticity, stiff to hard, trace calcareous inclusions, with sand, trace	SM	
GRAVELLY CLAY: pale yellow with light brown mottling, low plasticity, very soft	VM	
CLAY: grey with light brown mottling, moderate-high plasticity, stiff to hard, trace calcareous inclusions, with sand, trace	SM	
	M	Potential saturated zone
	VM	
SANDY CLAY: yellow-brown with grey mottling,	M	

Well Installation Details



GROUNDWATER MONITORING WELL : SLMW13

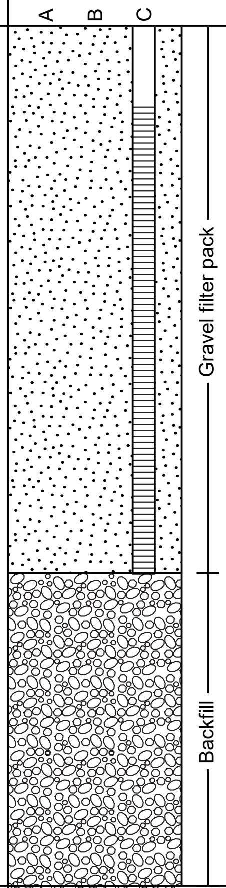
Depth (m): 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20

Material Description
moderate plasticity, stiff
CLAYEY SAND: yellow-brown with grey mottling, fine to medium, moderate plasticity, loose
SANDY CLAY: brown-orange with grey mottling, moderate-high plasticity, stiff
CLAY: brown-orange with grey mottling, moderate-high plasticity, stiff, with sand, with gravel, with calcareous inclusions
CLAY: brown-orange with grey mottling, moderate-high plasticity, stiff, with sand
CLAYEY SAND: brown-orange with grey mottling, fine, moderate-high plasticity, medium dense
CLAY: brown-orange with grey mottling, moderate-high plasticity, stiff, with sand
CLAY: yellow-brown with light grey mottling, low-moderate plasticity, soft to stiff, with sand, with gravel, with calcareous inclusions
SANDY CLAY: brown-orange with light grey mottling, moderate plasticity, stiff, trace calcareous inclusions
CLAYEY SAND: brown-orange with grey mottling, fine, moderate-high plasticity, medium dense
SANDY CLAY: brown-orange with light grey mottling, moderate plasticity, stiff
CLAY: brown-orange with light brown mottling, moderate-high plasticity, stiff, with sand
CLAY: dark brown, moderate-high plasticity, stiff, with sand
CLAY: dark grey with brown mottling, moderate-high plasticity, hard, with sand
CLAY: yellow-brown with light grey mottling, low-moderate plasticity, soft to stiff, with sand, with gravel, with calcareous inclusions
Termination Depth at: 14.50 m

Moisture	Additional Observations
M	Potential saturated zone
M	
SM	
M	
M	Potential saturated zone
M	
M	Potential saturated zone
SM	
D	
D	
SM	
M	

Groundwater

Well Installation Details



GROUNDWATER MONITORING WELL : EX10

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Saltwater Lakes Dewat
ADDRESS Precincts 2, Riverlea Park
PERMIT NO. 455396

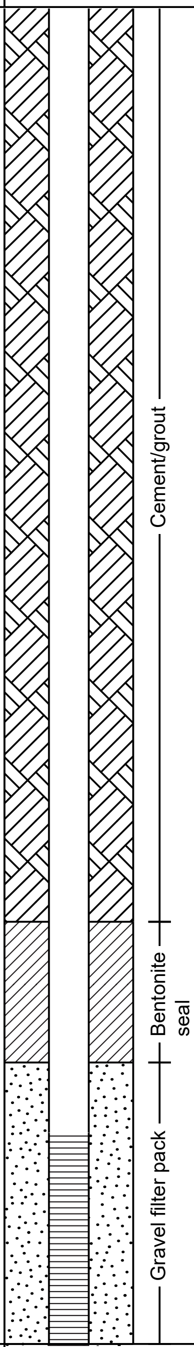
DRILLING DATE 27/11/2023 02:22PM -
DRILLING COMPANY Underdale Drillers
DRILL RIG Rockmaster
DRILLING METHOD Hollow Flight Auger
BOREHOLE DIAMETER (mm) 250
TOTAL DEPTH (mBGL) 9.500

COORDINATES 272772.439, 6163163.54
COORD SYSTEM GDA2020_MGA_zone_54
GROUND ELEVATION (mAHD)
TOC (mAHD)
LOGGED BY A Brito
CHECKED BY TO

CASING DIAMETER (mm) 100
CASING PVC (Class 18)
SCREEN PVC (Class 18)

COMMENTS

Depth (m)	Samples	Duplicate	PID	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0–1					SAND: pale brown, fine to medium, loose	D			Cement/grout (0–6.5)
1–2					SAND: light brown, fine to medium, low plasticity, loose, with clay	D			
2–3					SAND: light brown, fine to medium, low plasticity, with clay	SM			
3–4					SANDY CLAY: moderate plasticity, dense	M			
4–7					SANDY CLAY: moderate plasticity, trace gravel	VM			Bentonite seal (6.5–7.5)
7–8					SANDY CLAY: moderate plasticity, trace	S			Gravel filter pack (7.5–9.5)
8–9.5					CLAYEY SAND: light yellow, fine to medium, low-moderate plasticity, dense	S			
9.5					Termination Depth at:9.500 m				



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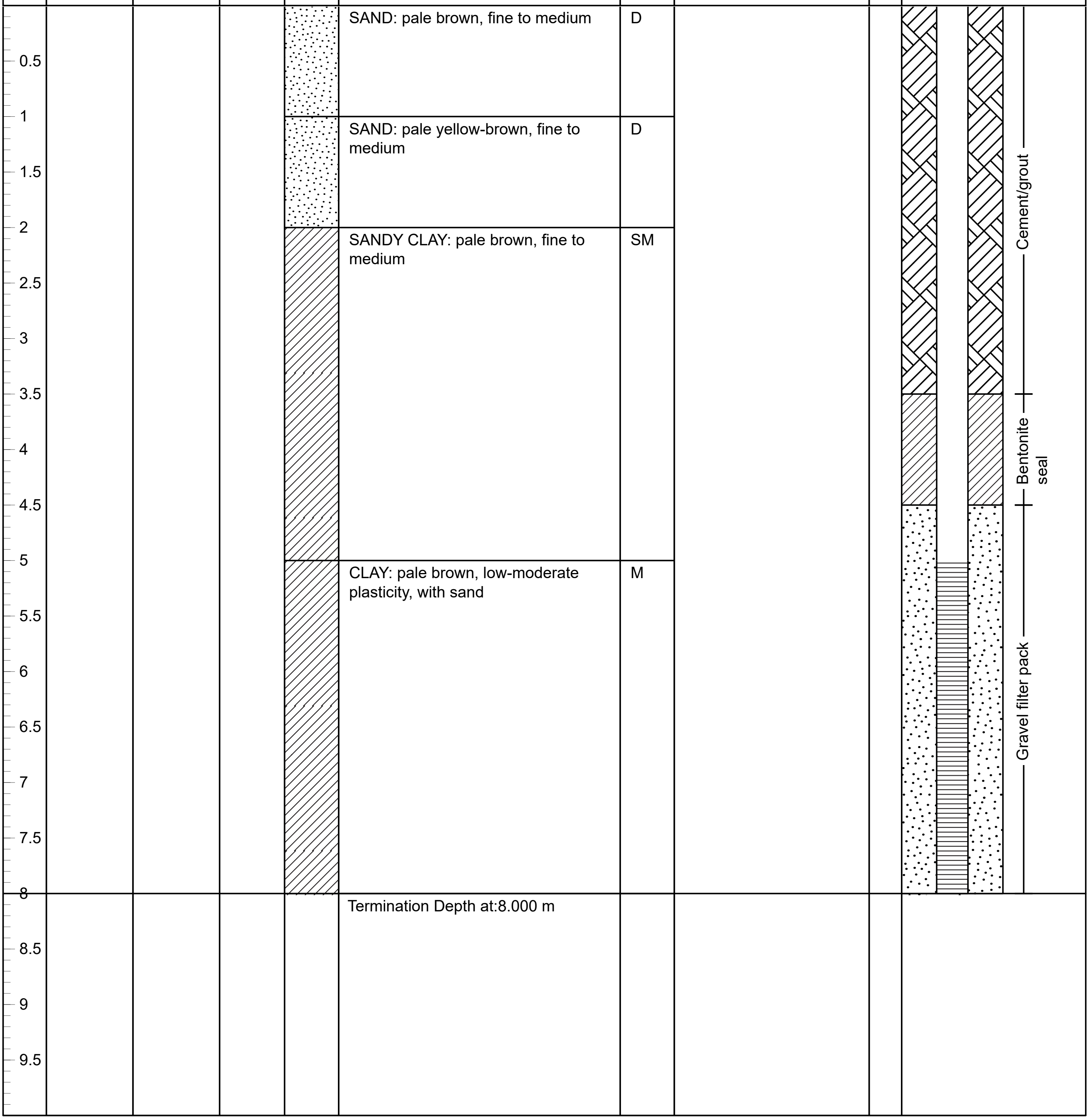
GROUNDWATER MONITORING WELL : EX11

PROJECT NUMBER 231445-01	**DRILLING DATE** 27/11/2023 12:36PM -	**COORDINATES** 272808.602, 6162986.457
PROJECT NAME Riverlea Saltwater Lakes Dewat	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2, Riverlea Park	**DRILL RIG** Rockmaster	**GROUND ELEVATION (mAHD)**
PERMIT NO. 455397	**DRILLING METHOD** Hollow Flight Auger	**TOC (mAHD)**
	BOREHOLE DIAMETER (mm) 250	**LOGGED BY** A Brito
	TOTAL DEPTH (mBGL) 8.000	**CHECKED BY** TO
CASING DIAMETER (mm) 0	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Samples	Duplicate	PID	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0–1					SAND: pale brown, fine to medium	D			
1–2					SAND: pale yellow-brown, fine to medium	D			
2–5					SANDY CLAY: pale brown, fine to medium	SM			
5–8					CLAY: pale brown, low-moderate plasticity, with sand	M			
8					Termination Depth at:8.000 m				



GROUNDWATER MONITORING WELL : EX12

EDi lbw co — DELIVERING ENVIRONMENTAL SOLUTIONS

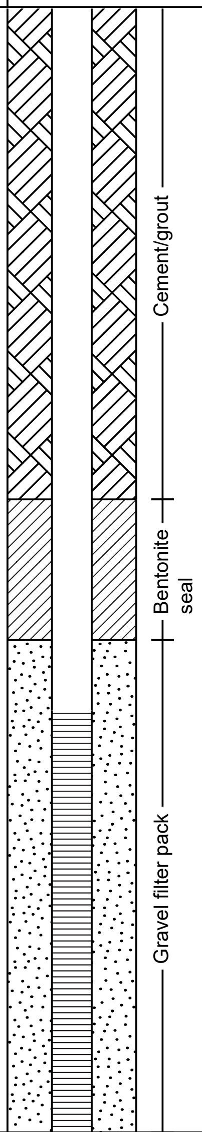
PROJECT NUMBER 231445-01	**DRILLING DATE** 30/11/2023 10:25AM -	**COORDINATES** 272722.122, 6162790.378
PROJECT NAME Riverlea Saltwater Lakes Dewat	**DRILLING COMPANY** Underdale Drillers	**COORD SYSTEM** GDA2020_MGA_zone_54
ADDRESS Precincts 2, Riverlea Park	**DRILL RIG** Rockmaster	**GROUND ELEVATION (mAHD)**
PERMIT NO. 455398	**DRILLING METHOD** Hollow Flight Auger	**TOC (mAHD)**
	BOREHOLE DIAMETER (mm) 250	**LOGGED BY** A Brito
	TOTAL DEPTH (mBGL) 8.000	**CHECKED BY** TO
CASING DIAMETER (mm) 100	**CASING** PVC (Class 18)	**SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Samples	Duplicate	PID	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater
0–0.5					CLAYEY SAND: dark brown, fine to medium, low plasticity, trace clay	SM		
0.5–1.5					CLAYEY SAND: pale brown, medium to coarse, low plasticity	SM		
1.5–2.5					SANDY CLAY: brown, moderate-high plasticity	SM		
2.5–4					CLAY: brown with grey mottling, moderate-high plasticity, soft, with sand	M		
4–6.5					CLAY: yellow-brown, moderate-high plasticity, stiff, with sand	S		
6.5–8					CLAY: yellow-brown, moderate-high plasticity, stiff, with sand	S		
8					Termination Depth at:8.000 m			

Depth scale: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5

Well Installation Details



GROUNDWATER MONITORING WELL : EX13

PROJECT NUMBER 231445-01
PROJECT NAME Riverlea Saltwater Lakes Dewat
ADDRESS Precincts 2, Riverlea Park
PERMIT NO. 455399

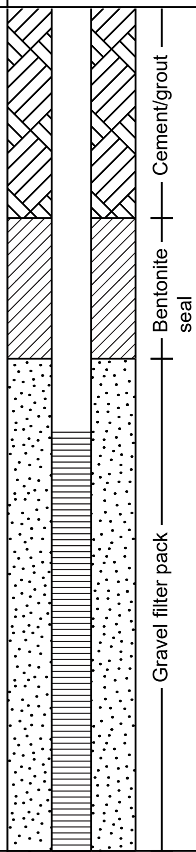
DRILLING DATE 27/11/2023 09:55AM -
DRILLING COMPANY Underdale Drillers
DRILL RIG Rockmaster
DRILLING METHOD Hollow Flight Auger
BOREHOLE DIAMETER (mm) 250
TOTAL DEPTH (mBGL) 6.000

COORDINATES 273251.58, 6162814.635
COORD SYSTEM GDA2020_MGA_zone_54
GROUND ELEVATION (mAHD)
TOC (mAHD)
LOGGED BY A Brito
CHECKED BY TO

CASING DIAMETER (mm) 100 **CASING** PVC (Class 18) **SCREEN** PVC (Class 18)

COMMENTS

Depth (m)	Samples	Duplicate	PID	Graphic Log	Material Description	Moisture	Additional Observations	Groundwater	Well Installation Details
0.0–1.2					SANDY CLAY: dark brown, medium to coarse, low plasticity	D			Cement/grout (0–1.5)
1.2–3.0					SANDY CLAY: pale yellow-brown, medium to coarse, low plasticity, medium dense	SM			Bentonite seal (1.5–2.5)
3.0–4.0					CLAY: pale brown, moderate plasticity, medium dense	VM			Gravel filter pack (2.5–6.0)
4.0–6.0					CLAY: pale brown, moderate plasticity	S			
6.0					Termination Depth at:6.000 m				



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GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439266
Expiry Date:	20/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5868/766
   Block 68 in Deposited Plan 1671
   Hundred of Port Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 20/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439268
Expiry Date:	20/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5868/767
   Block 67 in Deposited Plan 1671
   Hundred of Port Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 20/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439269
Expiry Date:	20/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5868/780
   Allotment 92 in Filed Plan 174426
   Hundred of Port Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 20/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439270
Expiry Date:	20/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5868/785
   Block 58 in Deposited Plan 1671
   Hundred of Port Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 20/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439272
Expiry Date:	20/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 20/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439413
Expiry Date:	27/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
   CT 5868/766
   Block 68 in Deposited Plan 1671
   Hundred of Port Adelaide
2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
16. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 27/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439414
Expiry Date:	27/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
   CT 5868/766
   Block 68 in Deposited Plan 1671
   Hundred of Port Adelaide
2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
16. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 27/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439417
Expiry Date:	27/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5868/785
   Block 58 in Deposited Plan 1671
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
16. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 27/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439418
Expiry Date:	27/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
   CT 6276/873
   Piece 9041 in Deposited Plan 130732
   Hundred of Port Adelaide
2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
16. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

smKnight

Date: 27/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439420
Expiry Date:	27/03/2024

Permission is hereby granted to: LBW CO PTY LTD
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
16. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
17. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
18. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is to be completed only in the Quaternary aquifer Q1.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 27/03/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	439994
Expiry Date:	19/04/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5868/772
   Block 65 in Deposited Plan 1671
   Hundred of Port Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
11. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
12. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
13. The well is not to penetrate beyond a maximum depth of 10 metres unless approved by the Regional Hydrogeologist.
14. The authorised activity must be undertaken by a licensed driller.
15. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
16. Water samples are required from all wells drilled in respect of this permit.
17. Strata samples are not required.
18. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
19. All wells must be drilled vertical unless written permission is obtained from the Minister.
20. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. This permit does not authorise the taking of water from the well for any purpose other than testing.
7. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.
8. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AJ Millhouse

Date: 19/04/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448909
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6287/449
   Piece 9044 in Deposited Plan 132372
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448910
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6287/449
   Piece 9044 in Deposited Plan 132372
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448911
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6287/449
   Piece 9044 in Deposited Plan 132372
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q2. The aquifer above is to be cased off and pressure cemented.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.

3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448912
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448913
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448915
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448916
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AG Millhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448917
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide
2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q1.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.

4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448918
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide
2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q2. The aquifer above is to be cased off and pressure cemented.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448919
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide
2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q2. The aquifer above is to be cased off and pressure cemented.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.

3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	448920
Expiry Date:	20/09/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
20. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
21. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
22. The well is to be completed only in the Quaternary aquifer Q2. The aquifer above is to be cased off and pressure cemented.
23. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
24. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.
8. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

AMillhouse

Date: 20/09/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	455396
Expiry Date:	16/11/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. If this well is for water extraction; SA Health strongly recommends water sampling and testing for microbiological (E. coli) and chemical quality testing by a NATA accredited water testing laboratory prior to water use.
20. SA Health and the Environment Protection Authority strongly recommend water sampling and testing is undertaken by a NATA accredited water-testing laboratory every 2 years.
21. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
22. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
23. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
24. The well is to be completed only in the Quaternary aquifer Q1.
25. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 16/11/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	455397
Expiry Date:	16/11/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. If this well is for water extraction; SA Health strongly recommends water sampling and testing for microbiological (E. coli) and chemical quality testing by a NATA accredited water testing laboratory prior to water use.
20. SA Health and the Environment Protection Authority strongly recommend water sampling and testing is undertaken by a NATA accredited water-testing laboratory every 2 years.
21. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
22. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
23. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
24. The well is to be completed only in the Quaternary aquifer Q1.
25. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

2. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 16/11/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	455398
Expiry Date:	16/11/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6281/213
   Allotment 101 in Deposited Plan 129442
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. If this well is for water extraction; SA Health strongly recommends water sampling and testing for microbiological (E. coli) and chemical quality testing by a NATA accredited water testing laboratory prior to water use.
20. SA Health and the Environment Protection Authority strongly recommend water sampling and testing is undertaken by a NATA accredited water-testing laboratory every 2 years.
21. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
22. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
23. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
24. The well is to be completed only in the Quaternary aquifer Q1.
25. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

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3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
7. This permit does not authorise the taking of water from the well for any purpose other than testing.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 16/11/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	455399
Expiry Date:	16/11/2024

Permission is hereby granted to: LBW CO PTY LTD
ACN 126 992 274
184 MAGILL ROAD
NORWOOD SA 5067

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6291/931
   Piece 9050 in Deposited Plan 133137
   Hundred of Port Adelaide

2. The authorised activity must be undertaken by a licensed driller.
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
5. Water samples are required from all wells drilled in respect of this permit.
6. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
13. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
14. The activity must not adversely affect water-dependent ecosystems nearby.
15. The activity shall not significantly increase local drawdown.
16. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.
17. The activity shall not adversely affect the quality, quantity and accessibility of water for supply from existing wells operated by other landholders.
18. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
19. If this well is for water extraction; SA Health strongly recommends water sampling and testing for microbiological (E. coli) and chemical quality testing by a NATA accredited water testing laboratory prior to water use.
20. SA Health and the Environment Protection Authority strongly recommend water sampling and testing is undertaken by a NATA accredited water-testing laboratory every 2 years.
21. The well subject to this permit must not be completed as an industrial water supply well unless prior approval has been obtained from the department.
22. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
23. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
24. The well is to be completed only in the Quaternary aquifer Q1.
25. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

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TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

smKnight

Date: 16/11/2023

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

Appendix D

Calibration Certificates

Solinst Model 122 Interface Meter

Instrument Interface Meter (30M)
Serial No. 312523

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	9.25V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by: Jeremy Callado

Calibration date: 28/04/2023

Next calibration due: 27/06/2023

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 11C100756

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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 7.00		pH 7.00		393774	7.00
2. pH 4.00		pH 4.00		394432	4.00
3. ORP		243.9 mV on 15.5 C		398884/395763	244.1
4. EC		2286 uS/cm @ 16 °C		396172	2286
6. D.O		0 ppm		391223	0.1
7. Temp		18		MultiThem	15.5

Calibrated by: Trent Chase

Calibration date: 28-Apr-23

26/10/23

Air-Met Scientific Pty Ltd
1300 137 067

Oil / Water Interface Meter

Instrument Interface Meter (30M)
Serial No. 348878

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.8 Vdc
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by: Matthew Wright

Calibration date: 26/10/2023

Next calibration due: 23/04/2024

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 22G103291

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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. D.O		0 ppm		391223	0 ppm
2. Conductivity		2760uS		401089	2760uS
3. pH7		pH 7.00		413975	pH 7.00
4. pH4		pH 4.00		405966	pH 4.0
5. ORP mV		235.32		406331/398193	235.1
6. Temp °C		19.4		Multi-therm	19.5

Calibrated by: Matthew Wright

Calibration date: 27/10/2023

Next calibration due: 25/01/2024

Appendix E

Water Quality Parameters and WaterConnect Output

Field Parameters
May 2023

Bore	Date	Time	Purge Volume	Electrical conductivity	pH	Dissolved Oxygen	Temperature	Redox
			L	µS/cm	-	mg/L	°C	mV
SLMW01-P	5/05/2023	9:13	1	6103	7.43	0.58	14.4	122.2
		9:24	2	6107	7.43	0.46	14.5	121.9
		9:26	3	6086	7.42	0.58	14.3	120.4
		9:27	4	6130	7.42	0.44	14.7	119.7
		9:29	5	6134	7.42	0.56	14.7	119.4
SLMW01-Q1	5/05/2023	8:32	1	4783	7.69	2.79	12	132.1
		8:35	2	5241	7.39	0.21	14.6	125
		8:37	3	5560	7.28	3.87	15.3	117.4
		8:44	4	5584	7.28	8.34	14.3	107.3
		8:50	5	5718	7.29	9.24	14.9	109.6
		8:51	6	5720	7.29	9.35	14.6	109.9
SLMW02-Q1	5/05/2023	12:04	1	6020	7.34	0.31	16.1	143.7
		12:09	2	6024	7.29	0.15	16.1	140
		12:11	3	6033	7.27	0.15	16.2	139.4
		12:15	4	6067	7.25	0.23	16.2	138.2
		12:18	5	6069	7.25	0.27	16.2	138.5
SLMW03-Q1	3/05/2023	8:57	1	8562	7.32	8.24	14.9	154.38
		9:37	2	7799	7.33	8.89	15.5	155.2
		9:38	3	4523	7.6	11.97	15.2	152.5
		9:45	4	5585	7.66	13.3	15.2	147.5
		9:49	5	4907	7.67	13.62	15.2	143.8
		9:53	6	4484	7.66	13.44	15.2	143.6
SLMW04-P	8/05/2023	8:18	1	5343	7.85	1.18	14.3	138.7
		8:20	2	5503	7.6	1.4	15	137.8
		8:24	3	5495	7.59	2.22	15	137.6
		8:26	4	5445	7.55	6.45	15	136.7
		8:31	5	5470	7.55	3.53	14.9	136.1
SLMW05-P	5/05/2023	10:58	1	6821	7.41	5.37	13.8	120.7
		11:01	2	6126	7.51	6.18	14.4	120.1
		11:05	3	6142	7.51	6.39	14.5	122.1
		11:08	4	6165	7.52	6.58	14.7	121.6
		11:11	5	6163	7.52	6.81	14.7	121.7
SLMW05-Q1	5/05/2023	10:30	1	8290	7.31	0.74	14.9	137.6
		10:34	2	8302	7.31	0.76	14.9	136.4
		10:35	3	8379	7.26	0.76	14.9	134.3
		10:39	4	8421	7.22	0.83	14.9	132.7
		10:42	5	8423	7.22	0.77	14.9	132.8
SLMW06-Q1	3/05/2023	11:45	1	4881	7.89	12.75	16.3	14.7
		12:28	2	4914	7.88	13.35	16.3	141.3
		12:29	3	4210	7.73	14.49	16.4	138.1
		12:36	4	4766	7.73	15.36	16.3	130
		12:52	5	4683	7.73	15.01	16.3	129.9

Field Parameters
May 2023

DELIVERING ENVIRONMENTAL SOLUTIONS

Bore	Date	Time	Purge Volume L	Electrical conductivity µS/cm	pH -	Dissolved Oxygen mg/L	Temperature °C	Redox mV
SLMW07-Q1	3/05/2023	14:20	1	8659	7.67	8	15.8	131.1
		14:20	2	8671	7.67	8.04	15.9	130.9
		14:20	3	8654	7.67	8.14	15.8	130.7
		14:21	4	8654	7.67	7.85	15.8	129.9
		14:25	5	8663	7.67	7.98	15.8	129.7
SLMW08-Q1	4/05/2023	11:58	1	9938	7.63	2.68	16.2	41.3
		11:59	2	9715	7.31	8.78	16.4	34.1
		12:04	3	9619	7.37	8.65	16.4	86.8
		12:08	4	9622	7.33	8.33	16.4	76.2
		12:10	5	9621	7.38	8.41	16.4	90.9
SLMW09-P	4/05/2023	13:11	1	2403	7.66	1.75	15.8	-35.4
		13:35	2	2464	7.45	1.21	16.4	-36.3
		13:37	3	2467	7.41	1.88	16.5	-61.8
		13:40	4	2466	7.39	3.26	16.5	-77.2
		13:43	5	2462	7.39	4.51	16.5	-90.9
		13:45	6	2464	7.39	2.83	16.4	-91.03
6528-2628	4/05/2023	10:30	1	81923	6.72	1.86	16.2	115.2
		10:33	2	80253	6.68	5.07	16.2	117.4
		10:36	3	79764	6.66	6.2	16.2	120.8
		10:40	4	79580	6.65	5.7	16.2	121.6
		10:40	5	79784	6.65	6.11	16.2	122.8
		10:44	6	79779	6.65	8.6	16.2	124.6
6628-21445	8/05/2023	9:59	1	10950	8.07	4.66	13.08	-194.8
		10:02	2	11294	8.1	4.81	14.9	-241.8
		10:07	3	11366	8.08	4.35	15.1	-300.1
		10:10	4	11346	8.06	4.26	14.9	-296.8
		10:19	5	11345	7.98	3.72	15	-267.9
		10:24	6	11447	7.91	3.57	15.3	-223.2
		10:30	7	11427	7.91	3.43	15.2	-223.8
6628-23298	5/05/2023	13:20	1	5682	6.85	1.2	14.2	1143.3
		13:22	2	5915	6.81	1.16	14.4	-100.4
		13:25	3	6106	6.79	1.37	14.5	-93.1

Field Parameters
November 2023

DELIVERING ENVIRONMENTAL SOLUTIONS

Bore	Date	Time	Purge Volume L	Electrical conductivity µS/cm	pH -	Dissolved Oxygen mg/L	Temperature °C	Redox mV
SLMW01-P	1/11/2023	15:04	1.25	9428	7.27	0.22	20	11
		15:07	2.5	9439	7.24	0.14	19.8	26.5
		15:12	3.75	9471	7.24	0.15	19.6	35
		15:16	5	9468	7.24	0.1	19.4	41
SLMW01-Q1	1/11/2023	14:21	1.25	8644	6.9	1.18	20.5	51.6
		14:23	2.5	8772	6.89	0.29	20.3	50.3
		14:27	3.75	8994	6.89	0.6	20.1	49.1
		14:31	5	9042	6.88	0.5	19.9	48.1
		14:34	6.25	9083	6.88	0.8	19.9	48
		14:37	7.5	9102	6.88	0.89	19.9	49
SLMW02-Q1	1/11/2023	12:16	1.25	9119	7.1	0.39	19.7	90.3
		12:19	2.5	9109	7.08	0.24	19.4	86.2
		12:22	3.75	9032	7.09	0.16	19	89.8
		12:32	5	9057	7.07	0.23	19	89.9
		12:38	7.5	9136	7.07	0.58	19	90.6
		13:05	6.25	9099	7.07	0.46	19	90.2
SLMW03-Q1	1/11/2023	13:25	1.25	12867	7.08	0.27	19.7	114.5
		13:29	2.5	12937	7.06	0.18	19.5	107.2
		13:32	3.75	12968	7.07	0.16	19.4	103
		13:35	5	13011	7.05	0.25	19.3	100.3
		13:39	6.25	13036	7.06	0.59	19.2	98.6
		13:42	7.5	13042	7.06	0.84	19.2	97.6
SLMW04-P	2/11/2023	14:34	1.25	8379	7.32	1.44	18.5	150.4
		14:37	2.5	8475	7.31	1.05	18.5	147.1
		14:42	3.75	8519	7.31	0.84	18.5	143.4
		14:46	5	8469	7.31	1.08	18.4	140.3
		14:50	6.25	8496	7.31	0.94	18.3	138.8
SLMW05-P	1/11/2023	11:15	1.25	9887	7.5	4.55	18	89.2
		11:20	2.5	9939	7.43	4.7	17.6	112.3
		11:24	3.75	9965	7.42	4.7	17.3	121.7
		11:28	5	9966	7.44	4.56	17.3	126.5
		11:32	6.25	9985	7.41	4.35	17.4	129.8
		11:35	7.5	9990	7.41	4.3	17.4	131.6
SLMW05-Q1	1/11/2023	10:29	1.25	12825	7.09	0.3	18.4	12.8
		10:32	2.5	12969	7.06	0.21	18.3	6.3
		10:36	3.75	13180	7.02	0.29	18.2	16.6
		10:39	5	13244	7.01	0.55	18.2	27.1
		10:46	6.25	13286	6.99	1.27	18.1	40.8
		10:50	7.5	13287	6.99	1.42	18.1	44.6
		10:52	8.75	13305	6.99	1.46	18.1	48.8

Field Parameters
November 2023

DELIVERING ENVIRONMENTAL SOLUTIONS

Bore	Date	Time	Purge Volume	Electrical conductivity	pH	Dissolved Oxygen	Temperature	Redox
			L	µS/cm	-	mg/L	°C	mV
SLMW06-Q1	1/11/2023	9:34	1.25	11142	7.38	1.19	18.6	63.4
		9:37	2.5	11162	7.41	1.23	1894	71.4
		9:40	3.75	11171	7.4	1.29	18.3	76.4
		9:44	5	11178	7.4	1.31	18.3	80.3
		9:48	6.25	11157	7.4	1.35	18.2	84
SLMW07-Q1	1/11/2023	8:25	1.25	14538	7.59	5.75	18	56.7
		8:29	2.5	14635	7.55	5.41	17.8	85.5
		8:33	3.75	14680	7.58	5.53	17.6	101.1
		8:38	5	14728	7.59	5.68	17.5	110.1
		8:42	6.25	14755	7.6	5.82	17.5	115.4
		8:46	7.5	14585	7.6	5.85	17.5	117.5
		8:52	8.75	14756	7.61	5.8	17.5	118.9
SLMW10-A	2/11/2023	9:43	2.5	9198	7.62	0.9	20	63
		9:46	3.75	9217	7.6	1	9.9	76.6
		9:50	5	9248	7.57	1.05	19.8	87
		9:53	6.25	9262	7.55	1.16	19.7	93.8
		9:57	7.5	9265	7.52	1.16	19.6	100.2
		10:00	8.75	9276	7.5	1.31	19.6	105.6
		10:03	9.75	9291	7.5	1.36	19.6	108.4
SLMW10-B	2/11/2023	9:04	1.25	9007	7.46	0.1	20	-43.8
		9:07	2.5	9011	7.42	0.05	19.9	-27.2
		9:13	3.75	9007	7.37	0.06	19.9	-8.5
		9:16	5	9010	7.37	0.1	19.9	2.7
		9:19	6.25	9016	7.37	0.12	19.9	10.4
SLMW10-Q	2/11/2023	8:24	1.25	9512	7.24	0.69	20.1	32.6
		8:33	3.75	9564	7.19	0.41	20	52.9
		8:38	5	9585	7.19	0.35	20	59
		8:41	6.25	9591	7.19	0.4	20	63.1
SLMW11-B	2/11/2023	11:24	1.25	8898	7.57	4.82	20.3	1.2
		11:27	2.5	8963	7.5	3.98	20.1	61.5
		11:30	3.75	8988	7.49	4.42	20	89.9
		11:37	5	8999	7.48	4.29	19.8	104.2
		11:39	6.25	9007	7.48	3.9	19.7	106.1
SLMW11-Q2	2/11/2023	10:36	1.25	8590	7.21	0.37	19.7	7592
		10:40	2.5	8752	7.18	0.26	19.6	80.1
		10:44	3.75	8727	7.16	0.27	19.6	80.9
		10:49	5	8729	7.19	0.3	19.6	81.1
		10:52	6.25	8785	7.18	0.58	19.6	80.5
		10:56	7.5	8826	7.18	0.99	19.7	79.5
SLMW12-A	31/10/2023	12:23	2	13166	7.55	3.75	21.3	51
		12:25	3	13266	7.46	3.92	20	62.3
		12:31	3	13425	7.49	4.34	19	74.1
		12:37	4	13542	7.47	4.2	18.9	80.5
		12:46	5	13605	7.45	4.15	18.3	86.4
		12:51	6	13560	7.44	4.2	18.9	86.4

Field Parameters
November 2023

DELIVERING ENVIRONMENTAL SOLUTIONS

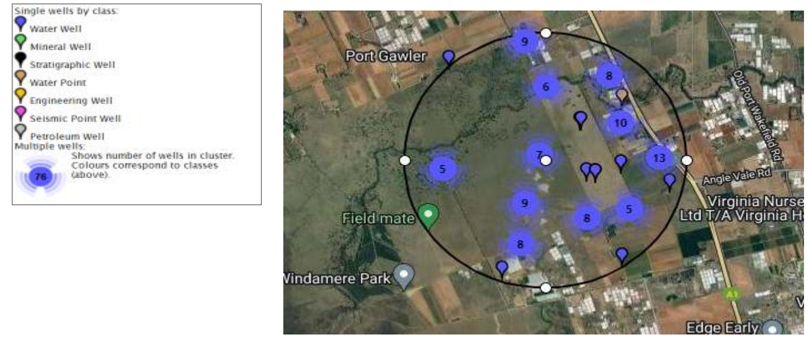
Bore	Date	Time	Purge Volume L	Electrical conductivity µS/cm	pH -	Dissolved Oxygen mg/L	Temperature °C	Redox mV
SLMW12-B	31/10/2023	13:26	1	13776	7.58	6.31	21.5	-100.3
		13:30	2	14233	7.2	6.45	19.8	-45.4
		13:36	3	14214	7.24	6.07	19.4	-19.2
		13:43	4	14120	7.24	5.55	19.2	0.3
		13:49	5	14086	7.24	5.09	19.2	12.7
		13:53	6	14068	7.24	5.04	19.2	18.2
		13:57	7	14058	7.24	5.11	19.2	20.3
SLMW12-C	31/10/2023	14:31	1	14954	7.19	5.36	19.9	33.6
		14:35	2	14986	7.19	5.2	19.6	46.6
		14:38	3	14995	7.17	5.15	19.7	48
		14:42	4	14997	7.16	4.63	19.7	39
		14:50	5	15168	7.14	4.13	19.8	39.3
		14:55	6	15221	7.09	3.85	19.8	43.4
		15:00	7	15228	7.09	3.71	19.8	45.5
SLMW13-A	2/11/2023	13:40	1.25	8728	7.37	1.38	19.7	138.1
		13:45	2.5	8772	7.34	0.99	19.3	131.4
		13:48	3.75	8779	7.35	0.76	19.2	128.8
		13:52	5	8791	7.34	0.68	19.3	126.7
		13:56	6.25	8804	7.35	0.98	19.2	124.8
SLMW13-B	2/11/2023	13:03	1.25	8151	7.4	4.24	19.5	119.5
		13:07	2.5	8103	7.38	4.01	19.5	111.6
		13:11	3.75	8150	7.35	3.71	19.6	109
		13:14	5	8214	7.35	3.91	19.4	107.5
		13:17	6.25	8220	7.35	3.55	19.4	107.4
SLMW13-Q2	2/11/2023	12:23	1.25	10150	7	5.3	20.2	50
		12:28	2.5	10080	7	4.24	21.5	66.1
		12:34	3.75	10117	6.99	2.1	20.4	79.2
		12:39	5	10110	6.99	2.52	20.2	87.7
		12:42	6.25	10109	6.99	2.52	20.3	93
6628-23298	7/11/2023	15:10	1	7765	4.95	0.1	20.9	-93.1

Field Parameters
Surface Water Monitoring Nov 2023

DELIVERING ENVIRONMENTAL SOLUTIONS

Location ID	Date	Time	Electrical conductivity µS/cm	pH -	Dissolved Oxygen mg/L	Temperature °C	Redox mV
SW01	7/11/2023	14:16	11263	5.08	6.07	23.7	121.0
SW02	7/11/2023	13:00	5741	5.03	11.49	21.3	120.7
SW03	7/11/2023	12:45	6560	5.08	2.41	21.7	119.6
SW04	7/11/2023	12:19	22341	5.03	3.92	22.0	136.6
SW05	7/11/2023	13:27	9986	5.02	8.12	24.1	122.4
SW06	7/11/2023	13:48	13309	5.07	16.29	23.7	131.3
SW07	7/11/2023	11:24	11780	5.17	6.10	21.1	106.1
SW08	7/11/2023	10:51	13805	4.75	7.80	20.4	94.0
SW09	7/11/2023	10:15	71456	5.16	7.31	19.9	160.8

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km
Search By: TO
Search Date: 21/11/2023



Headings	Class
EC: Electrical conductivity	WW: Water wells
TDS: Total dissolved solids	ENG
SWL: Standing water level	Strat
RSWL: Relative standing water level	

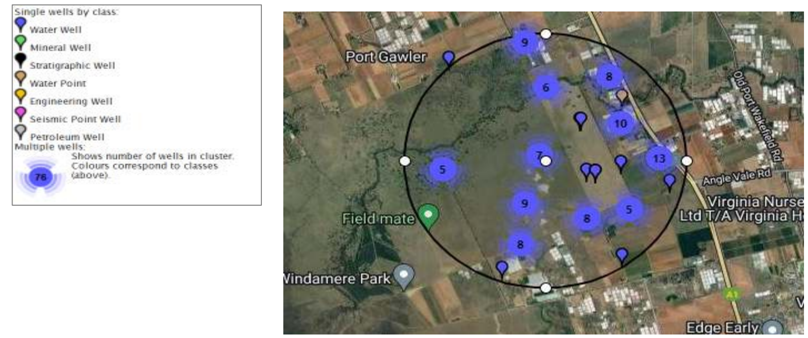
Purpose		Status
DOM: Domestic	INV: Investigation	ABD: Abandoned
OBS: Observation	IRR: Irrigation	BKF: Backfilled
STK: Stock	MAR: Managed aquifer rechar	DEC: Decommissioned
DRN: Drainage	MON: Monitoring	DRY: Dry
ENV: Environmental	REC: recreation	OPR: Operational
IND: Industrial		RHB: Rehabilitated
		UKN: Unknown

Well Search Summary	
Search Radius:	2 km
Total number of wells:	99

Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-1000	WW	STK	BKF	1/11/1985			12/09/1962		4.29	5/03/1969	2831	5062	27050	9	27050			272195.48	6165001.89	54
6628-1003	WW	IRROBS	BKF	13/05/1971			13/05/1971		-4.24	29/03/1967	1647	2970	25986	7.5	25986	10.1	24560	271958.46	6164943.87	54
6628-1004	WW	IRRSTK	OPR	14/11/2002	25/01/1949	91.44	25/01/1949		6.95	25/01/1949	2064	3710	45184			1.26	17923	271794.82	6164805.53	54
6628-1006	WW	IRRSTK	OPR	16/12/1986	5/05/1971	131.37	5/05/1971	67.67			636	1155	38412	7.5	31762	18.95	26058	271134.42	6164513.81	54
6628-1007	WW	IRR	BKF	9/11/1989	30/05/1969	137.16	30/05/1969				1095	1983	25358	6.5	25358	1.89	25353	272499.74	6164311.57	54
6628-1008	WW	IRR	UKN	26/08/2004	1/01/1956	103.63	1/01/1956	54.86	-10.86	19/02/1963	1180	2136	24651			12.63	22710	273415.42	6164507.9	54
6628-1009	WW	IRR	BKF	10/12/2002	23/08/1960	76.2	23/08/1960		3.47	23/08/1960	1357	2452	29759	10.5	29759			273209.42	6164423.81	54
6628-1010	WW	IRR	BKF	22/12/2021			19/02/1962				1591	2870	15/06/2019			16.42	24552	273313.82	6164655.47	54
6628-1011	WW	IRR	UKN	26/08/2004			16/05/1968	54.86	-6.76	16/05/1968	1201	2172	1/01/1978			7.58	24974	273089.41	6164446.84	54
6628-1012	WW	IRR	BKF	16/03/1988	4/07/1960	97.36	4/07/1960				1356	2450	26815	7.5	26815	19	26815	272673.44	6164812.88	54
6628-1086	WW	DOMIRR	BKF	10/12/2002	1/01/1950	76.2	6/02/1952		-4.68	27/11/1961	990	1792	31712	7.5	27/10/1986	7.58	24567	273492.4	6164013.87	54
6628-1087	WW	STK	OPR	4/03/1969			23/03/1962				1489	2688	20/02/1969	7.5	20/02/1969	0.38	22728	272393.38	6164178.86	54
6628-1088	WW	IRRSTK	NL	4/11/2005			16/03/1962		7.58	16/03/1962						11.37	22721	273585.44	6163769.86	54
6628-1089	WW	IRR	BKF	18/02/1981	13/02/1952	82.3	13/02/1952				900	1632	1/01/1978	7	14/05/1968	6.31	24588	273664.45	6164082.8	54
6628-1090	WW	IRROBS	BKF	4/09/2023	1/03/1957	109.73	1/03/1957		5.43	16/08/1960	1049	1900	23/06/2023	8.6	4/12/1975	8.84	24702	273553.81	6163918.48	54
6628-1091	WP	IRRRIV	UKN	26/08/2004							1430	2583	31/07/1961					273605.45	6163974.8	54
6628-1092	WW	IRROBS	BKF	10/03/2021			9/04/1959				898	1627	1/11/2020	7.3	15/12/1986			273994.47	6163454.89	54
6628-1093	WW	IRR	OPR	15/12/1986	1/01/1962	121.92	1/01/1962				987	1787	1/11/2017	7.6	15/12/1986			273853.8	6163580.53	54
6628-1094	WW	IRR	BKF	28/09/1999	2/09/1969	105.77	2/09/1969				1345	2430	12/01/1999	7.5	25/03/1992	15.16	25448	274048.41	6163293.83	54
6628-1098	WW	IRR	BKF	6/08/1974	18/09/1970	106.68	18/09/1970				832	1509	24/09/1970	7	24/09/1970	18.95	25829	274157.45	6163230.9	54
6628-2218	WW	OBS	OPR	25/09/1998	12/06/1968	191.11	12/06/1968	173.87	-1.68	18/09/2023	2347	4210	26/03/2003	7.8	26/03/2003			271068.79	6162976.56	54
6628-2219	WW	OBS	OPR	25/09/1998	3/12/1968	15.24	3/12/1968	7.92	2.86	18/09/2023	1188	2150	31/03/1978	7.2	31/03/1978	1.36	25266	271075.78	6162961.53	54
6628-2220	WW	OBS	OPR	25/09/1998	28/11/1968	42.67	28/11/1968	37.49	3.05	18/09/2023	484	880	7/02/1978	7.5	7/02/1978	0.76	25170	271061.78	6162995.53	54
6628-2221	WW	STK	BKF	22/01/1975	1/01/1962		19/04/1974				9229	15868	19/02/1969	9	19/02/1969	0.04	27138	272203.38	6161826.75	54
6628-2222	WW	STK	OPR	14/02/1975	14/02/1975	39.62	14/02/1975	32.92	0.44	14/02/1975	967	1751	20/02/1975	7.3	20/02/1975	4	27439	272165.37	6161802.73	54
6628-2223	WW	STK	BKF	21/10/1969	1/01/1962		21/03/1962				5855	10276	23/01/1963			0.04	22726	273160.45	6162257.9	54
6628-2224	WW	STK	OPR	20/05/1992	10/11/1969	69.92	10/11/1969	60.19	-8.2	10/11/1969	777	1410	20/05/1992	7.8	20/05/1992			273207.44	6162271.82	54
6628-2225	WW	DRN	BKF	25/02/2021	3/03/1966	9.12	3/03/1966				17258	28385	3/03/1966	7	3/03/1966			273283.39	6162371.92	54
6628-2229	WW	DOMIRR, ST	BKF	28/11/2002	1/01/1964	27.36	26/09/1967		0.9	1/01/1969	2103	3780	1/05/2000			3.79	24741	273751.74	6162400.5	54
6628-2230	WW	IRRSTK	UKN	13/07/2004	1/01/1964	25.91	10/09/1964		0.9		1305	2360	10/09/1964			2.53		273667.45	6162022.84	54
6628-2231	WW		ABD	27/02/1964														273751.46	6162415.81	54
6628-2232	WW	DOMSTK	BKF	24/02/1986	1/01/1969	44.5	1/01/1969				1035	1874	15/05/1969	6.5	15/05/1969	12.63	25338	273494.44	6162027.91	54

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km
Search By: TO
Search Date: 21/11/2023



Headings	Class
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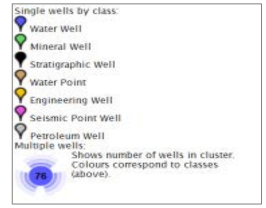
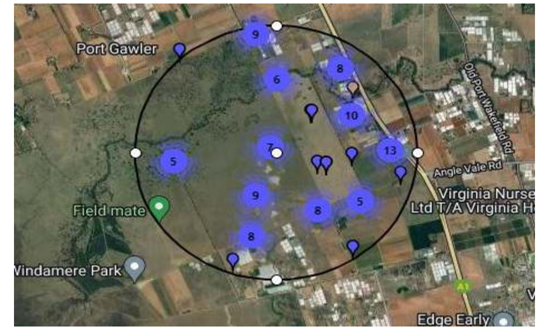
		UKN: Unknown

Well Search Summary	
Search Radius:	2 km
Total number of wells:	99

Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-2240	WW	STK	NL	1/01/1963			25/01/1949	57.91			764	1386	17/06/2015			6.31	17923	272418.4	6161434.81	54
6628-2267	WW	IRR	BKF	19/08/2022	1/01/1966	45.72	10/05/1966		-13.1	6/05/1966	845	1532	30/04/2011	6.4	10/05/1966	10.1	24233	274275.41	6162855.86	54
6628-2283	WW	STK	BKF	14/08/1967	1/01/1956		8/06/1956		7.26	8/06/1956	1580	2851	8/06/1956					274294.44	6162707.81	54
6628-11563	WW	IRR	OPR	18/02/1981	18/02/1981	93	18/02/1981	66.00	-18.7	18/02/1981	995	1802	23/06/2021	7.1	17/02/1981			273645.77	6164040.49	54
6628-11750	WW	IRR	OPR	7/11/2003	19/06/1981	122	19/06/1981				1479	2670	23/06/2021	7.9	22/06/1981			273350.76	6164413.52	54
6628-13380	WW	DOMSTK	OPR	24/02/1986	1/04/1985	91	1/04/1985	63.00	-23.4	12/08/1985	688	1250	1/06/2002	7.6	24/02/1986	12.63	31138	273481.42	6162072.88	54
6628-13412	WW	DOMSTK	OPR	20/06/1985	20/06/1985	98	20/06/1985	72.00			944	1710	25/06/1985	8.1	25/06/1985	7	31218	272390.42	6164116.85	54
6628-13413	WW	DOMSTK	OPR	15/06/1985	15/06/1985	98	15/06/1985	75.00			1423	2570	25/06/1985	7.3	25/06/1985	8	31213	272318.39	6164217.86	54
6628-13418	WW	DOMSTK	OPR	7/03/1985	7/03/1985	97	7/03/1985	65.30			1469	2652	7/03/1985	7.8	7/03/1985	5		271434.37	6163066.75	54
6628-13538	WW	IRR	OPR	24/02/1992	2/09/1985	97	2/09/1985	66.00			1378	2490	1/02/2018	7.9	24/03/1992	15.16	31292	273035.82	6164473.49	54
6628-13926	WW	IRR	OPR	15/01/1987	15/01/1987	91.5	15/01/1987	66.00			1552	2800	17/06/2015	6.9	3/02/1987	3	31792	272149.77	6164954.48	54
6628-14018	WW	IRR	OPR	27/08/1987	27/08/1987	122	27/08/1987	66.00			1692	3050	28/06/2023	7.8	1/09/1987	10	32016	272137.44	6164914.88	54
6628-14161	WW	IRR	OPR	18/09/1987	18/09/1987	91	18/09/1987	66.00			1552	2800	3/06/2022	7.6	18/09/1987	12.63	32038	272331.75	6164840.53	54
6628-14162	WW	IRR	OPR	6/11/1987	6/11/1987	110	6/11/1987	66.00			1620	2920	15/02/2022	8.2	17/11/1987	8	32083	272357.76	6165013.55	54
6628-14200	WW	IRR	UKN	26/08/2004	16/03/1988	122	16/03/1988	66.00			1776	3200	16/03/1988	7.8	16/03/1988	12	32218	272556.43	6165026.88	54
6628-14491	WW	DOMSTK	BKF	5/10/2021	1/03/1989	91.5	1/03/1989		-25	19/07/1989	722	1310	1/06/2002	7.5	1/03/1989	4	32568	274303	6162730	54
6628-14512	WW	IRR	OPR	9/03/1989	9/03/1989	122	9/03/1989	66.00			1463	2640	23/06/2021	7.2	12/03/1989	25	32579	273368.83	6164092.53	54
6628-15140	WW	IRR	OPR	9/11/1989	9/11/1989	122	9/11/1989	66.00			1653	2980	1/11/2008	7.4	15/11/1989	12	32821	272490.77	6164314.57	54
6628-16223	WW	IRR	OPR	26/11/1992	26/11/1992	114	26/11/1992	67.00			964	1745	15/06/2019	7.7	26/11/1992	12	33934	274012.77	6163404.5	54
6628-18498	WW	DOMSTK	OPR	1/12/2003	26/08/1996	122	26/08/1996	66.00	-14.5	26/08/1996	833	1512	1/06/2020			25	35301	273509.76	6161781.55	54
6628-19956	WW	IRR	OPR	1/03/2001	30/09/1999	122	30/09/1999	72.00	-14.8	30/09/1999	964	1745	31/03/2013			14	36431	274057.81	6163254.55	54
6628-19991	WW	MON	OPR	17/12/1999	17/12/1999	12.5	17/12/1999	7.50	8.53	20/09/2023	2727	4880	1/10/2015	7.39	16/02/2000	1	36511	274471.76	6163123.49	54
6628-19992	WW	MON	OPR	17/12/1999	17/12/1999	6	17/12/1999	2.00	8.5	21/12/2016	3500	6230	1/10/2015	7.5	22/02/2000			274471.78	6163122.49	54
6628-19993	WW	MON	OPR	26/08/2004	20/01/2000	17	20/01/2000	13.00	8.96	18/09/2023	10348	17630	2/10/2015	7.5	22/02/2000			273706.8	6164207.48	54
6628-20005	WW	MON	OPR	21/12/1999	21/12/1999	9.5	21/12/1999	6.00	5.66	18/09/2023	7621	13200	30/09/2015	6.96	16/02/2000			273498.74	6161841.55	54
6628-20006	WW	MON	OPR	21/12/1999	21/12/1999	3	21/12/1999	1.00	5.46	21/12/2016	6119	10700	1/10/2015					273498.81	6161842.55	54
6628-20666	WW	MON	OPR	23/09/2001	23/09/2001	87.5	23/09/2001	65.00	-7.27	18/09/2023	674	1224	17/12/2013	7.94	17/12/2013	6	37157	273663.34	6161487.41	54
6628-20746	WW	INV	OPR	1/11/2001	1/11/2001	4	1/11/2001	4.00	5.35	18/03/2004	8592	14800	11/03/2002					274115.78	6161950.47	54
6628-20984	WW	IRR	OPR	30/08/2004	5/12/2002	122	5/12/2002	66.00	-22.6	5/12/2002	1006	1823	1/07/2017			10	37594	274336.82	6163506.55	54
6628-21031	WW	STK	OPR	1/07/2022			29/11/2002	34.00	-8	29/11/2002	162	294	1/11/2017			3	37588	273742.74	6162393.51	54
6628-21445	WW	INVMON			31/07/2003	6	31/07/2003	4.00		24/06/2015								271079.25	6162957.61	54
6628-23298	WW	INV			14/01/2008	10	14/01/2008	5.10	3.73	14/01/2008								272962.81	6164331.18	54

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km
Search By: TO
Search Date: 21/11/2023





Headings	Class
EC: Electrical conductivity	WW: Water wells
TDS: Total dissolved solids	ENG
SWL: Standing water level	Strat
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Purpose		Status
DOM: Domestic	INV: Investigation	ABD: Abandoned
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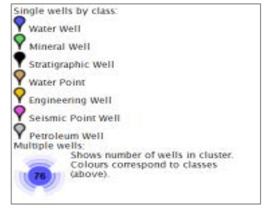
		UKN: Unknown

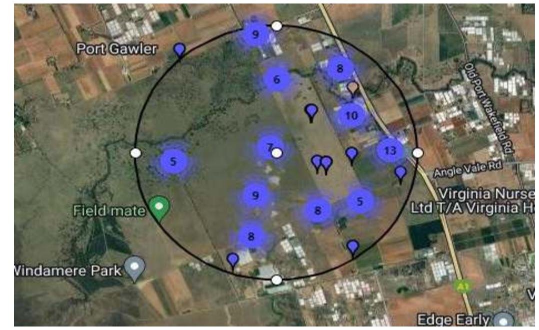
Well Search Summary	
Search Radius:	2 km
Total number of wells:	99

Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-23299	WW	INV	BKF	8/02/2021	14/01/2008	5.5	14/01/2008		6.56	14/01/2008								273617.25	6162947.84	54
6628-23300	WW	INV			14/01/2008	8.1	14/01/2008	8.10	2.42	14/01/2008								272258.8	6162472.56	54
6628-23303	WW				15/01/2008	7	15/01/2008	2.50	2.4	15/01/2008								271718.12	6161582.11	54
6628-27634	WW																	272546.78	6161312.55	54
6628-27635	WW		BKF	18/07/2014	18/07/2014	80	18/07/2014	72.00	-15.2	18/07/2014						0	41836	272546.78	6161312.55	54
6628-27790	WW	IRR	OPR	1/07/2022	25/07/2014	96	25/07/2014	84.00			783	1421	7/07/2022			10	41845	272523.82	6161373.48	54
6628-28060	WW	IRR	OPR	1/07/2022	20/08/2015	122	20/08/2015	72.00	-9.9	20/08/2015	1172	2120	23/06/2023			12	42236	273786.79	6163541.48	54
6628-29734	WW		OPR	1/07/2022	11/09/2018	122	11/09/2018	90.00			806	1462	7/07/2022			20	43354	271981.79	6161248.54	54
6628-30999	WW	INV	BKF	6/04/2022	1/12/2020	7.5	1/12/2020											274181.78	6162994.53	54
6628-31000	WW	INV	BKF	6/04/2022	1/12/2020	7.5	1/12/2020											274160.78	6163191.51	54
6628-31002	WW	INV	BKF	6/04/2022	1/12/2020	8	1/12/2020											274301.78	6163196.53	54
6628-31003	WW	INV	BKF	6/04/2011			1/12/2020	4.50										274347.78	6162883.52	54
6628-31183	WW		OPR	1/07/2022	15/01/2021	120	15/01/2021	69.00	-31.7	15/01/2021	1121	2030	1/07/2022			10	44211	274321	6162668	54
6628-32153	WW				17/10/2022	122	17/10/2022	66.00	-6.2	17/10/2022	1423	2570	26/10/2022			10	44848	273553.88	6163892.01	54
6628-32402	WW	INV			18/04/2023	4	18/04/2023	2.50										273020.78	6163609.52	54
6628-32403	WW	INV			20/04/2023	5	20/04/2023	3.00										273129.77	6162805.52	54
6628-32404	WW	INV			18/04/2023	6	18/04/2023	4.50										271856.78	6162837.52	54
6628-32405	WW	INV			18/04/2023	7	18/04/2023	5.50										273037.78	6163608.52	54
6628-32406	WW	INV			18/04/2023	7.5	18/04/2023	3.00										272431.78	6163242.52	54
6628-32407	WW	INV			19/04/2023	6.5	19/04/2023	4.00										272738.78	6163163.52	54
6628-32408	WW	INV			19/04/2023	9	19/04/2023	7.00										271802.78	6162837.53	54
6628-32412	WW	INV			19/04/2023	6.5	19/04/2023	2.50										272528.78	6162760.51	54
6628-32413	WW	INV			19/04/2023	6	19/04/2023	2.50										272112.78	6162173.52	54
6628-32414	WW	INV			19/04/2023	6	19/04/2023	2.00										271660.78	6161773.51	54
6628-32765	WW	INV			23/10/2023	6.3	23/10/2023	5.30										272772.78	6163174.52	54
6628-32766	WW	INV			23/10/2023	9.2	23/10/2023	8.20										272772.78	6163174.52	54
6628-32767	WW	INV			23/10/2023	7.8	23/10/2023											272804.77	6162989.53	54
6628-32768	WW	INV			18/10/2023	13	18/10/2023											272772.78	6163174.52	54
6628-32769	WW	INV			16/10/2023	13	16/10/2023											272813.78	6162970.52	54
6628-32770	WW	INV			23/10/2023	4	23/10/2023											272733.78	6162762.51	54
6628-32771	WW	INV			23/10/2023	8	23/10/2023											272733.78	6162762.51	54
6628-32772	WW	INV			19/10/2023	13	19/10/2023											272733.78	6162762.51	54

DELIVERING ENVIRONMENTAL SOLUTIONS

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km
Search By: TO
Search Date: 21/11/2023





Headings	Class
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Purpose		Status
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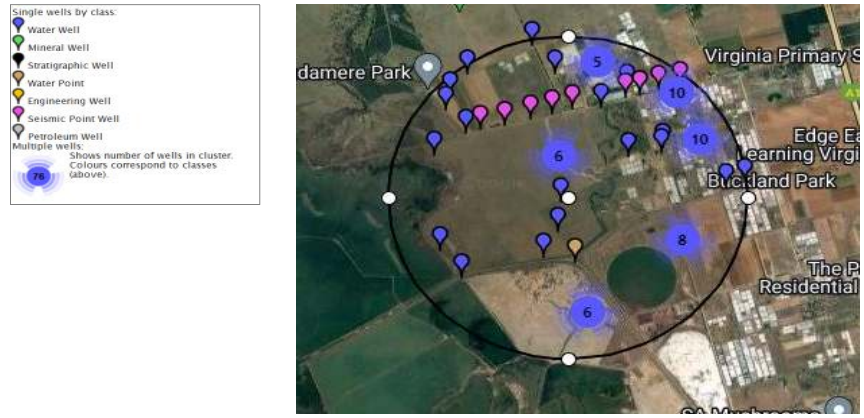
		UKN: Unknown

Well Search Summary	
Search Radius:	2 km
Total number of wells:	99

Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-32773	WW	INV			23/10/2023	4.5	23/10/2023											273257.78	6162797.53	54
6628-32774	WW	INV			24/10/2023	8.8	24/10/2023											273257.78	6162797.53	54
6628-32775	WW	INV			20/10/2023	14.5	20/10/2023	9.50										272350.78	6162814.51	54

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km - in area downstream of potential discharge
Search By: TO
Search Date: 22/11/2023



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Purpose		Status
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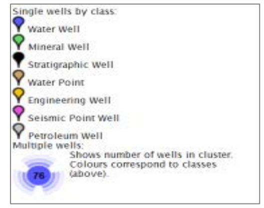
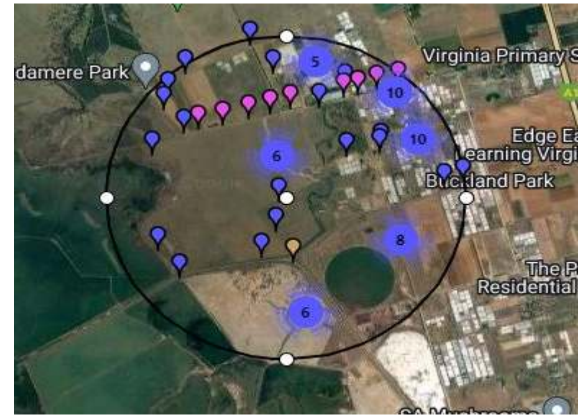
Well Search Summary	
Search Radius:	2 km
Total number of wells:	74

Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-19717	WW	OBS	OPR	25/09/1998	3/03/1965	109.73	3/03/1965	60.00	-1.24	7/11/2023	502	913	45237	11.3	37707	0.25	35947	271013.77	6160503.54	54
6528-246	WW	STK	OPR		21/03/1962	2.74	21/03/1962		1.87	21/03/1962	6194	10850	23034			0.38	22726	270831.32	6160948.76	54
6628-19718	WW	OBS	UKN	7/12/1998	16/12/1968	42.67	16/12/1968	32.31	-0.1	21/04/1992	432	785	27997	8.6	27997	6.31	25272	271012.35	6161214.76	54
6628-21356	WW	OBS	OPR	25/09/1998	24/11/1961	106.68	24/11/1961	95.71	-1.31	15/09/2023	644	1170	36647	8.2	33626	6.21		271015.79	6158742.52	54
6628-2240	WW	STK	NL	1/01/1963			25/01/1949	57.91			764	1386	42172			6.31	17923	272418.4	6161434.81	54
6628-2243	WW	STK	OPR	27/02/1969	1/01/1963	33.53	1/01/1963	33.53	2.18	21/03/1963	715	1298	23034					271964.78	6160912.52	54
6628-2251	WW	DOMOBS, S	RHB	18/08/1995	16/02/1901	34.1	18/08/1995	65.00			1070	1937	44136	7.9	31467	6.2	34929	273316.75	6161085.54	54
6628-2252	WW	IRROBS	BKF	12/05/1999	11/03/1901	73.15	11/03/1901	67.06	-29.4	29/04/1967	967	1751	8/11/1974	8.2	27341	12.63	24699	273482.43	6160996.82	54
6628-2260	WW	DOMIRR, ST	BKF	19/08/1983	1/01/1920		19/08/1983		1.97	19/08/1983	790	1433	24/01/1963			1.01	30547	273415.4	6159283.76	54
6628-2261	WW	DRN	OPR	4/03/1966	4/03/1966	7.3	4/03/1966				17258	28385	24170	7	24170			273288.37	6159710.74	54
6628-2262	WW	OBSSTK	BKF	19/05/2005	1/01/1949		21/07/1966		4.58	21/09/1977	683	1240	27990	8.3	18/08/1976	0.21	25494	272803.05	6160268.86	54
6628-2263	WW	OBSSTK	ABD	28/03/1961	1/03/1901	58.52	28/03/1961		7.32	29/02/1988	17136	28184	24/03/1960					272014.4	6160277.81	54
6628-2264	WW	STK	BKF	9/01/2020	1/01/1962	39.62	1/01/1962		2.78	23/01/1962	971	1760	23/01/1962			0.38	22669	271973	6160254	54
6628-2265	WW	DOMSTK	NL	12/05/1999	29/11/1975	89.98	29/11/1975	78.03			688	1250	17/12/1975	8.3	17/12/1975	3.79	27727	271597.44	6159796.76	54
6628-2266	WW	OBS	BKF	25/01/1963	26/09/1962	102.11	26/09/1962		-8.39	4/12/1962	783	1420	11/02/1963					272047.44	6159334.83	54
6628-2387	WP										13099	22000	20/10/1970	8	20/10/1970			272251.44	6158967.82	54
6628-2388	WW						16/02/1949				1276	2307	16/02/1949			0.51	17945	272377.45	6158379.77	54
6628-2389	WW	OBS									103626	129533	18/03/1968	7	18/03/1968			271907.39	6158087.77	54
6628-2390	WW	STK	BKF	9/06/2006			22/06/1956				1455	2627	21/06/1956					272078.33	6159694.78	54
6628-2391	WW	OBS	ABD	3/05/1999	1/01/1965		20/01/1965		3.55	5/09/1988	19721	32000	10/01/1975	8	10/01/1975			272851.46	6158400.79	54
6628-2392	WW	IRROBS, STK					19/05/1964		3.37	22/06/1956	1975	3554	24/03/1969	7	24/03/1969			272809.43	6158346.81	54
6628-2393	WW	STK	OPR	23/07/1969			21/03/1962		2.57	1/01/1969	1095	1983	18/06/1969	6.5	18/06/1969	0.38	22726	272904.32	6158971.72	54
6628-12125	WW	DOMIRR, ST	BKF	12/05/1999	8/12/1982	75	8/12/1982				1045	1892	24/02/1986	7.9	24/02/1986	8	30293	273380.79	6159166.48	54
6628-14224	WW	DOM	OPR	28/10/1987	28/10/1987	91	28/10/1987	65.00			692	1257	11/02/2008			3	32078	273581.78	6160523.52	54
6628-14296	WW	DOM	OPR	1/12/2003	9/09/1988	91	9/09/1988	66.00	-19	5/06/1991	701	1272	1/06/2023	8.2	14/09/1988	4	33394	273221.81	6160370.52	54
6628-15137	WW	DOMSTK	OPR	31/03/1988	31/03/1988	91	31/03/1988	66.00			727	1318	2/01/2022			3	32233	273462.8	6161146.51	54
6628-15532	WW	DOMSTK	OPR	15/02/1991	13/02/1991	92	13/02/1991	66.00	-23.2	15/02/1991	824	1495	1/02/2010	7.8	15/02/1991	4	33282	273784.77	6160582.47	54
6628-15533	WW	IND	BKF	25/02/1999	4/04/1991	110	4/04/1991		-1.4	12/08/1991	1138	2060	5/04/1991	7.6	5/04/1991	12	33332	273341.36	6159207.79	54
6628-15585	WW	DOMSTK	OPR	7/06/1991	7/06/1991	91	7/06/1991	66.00	-16.6	12/08/1991	726	1317	9/06/2021	7.3	7/06/1991	5	33396	273843.74	6160488.57	54
6628-15592	WW	DOMSTK	OPR	26/07/1991	18/07/1991	91	18/07/1991	67.50	-15.2	12/08/1991	770	1396	3/08/2023	7.9	26/07/1991	4	33437	273479.8	6160413.48	54
6628-15647	WW		OPR	24/11/1988	11/11/1988	91	11/11/1988	65.00	-18.3	7/12/1988	736	1335	10/07/2022	7.8	24/11/1988	3	32458	273713.82	6160506.47	54
6628-15648	WW		OPR	4/12/1988	4/11/1988	91	4/11/1988	65.00	-12.85	2/07/2002	754	1368	10/07/2017	7.8	4/12/1988	3	32451	273549.81	6160512.55	54
6628-15652	WW	DOM	OPR	17/10/1991	17/10/1991	95	17/10/1991	89.00			777	1409	1/06/2017	7.5	17/10/1991	7	33528	273413.78	6159797.51	54
6628-16041	WW	DOMSTK	OPR	2/06/1992	2/06/1992	91	2/06/1992	67.00	-8.7	17/09/2001	637	1157	1/06/2017	7.2	2/06/1992	5	33757	273357.78	6160460.54	54
6628-16493	WW	DOMSTK	OPR	25/12/1993	25/02/1993	79	25/02/1993	73.00			753	1366	23/06/2023			7.6	34025	273176.76	6160382.5	54

LBW co
DELIVERING ENVIRONMENTAL SOLUTIONS

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km - in area downstream of potential discharge
Search By: TO
Search Date: 22/11/2023





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Well Search Summary	
Search Radius:	2 km
Total number of wells:	74

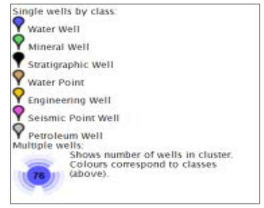
Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-16606	WW	STK	OPR	8/04/1994	30/03/1994	92	30/03/1994	72.00			747	1354	1/06/2023	7.8	8/04/1994	4	34423	273158.81	6160314.47	54
6628-17064	WW	DOM	OPR	17/02/1995	17/02/1995	90	17/02/1995	72.00			721	1307	1/06/2023	7.2	17/02/1995	4	34747	273544.82	6159819.49	54
6628-2236	SP																	273350.53	6161139.87	54
6628-2238	SP						16/09/1959											272907.52	6161019.76	54
6628-2239	SP						16/09/1959											273112.55	6161076.86	54
6628-2241	SP						14/09/1959											272752.54	6160978.76	54
6628-2242	SP						16/09/1959											272178.5	6160821.75	54
6628-2244	SP						16/09/1959											271717.51	6160691.8	54
6628-2245	SP						16/09/1959											271950.54	6160757.73	54
6628-2246	SP						16/09/1959											271179.51	6160542.72	54
6628-2247	SP						16/09/1959											271444.55	6160608.79	54
6628-17917	WW	DOMSTK	OPR	1/12/2003	13/02/1996	91	13/02/1996	72.00			709	1287	31/07/2014	7.1	13/02/1996	3.5	35108	273884.82	6159916.52	54
6628-18376	WW	DOMSTK	OPR	1/12/2003	7/12/1996	100	7/12/1996	82.20	-22	7/12/1996	710	1289	1/07/2022			10	35406	272963.76	6160944.56	54
6628-18377	WW	DOM	OPR	2/04/2001	11/12/1996	91.5	11/12/1996	82.20	-22	11/12/1996	661	1200	2/04/2001			7.5	35410	273202.57	6161014.92	54
6628-18591	WW	DOMSTK	OPR	5/05/2005	12/07/1997	91.5	12/07/1997	82.00	-9.54	17/09/2001	1322	2390	6/06/2016			6.2	35622	273796.81	6160592.53	54
6628-18942	WW	OBS	OPR	25/09/1998	15/05/1998	82	15/05/1998	66.00	0.69	18/09/2023	674	1223	26/03/2003	8.4	26/03/2003	2	35930	272480.78	6160850.52	54
6628-19389	WW	IRR	OPR	7/11/2003	16/11/1998	72	16/11/1998	66.00	-5.7	16/11/1998	976	1767	1/07/2022			25	36115	272762.56	6161089.78	54
6628-19481	WW	IND	OPR	1/07/2022	25/02/1999	142	25/02/1999	85.00			1434	2590	25/02/1999			25	36216	273366.18	6159108.11	54
6628-19999	WW	MON	OPR	21/12/1999	21/12/1999	9.5	21/12/1999	6.00	4.85	18/09/2023	14211	23700	1/10/2015	6.93	16/02/2000			273244.81	6161094.54	54
6628-20000	WW	MON	BKF	2/09/2020	21/12/1999	3	21/12/1999		4.77	21/12/2016	21378	34400	1/10/2015					273242.79	6161094.49	54
6628-21446	WW	INVMON	BKF	23/09/2014	31/07/2003	6	31/07/2003	3.00	1.96	20/09/2010								272718.66	6158480.99	54
6628-21584	WW	INV					29/09/2003	21.00	2.7	21/12/2016						1	37889	273247.3	6161097.82	54
6628-21585	WW	INV			30/09/2003	19.8	30/09/2003	15.00	4.89	21/12/2016						2.5	37894	273238.9	6161096.06	54
6628-21594	WW	INV					29/09/2003	4.50	4.83	21/12/2016						1	37893	273240.36	6161096.54	54
6628-21831	WW	DOMSTK	OPR	21/01/2006	30/06/2004	90	30/06/2004	66.00	-21.8	30/06/2004	725	1314	19/06/2023			3	38167	273582.77	6160458.52	54
6528-2628	WW	INV			15/01/2008	3.5	15/01/2008	3.50	2.9	15/01/2008								270674.8	6160221.17	54
6528-2629	WW	INV			15/01/2008	3.5	15/01/2008	3.50	2.03	15/01/2008								270773.11	6159070.14	54
6628-23301	WW				15/01/2008	3.5	15/01/2008	3.50	1	15/01/2008								271896.87	6159020.54	54
6628-23302	WW				15/01/2008	5.1	15/01/2008	2.10	-0.25	15/01/2008								271476.01	6159994.1	54
6628-23303	WW				15/01/2008	7	15/01/2008	2.50	2.4	15/01/2008								271718.12	6161582.11	54
6628-23304	WW				15/01/2008	4	15/01/2008	4.00	2.03	15/01/2008								272248.33	6160114.43	54
6628-26420	WW		OPR	1/07/2022	21/01/2012	102	21/01/2012	78.00	-17	21/01/2012						12.63	40929	274085.83	6159983.27	54
6628-27634	WW																	272546.78	6161312.55	54
6628-27635	WW		BKF	18/07/2014	18/07/2014	80	18/07/2014	72.00	-15.2	18/07/2014						0	41836	272546.78	6161312.55	54
6628-27790	WW	IRR	OPR	1/07/2022	25/07/2014	96	25/07/2014	84.00			783	1421	7/07/2022			10	41845	272523.82	6161373.48	54

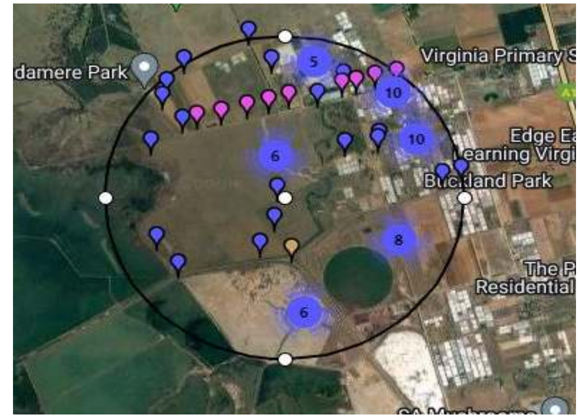
DELIVERING ENVIRONMENTAL SOLUTIONS

Job: Riverlea Saltwater Lakes Dewatering Investigation
LBW Job Number: 231445-01
Search Radius: 2 km - in area downstream of potential discharge
Search By: TO
Search Date: 22/11/2023

Headings	Class
EC: Electrical conductivity	WW: Water wells
TDS: Total dissolved solids	ENG
SWL: Standing water level	Strat
RSWL: Relative standing water level	

Purpose		Status
DOM: Domestic	INV: Investigation	ABD: Abandoned
OBS: Observation	IRR: Irrigation	BKF: Backfilled
STK: Stock	MAR: Managed aquifer rechar	DEC: Decommissioned
DRN: Drainage	MON: Monitoring	DRY: Dry
ENV: Environmental	REC: recreation	OPR: Operational
IND: Industrial		RHB: Rehabilitated
		UKN: Unknown





Well Search Summary	
Search Radius:	2 km
Total number of wells:	74

Unit No.	Class	Purpose	Status	Status Date	Original drill date	Original drill depth (m)	Max drill date	Cased to (m)	RSWL (mAHD)	SWL date	TDS (mg/L)	EC (mS/cm)	Salinity date	pH	pH_date	yield (L/min)	yield date	mga easting	mga northing	mga zone
6628-29734	WW		OPR	1/07/2022	11/09/2018	122	11/09/2018	90.00			806	1462	7/07/2022			20	43354	271981.79	6161248.54	54
6628-29751	WW	MON			4/10/2018	7	4/10/2018											272930.78	6158210.5	54
6628-30608	WW		OPR	1/07/2022	10/01/2020	78	10/01/2020	62.00	-5.5	10/01/2020	762	1382	10/01/2020			1	43838	271979	6160262	54
6528-3111	WW	MON	OPR	12/10/2023	11/08/2023	123	11/08/2023	96.00	-3.74	7/11/2023	866	1571	7/11/2023			2.8	45188	270783.78	6160772.53	54

Appendix F

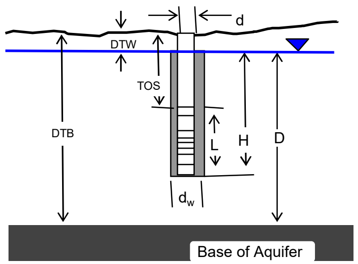
Slug Test Data

Site: Riverlea **Well ID:** MW01-P **Test No:** FH-1

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.075	Meter
Total screen length (L)	0.9	Meter
Depths to:		
water level (DTW)	3.53	Meter
top of screen (TOS)	3.95	Meter
base of aquifer (DTB)	4.85	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

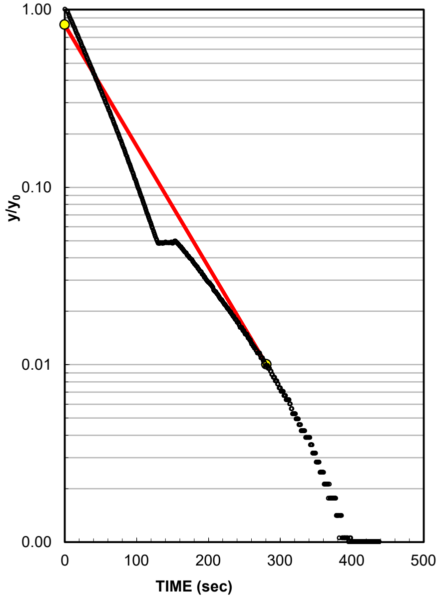
L_{wetted}	0.9	Meter
D =	1.32	Meter
H =	1.32	Meter
L/r_w =	12.41	-
$y_{0\text{-DISPLACEMENT}}$ =	2.85	meter
$y_{0\text{-SLUG}}$ eff casing=	2.30	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	1.370	
ln(Re/rw) =	2.043	
Re =	1.84	meter
Slope =	0.006811	$\log_{10}$/sec
$t_{90\%}$ recovery =	147	sec

Input is consistent.

K =	2.2	meter/day

Observed slug discrepancy: 58%
Eff casing slug discrepancy: 21%

Adjust slope of line to estimate K

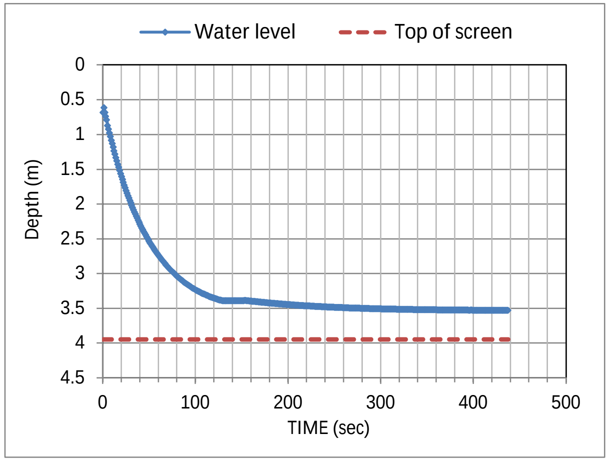


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 438

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.53	
Final obs:	0:07:18.0	3.531	-0.001

Entry	Reduced Dataset		
1	0:00:01.0	0.685	2.845
11	0:00:11.0	1.132	2.398
21	0:00:21.0	1.605	1.925
31	0:00:31.0	1.985	1.545
41	0:00:41.0	2.290	1.240
51	0:00:51.0	2.539	0.991
61	0:01:01.0	2.739	0.791
71	0:01:11.0	2.905	0.625
81	0:01:21.0	3.040	0.490
91	0:01:31.0	3.149	0.381
101	0:01:41.0	3.236	0.294
111	0:01:51.0	3.302	0.228
121	0:02:01.0	3.355	0.175
131	0:02:11.0	3.393	0.137
141	0:02:21.0	3.391	0.139
151	0:02:31.0	3.393	0.137
161	0:02:41.0	3.398	0.132
171	0:02:51.0	3.412	0.118
181	0:03:01.0	3.425	0.105
191	0:03:11.0	3.436	0.094
201	0:03:21.0	3.448	0.082
211	0:03:31.0	3.457	0.073
221	0:03:41.0	3.466	0.064
231	0:03:51.0	3.474	0.056
241	0:04:01.0	3.481	0.049
251	0:04:11.0	3.487	0.043
261	0:04:21.0	3.493	0.037
271	0:04:31.0	3.497	0.033
281	0:04:41.0	3.502	0.028
291	0:04:51.0	3.506	0.024
301	0:05:01.0	3.509	0.021
311	0:05:11.0	3.512	0.018
321	0:05:21.0	3.515	0.015
331	0:05:31.0	3.518	0.012
341	0:05:41.0	3.519	0.011
351	0:05:51.0	3.522	0.008
361	0:06:01.0	3.523	0.007
371	0:06:11.0	3.525	0.005
381	0:06:21.0	3.526	0.004



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.82
Observed drawdown (m)	2.8450
Inferred drawdown for formation (m)	2.3329
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0056
Vol. filter pack that recharged water originated from (m3)	0.0313
Specific yield of filter pack (-)	0.18
Effective casing radius (m)	0.037
Effective casing diameter (m)	0.075

Butler, 1997

Effective casing radius (m)	0.037
Effective casing diameter (m)	0.075

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

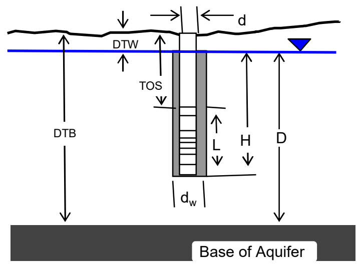
Top of screen in well is at 2.5m bgl (3.35m btoc) but adjusted to 3.1m (3.95m btoc) because sandy clay to 3.1m depth likely does not contribute to flows in/out of the well.

Site: Riverlea **Well ID:** MW01-P **Test No:** RH-1

Date:	05/10/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.104	Meter
Total screen length (L)	0.9	Meter
Depths to:		
water level (DTW)	3.536	Meter
top of screen (TOS)	3.95	Meter
base of aquifer (DTB)	4.85	Meter
'Slug' details:		
length	0.4	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	0.9	Meter
D =	1.314	Meter
H =	1.314	Meter
L/r_w =	12.41	-
$y_{0\text{-DISPLACEMENT}}$ =	0.13	meter
$y_{0\text{-SLUG}}$ eff casing=	0.05	meter
$y_{0\text{-SLUG}}$ =	0.21	meter
Fully penetrate C =	1.370	
ln(Re/rw) =	2.041	
Re =	1.83	meter
Slope =	0.007386	$\log_{10}$/sec
$t_{90\%}$ recovery =	135	sec

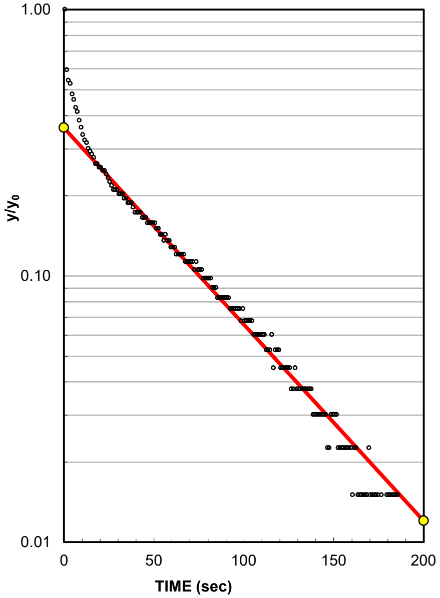
Input is consistent.

K =	**4.5**	**meter/day**

Observed slug discrepancy: 44%

Eff casing slug discrepancy: 94%

Adjust slope of line to estimate K



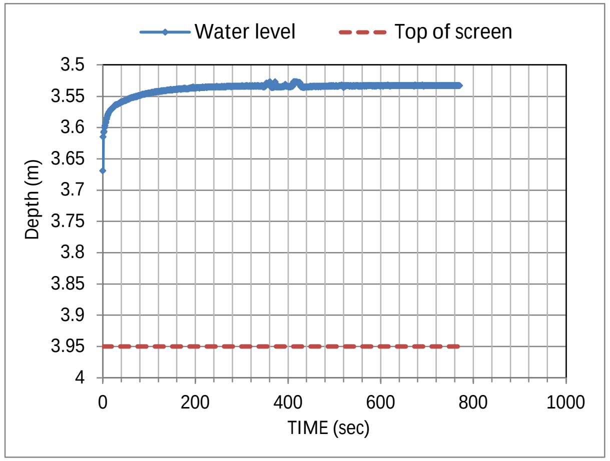
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 771

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.536	
Final obs:	0:12:51.0	3.527	0.009

Entry	Elapsed time	Water Level (Reduced Dataset)	Draw-down
1	0:00:01.0	3.669	0.133
20	0:00:20.0	3.570	0.034
39	0:00:39.0	3.560	0.024
58	0:00:58.0	3.554	0.018
77	0:01:17.0	3.550	0.014
96	0:01:36.0	3.546	0.010
115	0:01:55.0	3.543	0.007
134	0:02:14.0	3.541	0.005
153	0:02:33.0	3.539	0.003
172	0:02:52.0	3.538	0.002
191	0:03:11.0	3.537	0.001
210	0:03:30.0	3.537	0.001
229	0:03:49.0	3.535	0.001
248	0:04:08.0	3.535	0.001
267	0:04:27.0	3.535	0.001
286	0:04:46.0	3.534	0.002
305	0:05:05.0	3.534	0.002
324	0:05:24.0	3.533	0.003
343	0:05:43.0	3.533	0.003
362	0:06:02.0	3.527	0.009
381	0:06:21.0	3.535	0.001
400	0:06:40.0	3.534	0.002
419	0:06:59.0	3.528	0.008
438	0:07:18.0	3.535	0.001
457	0:07:37.0	3.534	0.002
476	0:07:56.0	3.534	0.002
495	0:08:15.0	3.533	0.003
514	0:08:34.0	3.533	0.003
533	0:08:53.0	3.534	0.002
552	0:09:12.0	3.534	0.002
571	0:09:31.0	3.533	0.003
590	0:09:50.0	3.533	0.003
609	0:10:09.0	3.533	0.003
628	0:10:28.0	3.533	0.003
647	0:10:47.0	3.533	0.003
666	0:11:06.0	3.533	0.003
685	0:11:25.0	3.533	0.003
704	0:11:44.0	3.533	0.003
723	0:12:03.0	3.533	0.003



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.36
Observed drawdown (m)	0.1330
Inferred drawdown for formation (m)	0.0479
Expected displacement based on slug volume (m)	0.2074
Vol. water recharged by filter pack (m3)	0.0003
Vol. filter pack that recharged water originated from (m3)	0.0006
Specific yield of filter pack (-)	0.49
Effective casing radius (m)	0.052
Effective casing diameter (m)	0.104

Butler, 1997

Effective casing radius (m)	0.052
Effective casing diameter (m)	0.104

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Top of screen in well is at 2.5m bgl (3.35m btoc) but adjusted to 3.1m (3.95m btoc) because sandy clay to 3.1m depth likely does not contribute to flows in/out of the well.

Site: Riverlea | **Well ID:** MW01-P | **Test No:** RH-2

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.099	Meter
Total screen length (L)	0.9	Meter
Depths to:		
water level (DTW)	3.53	Meter
top of screen (TOS)	3.95	Meter
base of aquifer (DTB)	4.85	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

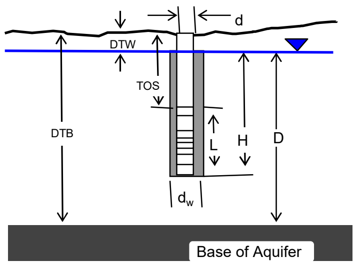
COMPUTED

L_{wetted}	0.9	Meter
D =	1.32	Meter
H =	1.32	Meter
L/r_w =	12.41	-
$y_{0\text{-DISPLACEMENT}}$ =	0.20	meter
$y_{0\text{-SLUG}}$ eff casing=	0.13	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.370	
ln(Re/rw) =	2.043	
Re =	1.84	meter
Slope =	0.005704	$\log_{10}$/sec
$t_{90\%}$ recovery =	175	sec

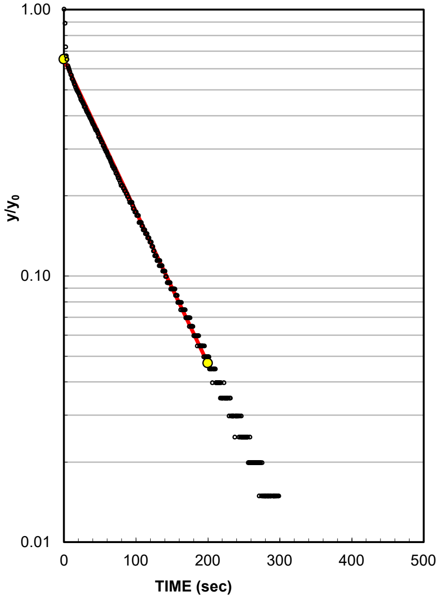
Input is consistent.

K =	3.2	meter/day

Observed slug discrepancy: 88%
Eff casing slug discrepancy: 42%



Adjust slope of line to estimate K

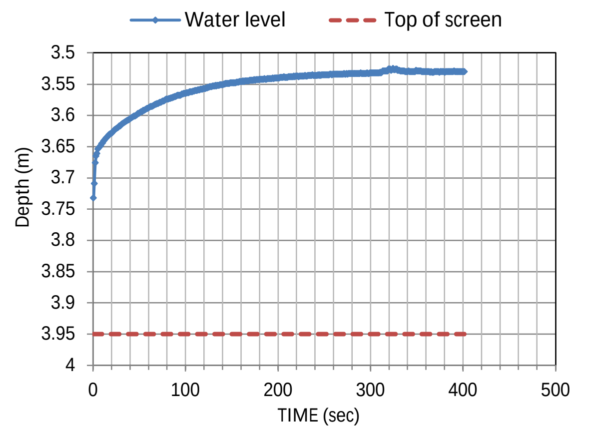


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 402

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.53	
Final obs:	0:06:42.0	3.525	0.005

Entry	Reduced Dataset		
1	0:00:01.0	3.732	0.202
11	0:00:11.0	3.644	0.114
21	0:00:21.0	3.628	0.098
31	0:00:31.0	3.615	0.085
41	0:00:41.0	3.605	0.075
51	0:00:51.0	3.596	0.066
61	0:01:01.0	3.588	0.058
71	0:01:11.0	3.581	0.051
81	0:01:21.0	3.574	0.044
91	0:01:31.0	3.569	0.039
101	0:01:41.0	3.565	0.035
111	0:01:51.0	3.560	0.030
121	0:02:01.0	3.557	0.027
131	0:02:11.0	3.553	0.023
141	0:02:21.0	3.551	0.021
151	0:02:31.0	3.548	0.018
161	0:02:41.0	3.546	0.016
171	0:02:51.0	3.544	0.014
181	0:03:01.0	3.542	0.012
191	0:03:11.0	3.541	0.011
201	0:03:21.0	3.540	0.010
211	0:03:31.0	3.539	0.009
221	0:03:41.0	3.537	0.007
231	0:03:51.0	3.537	0.007
241	0:04:01.0	3.536	0.006
251	0:04:11.0	3.535	0.005
261	0:04:21.0	3.534	0.004
271	0:04:31.0	3.534	0.004
281	0:04:41.0	3.533	0.003
291	0:04:51.0	3.533	0.003
301	0:05:01.0	3.532	0.002
311	0:05:11.0	3.531	0.001
321	0:05:21.0	3.526	0.004
331	0:05:31.0	3.528	0.002
341	0:05:41.0	3.530	0.000
351	0:05:51.0	3.529	0.001
361	0:06:01.0	3.530	0.000
371	0:06:11.0	3.530	0.000
381	0:06:21.0	3.531	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.65
Observed drawdown (m)	0.2020
Inferred drawdown for formation (m)	0.1313
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0008
Vol. filter pack that recharged water originated from (m3)	0.0018
Specific yield of filter pack (-)	0.43
Effective casing radius (m)	0.050
Effective casing diameter (m)	0.099

Butler, 1997

Effective casing radius (m)	0.050
Effective casing diameter (m)	0.099

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

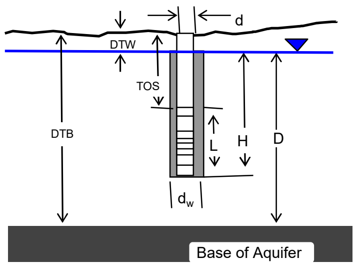
REMARKS:

Top of screen in well is at 2.5m bgl (3.35m btoc) but adjusted to 3.1m (3.95m btoc) because sandy clay to 3.1m depth likely does not contribute to flows in/out of the well.

Site:	Riverlea	Well ID:	MW01-Q1	Test No:	FH-1
				Date:	05/10/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.122	Meter
Total screen length (L)	1.1	Meter
Depths to:		
water level (DTW)	3.52	Meter
top of screen (TOS)	6.3	Meter
base of aquifer (DTB)	7.4	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	1.1	Meter
D =	3.88	Meter
H =	3.88	Meter
L/r_w =	15.17	-
$y_{0\text{-DISPLACEMENT}}$ =	3.24	meter
$y_{0\text{-SLUG}}$ eff casing=	0.87	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	1.519	
ln(Re/rw) =	2.656	
Re =	3.39	meter
Slope =	0.00695	$\log_{10}$/sec
$t_{90\%}$ recovery =	144	sec

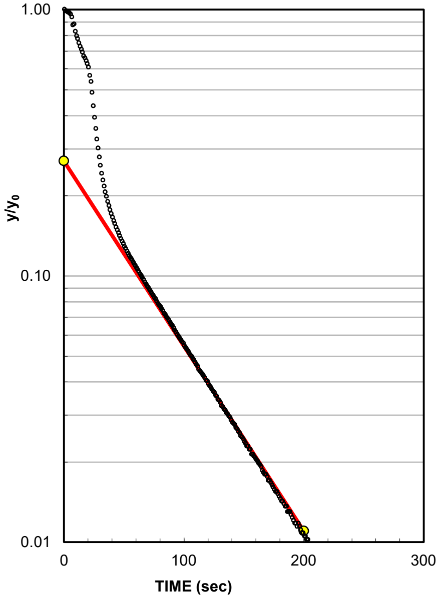
Input is consistent.

K =	**6.2**	**meter/day**

Observed slug discrepancy: 46%

Eff casing slug discrepancy: 115%

Adjust slope of line to estimate K



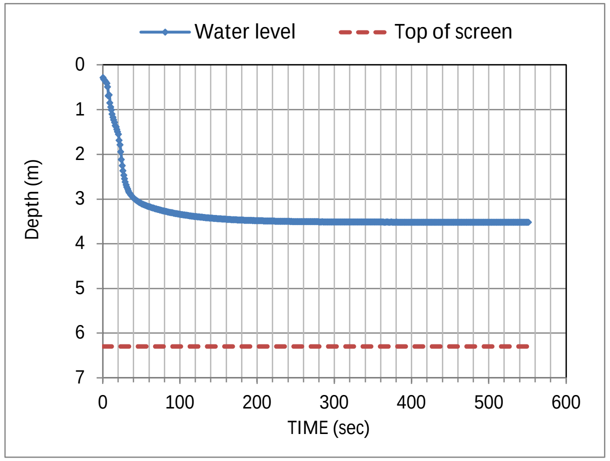
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 552

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.52	
Final obs:	0:09:12.0	3.521	-0.001

Entry	Reduced Dataset		
1	0:00:01.0	0.285	3.235
14	0:00:14.0	1.173	2.347
27	0:00:27.0	2.367	1.153
40	0:00:40.0	2.967	0.553
53	0:00:53.0	3.120	0.400
66	0:01:06.0	3.202	0.318
79	0:01:19.0	3.266	0.254
92	0:01:32.0	3.314	0.206
105	0:01:45.0	3.354	0.166
118	0:01:58.0	3.386	0.134
131	0:02:11.0	3.412	0.108
144	0:02:24.0	3.433	0.087
157	0:02:37.0	3.451	0.069
170	0:02:50.0	3.463	0.057
183	0:03:03.0	3.474	0.046
196	0:03:16.0	3.482	0.038
209	0:03:29.0	3.490	0.030
222	0:03:42.0	3.496	0.024
235	0:03:55.0	3.501	0.019
248	0:04:08.0	3.504	0.016
261	0:04:21.0	3.507	0.013
274	0:04:34.0	3.509	0.011
287	0:04:47.0	3.511	0.009
300	0:05:00.0	3.512	0.008
313	0:05:13.0	3.514	0.006
326	0:05:26.0	3.515	0.005
339	0:05:39.0	3.516	0.004
352	0:05:52.0	3.517	0.003
365	0:06:05.0	3.518	0.002
378	0:06:18.0	3.518	0.002
391	0:06:31.0	3.518	0.002
404	0:06:44.0	3.518	0.002
417	0:06:57.0	3.519	0.001
430	0:07:10.0	3.519	0.001
443	0:07:23.0	3.519	0.001
456	0:07:36.0	3.520	0.000
469	0:07:49.0	3.520	0.000
482	0:08:02.0	3.520	0.000
495	0:08:15.0	3.520	0.000



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.27
Observed drawdown (m)	3.2350
Inferred drawdown for formation (m)	0.8735
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0085
Vol. filter pack that recharged water originated from (m3)	0.0117
Specific yield of filter pack (-)	0.72
Effective casing radius (m)	0.061
Effective casing diameter (m)	0.122

Butler, 1997

Effective casing radius (m)	0.061
Effective casing diameter (m)	0.122

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

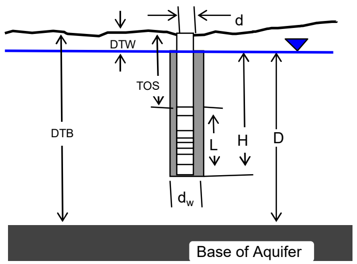
REMARKS:

Base of screen in well is 7.15m bgl (7.85m btoc) but base of sandy gravel is 6.6m bgl so effective base of screen set to 6.6m bgl (7.4m btoc). Top of screen 5.65m bgl but aquifer (sandy gravel) fully saturated from 5.5 to 6.6m bgl (6.3 to 7.4m btoc) so effective top of screen set at 5.5m bgl (6.3m btoc).

Site:	**Riverlea**	**Well ID:**	**MW01-Q1**	**Test No:**	**RH-1**
				Date:	**05/10/2023**
				Fieldwork by:	**LBWco**
				Processed by:	**JL**
				Checked by:	
				Test type (rising/falling):	**Rising**

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.052	Meter
Total screen length (L)	1.1	Meter
Depths to:		
water level (DTW)	3.526	Meter
top of screen (TOS)	6.3	Meter
base of aquifer (DTB)	7.4	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

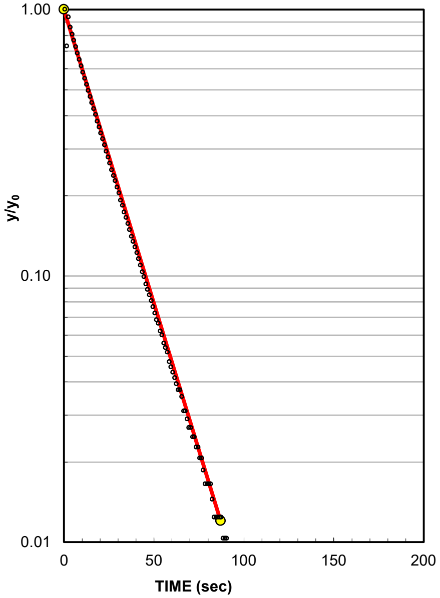
L_{wetted}	1.1	Meter
D =	3.874	Meter
H =	3.874	Meter
L/r_w =	15.17	-
$y_{0\text{-DISPLACEMENT}}$ =	0.48	meter
$y_{0\text{-SLUG}}$ eff casing=	0.48	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.519	
ln(Re/rw) =	2.655	
Re =	3.39	meter
Slope =	0.022078	$\log_{10}$/sec
$t_{90\%}$ recovery =	45	sec

Input is consistent.

K =	**3.5**	**meter/day**

Observed slug discrepancy: 7%
Eff casing slug discrepancy: 0%

Adjust slope of line to estimate K

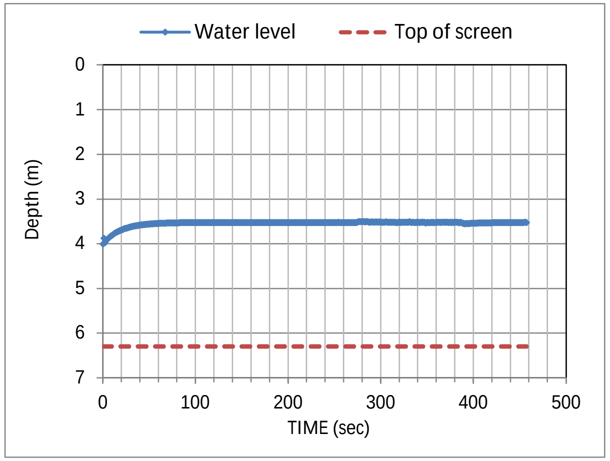


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 458

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.526	
Final obs:	0:07:38.0	3.504	0.022

Entry	Reduced Dataset		
1	0:00:01.0	4.010	0.484
12	0:00:12.0	3.793	0.267
23	0:00:23.0	3.676	0.150
34	0:00:34.0	3.610	0.084
45	0:00:45.0	3.574	0.048
56	0:00:56.0	3.553	0.027
67	0:01:07.0	3.541	0.015
78	0:01:18.0	3.535	0.009
89	0:01:29.0	3.531	0.005
100	0:01:40.0	3.529	0.003
111	0:01:51.0	3.528	0.002
122	0:02:02.0	3.527	0.001
133	0:02:13.0	3.527	0.001
144	0:02:24.0	3.527	0.001
155	0:02:35.0	3.527	0.001
166	0:02:46.0	3.526	0.000
177	0:02:57.0	3.527	0.001
188	0:03:08.0	3.526	0.000
199	0:03:19.0	3.527	0.001
210	0:03:30.0	3.527	0.001
221	0:03:41.0	3.526	0.000
232	0:03:52.0	3.526	0.000
243	0:04:03.0	3.527	0.001
254	0:04:14.0	3.526	0.000
265	0:04:25.0	3.526	0.000
276	0:04:36.0	3.516	0.010
287	0:04:47.0	3.510	0.016
298	0:04:58.0	3.520	0.006
309	0:05:09.0	3.521	0.005
320	0:05:20.0	3.521	0.005
331	0:05:31.0	3.524	0.002
342	0:05:42.0	3.525	0.001
353	0:05:53.0	3.530	0.004
364	0:06:04.0	3.524	0.002
375	0:06:15.0	3.525	0.001
386	0:06:26.0	3.530	0.004
397	0:06:37.0	3.547	0.021
408	0:06:48.0	3.538	0.012
419	0:06:59.0	3.533	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.4840
Inferred drawdown for formation (m)	0.4840
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0001
Vol. filter pack that recharged water originated from (m3)	0.0065
Specific yield of filter pack (-)	0.01
Effective casing radius (m)	0.026
Effective casing diameter (m)	0.052

Butler, 1997

Effective casing radius (m)	0.026
Effective casing diameter (m)	0.052

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

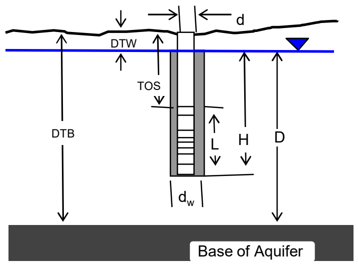
REMARKS:

Base of screen in well is 7.15m bgl (7.85m btoc) but base of sandy gravel is 6.6m bgl so effective base of screen set to 6.6m bgl (7.4m btoc). Top of screen 5.65m bgl but aquifer (sandy gravel) fully saturated from 5.5 to 6.6m bgl (6.3 to 7.4m btoc) so effective top of screen set at 5.5m bgl (6.3m btoc).

Site:	**Riverlea**	**Well ID:**	**MW01-Q1**	**Test No:**	**RH-2**
				Date:	**05/10/2023**
				Fieldwork by:	**LBWco**
				Processed by:	**JL**
				Checked by:	
				Test type (rising/falling):	**Rising**

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1.1	Meter
Depths to:		
water level (DTW)	3.526	Meter
top of screen (TOS)	6.3	Meter
base of aquifer (DTB)	7.4	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	1.1	Meter
D =	3.874	Meter
H =	3.874	Meter
L/r_w =	15.17	-
$y_{0\text{-DISPLACEMENT}}$ =	0.52	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.519	
ln(Re/rw) =	2.655	
Re =	3.39	meter
Slope =	0.023142	log_{10}/sec
$t_{90\%}$ recovery =	43	sec

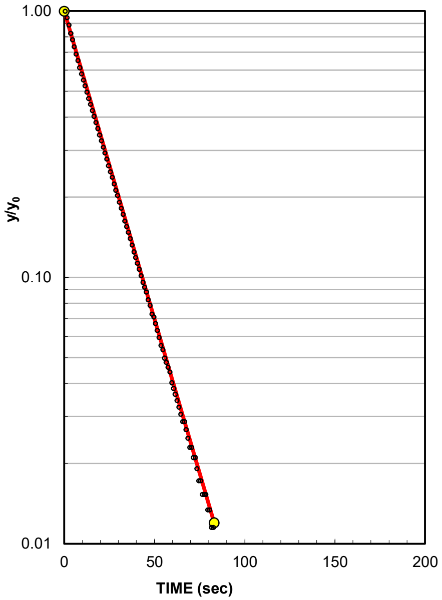
Input is consistent.

K =	**3.5**	**meter/day**

Observed slug discrepancy: 1%

Eff casing slug discrepancy: 0%

Adjust slope of line to estimate K

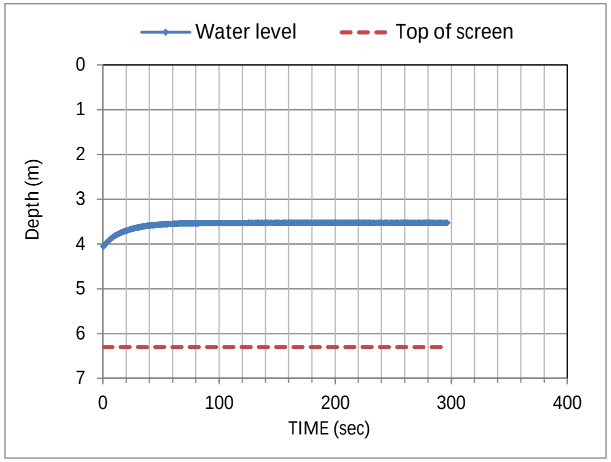


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 297

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.526	
Final obs:	0:04:57.0	3.525	0.001

Entry	Reduced Dataset		
1	0:00:01.0	4.047	0.521
8	0:00:08.0	3.866	0.340
15	0:00:15.0	3.759	0.233
22	0:00:22.0	3.687	0.161
29	0:00:29.0	3.637	0.111
36	0:00:36.0	3.603	0.077
43	0:00:43.0	3.579	0.053
50	0:00:50.0	3.563	0.037
57	0:00:57.0	3.551	0.025
64	0:01:04.0	3.543	0.017
71	0:01:11.0	3.538	0.012
78	0:01:18.0	3.534	0.008
85	0:01:25.0	3.531	0.005
92	0:01:32.0	3.530	0.004
99	0:01:39.0	3.528	0.002
106	0:01:46.0	3.527	0.001
113	0:01:53.0	3.527	0.001
120	0:02:00.0	3.526	0.000
127	0:02:07.0	3.525	0.001
134	0:02:14.0	3.525	0.001
141	0:02:21.0	3.525	0.001
148	0:02:28.0	3.526	0.000
155	0:02:35.0	3.525	0.001
162	0:02:42.0	3.525	0.001
169	0:02:49.0	3.525	0.001
176	0:02:56.0	3.525	0.001
183	0:03:03.0	3.525	0.001
190	0:03:10.0	3.525	0.001
197	0:03:17.0	3.525	0.001
204	0:03:24.0	3.525	0.001
211	0:03:31.0	3.525	0.001
218	0:03:38.0	3.525	0.001
225	0:03:45.0	3.525	0.001
232	0:03:52.0	3.526	0.000
239	0:03:59.0	3.525	0.001
246	0:04:06.0	3.525	0.001
253	0:04:13.0	3.525	0.001
260	0:04:20.0	3.525	0.001
267	0:04:27.0	3.525	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.5210
Inferred drawdown for formation (m)	0.5210
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0000
Vol. filter pack that recharged water originated from (m3)	0.0070
Specific yield of filter pack (-)	0.00
Effective casing radius (m)	0.025
Effective casing diameter (m)	0.050

Butler, 1997

Effective casing radius (m)	0.025
Effective casing diameter (m)	0.050

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

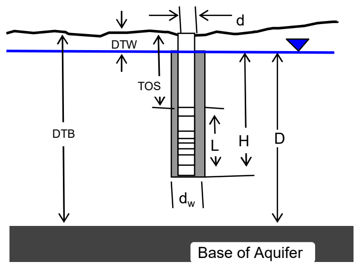
REMARKS:

Base of screen in well is 7.15m bgl (7.85m btoc) but base of sandy gravel is 6.6m bgl so effective base of screen set to 6.6m bgl (7.4m btoc). Top of screen 5.65m bgl but aquifer (sandy gravel) fully saturated from 5.5 to 6.6m bgl (6.3 to 7.4m btoc) so effective top of screen set at 5.5m bgl (6.3m btoc).

Site:	**Riverlea**	**Well ID:**	**MW02-Q1**
Test No:	**FH-1**		
Date:	**05/10/2023**		
Fieldwork by:	**LBWco**		
Processed by:	**JL**		
Checked by:			
Test type (rising/falling):	**Falling**		

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.109	Meter
Total screen length (L)	3	Meter
Depths to:		
water level (DTW)	4.28	Meter
top of screen (TOS)	4.95	Meter
base of aquifer (DTB)	7.95	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	3	Meter
D =	3.67	Meter
H =	3.67	Meter
L/r_w =	41.38	-
$y_{0\text{-DISPLACEMENT}}$ =	1.56	meter
$y_{0\text{-SLUG}}$ eff casing=	1.09	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	2.494	
ln(Re/rw) =	2.936	
Re =	4.49	meter
Slope =	0.011461	$\log_{10}$/sec
$t_{90\%}$ recovery =	87	sec

Input is consistent.

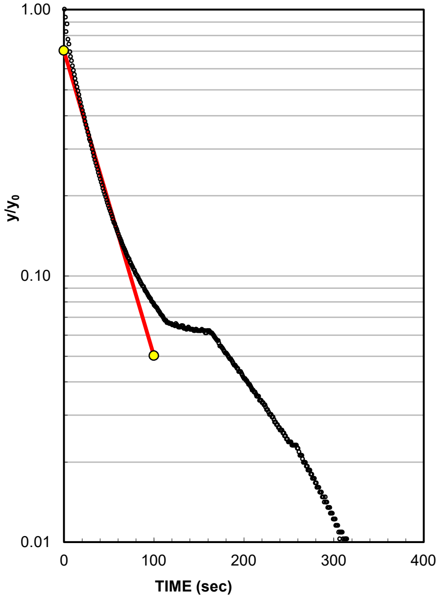
K =	**3.3**	**meter/day**

Observed slug discrepancy: 107%

Eff casing slug discrepancy: 35%

K= 3.3 is less than likely minimum of 6.09 for Medium Sand

Adjust slope of line to estimate K



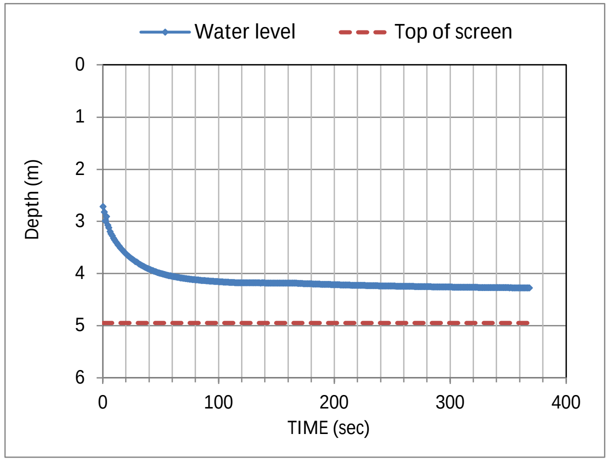
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 369

	Elapsed time	Water Level	Draw-down
	Hr:Min:Sec	Meter	Meter
Pre-start	0:00:00.0	4.28	
Final obs:	0:06:09.0	4.277	0.003

Entry	Reduced Dataset		
1	0:00:01.0	2.719	1.561
10	0:00:10.0	3.323	0.957
19	0:00:19.0	3.582	0.698
28	0:00:28.0	3.755	0.525
37	0:00:37.0	3.878	0.402
46	0:00:46.0	3.965	0.315
55	0:00:55.0	4.026	0.254
64	0:01:04.0	4.069	0.211
73	0:01:13.0	4.100	0.180
82	0:01:22.0	4.124	0.156
91	0:01:31.0	4.143	0.137
100	0:01:40.0	4.157	0.123
109	0:01:49.0	4.169	0.111
118	0:01:58.0	4.177	0.103
127	0:02:07.0	4.179	0.101
136	0:02:16.0	4.181	0.099
145	0:02:25.0	4.183	0.097
154	0:02:34.0	4.182	0.098
163	0:02:43.0	4.184	0.096
172	0:02:52.0	4.191	0.089
181	0:03:01.0	4.200	0.080
190	0:03:10.0	4.208	0.072
199	0:03:19.0	4.214	0.066
208	0:03:28.0	4.220	0.060
217	0:03:37.0	4.225	0.055
226	0:03:46.0	4.231	0.049
235	0:03:55.0	4.236	0.044
244	0:04:04.0	4.240	0.040
253	0:04:13.0	4.243	0.037
262	0:04:22.0	4.246	0.034
271	0:04:31.0	4.250	0.030
280	0:04:40.0	4.254	0.026
289	0:04:49.0	4.257	0.023
298	0:04:58.0	4.260	0.020
307	0:05:07.0	4.264	0.016
316	0:05:16.0	4.265	0.015
325	0:05:25.0	4.268	0.012
334	0:05:34.0	4.270	0.010
343	0:05:43.0	4.272	0.008



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.70
Observed drawdown (m)	1.5610
Inferred drawdown for formation (m)	1.0927
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0080
Vol. filter pack that recharged water originated from (m3)	0.0146
Specific yield of filter pack (-)	0.55
Effective casing radius (m)	0.054
Effective casing diameter (m)	0.109

Butler, 1997

Effective casing radius (m)	0.054
Effective casing diameter (m)	0.109

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

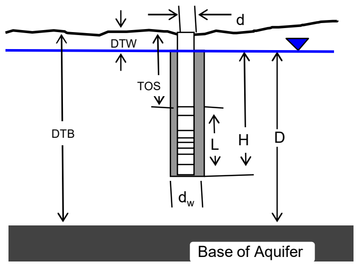
REMARKS:

Base of screen in well is 7.5m bgl (8.45m btoc) but base of sand is 7m bgl so effective base of screen set to 7m bgl (7.95m btoc). Top of screen 3m bgl but aquifer (sand) starts at 4m bgl so effective top of screen set at 4m bgl (4.95m btoc).

Site:	Riverlea	Well ID:	MW02-Q1	Test No:	FH-2
				Date:	05/10/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.073	Meter
Total screen length (L)	3	Meter
Depths to:		
water level (DTW)	4.28	Meter
top of screen (TOS)	4.95	Meter
base of aquifer (DTB)	7.95	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	3	Meter
D =	3.67	Meter
H =	3.67	Meter
L/r_w =	41.38	-
$y_{0\text{-DISPLACEMENT}}$ =	2.44	meter
$y_{0\text{-SLUG}}$ eff casing=	2.44	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	2.494	
ln(Re/rw) =	2.936	
Re =	4.49	meter
Slope =	0.01	$\log_{10}$/sec
$t_{90\%}$ recovery =	100	sec

Input is consistent.

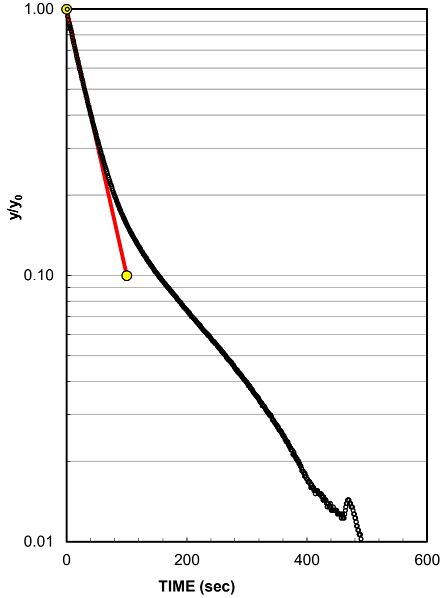
K =	1.3	meter/day

Observed slug discrepancy: 72%

Eff casing slug discrepancy: 0%

K= 1.3 is less than likely minimum of 6.09 for Medium Sand

Adjust slope of line to estimate K



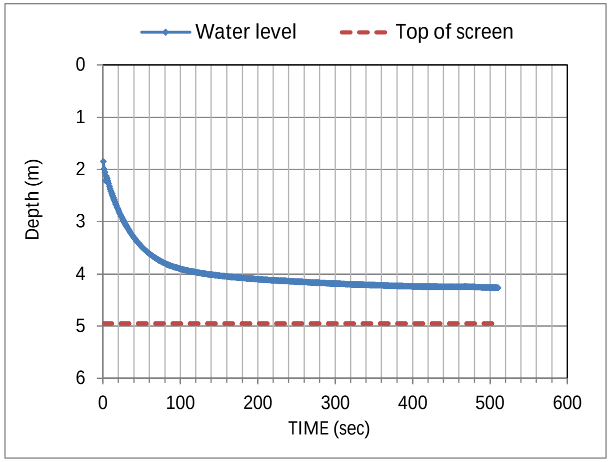
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 511

	Elapsed time	Water Level	Draw-down
	Hr:Min:Sec	Meter	Meter
Pre-start	0:00:00.0	4.28	
Final obs:	0:08:31.0	4.264	0.016

Entry	Reduced Dataset		
1	0:00:01.0	1.843	2.437
13	0:00:13.0	2.500	1.780
25	0:00:25.0	2.920	1.360
37	0:00:37.0	3.228	1.052
49	0:00:49.0	3.453	0.827
61	0:01:01.0	3.619	0.661
73	0:01:13.0	3.738	0.542
85	0:01:25.0	3.825	0.455
97	0:01:37.0	3.887	0.393
109	0:01:49.0	3.932	0.348
121	0:02:01.0	3.968	0.312
133	0:02:13.0	3.997	0.283
145	0:02:25.0	4.022	0.258
157	0:02:37.0	4.042	0.238
169	0:02:49.0	4.061	0.219
181	0:03:01.0	4.076	0.204
193	0:03:13.0	4.091	0.189
205	0:03:25.0	4.105	0.175
217	0:03:37.0	4.117	0.163
229	0:03:49.0	4.129	0.151
241	0:04:01.0	4.139	0.141
253	0:04:13.0	4.149	0.131
265	0:04:25.0	4.158	0.122
277	0:04:37.0	4.167	0.113
289	0:04:49.0	4.176	0.104
301	0:05:01.0	4.184	0.096
313	0:05:13.0	4.192	0.088
325	0:05:25.0	4.199	0.081
337	0:05:37.0	4.206	0.074
349	0:05:49.0	4.213	0.067
361	0:06:01.0	4.219	0.061
373	0:06:13.0	4.225	0.055
385	0:06:25.0	4.231	0.049
397	0:06:37.0	4.236	0.044
409	0:06:49.0	4.241	0.039
421	0:07:01.0	4.243	0.037
433	0:07:13.0	4.246	0.034
445	0:07:25.0	4.248	0.032
457	0:07:37.0	4.250	0.030



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	2.4370
Inferred drawdown for formation (m)	2.4370
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0054
Vol. filter pack that recharged water originated from (m3)	0.0326
Specific yield of filter pack (-)	0.17
Effective casing radius (m)	0.036
Effective casing diameter (m)	0.073

Butler, 1997

Effective casing radius (m)	0.036
Effective casing diameter (m)	0.073

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Base of screen in well is 7.5m bgl (8.45m btoc) but base of sand is 7m bgl so effective base of screen set to 7m bgl (7.95m btoc). Top of screen 3m bgl but aquifer (sand) starts at 4m bgl so effective top of screen set at 4m bgl (4.95m btoc).

Site:	**Riverlea**	**Well ID:**	**MW02-Q1**
Test No:	**RH-1**		
Date:	**05/10/2023**		
Fieldwork by:	**LBWco**		
Processed by:	**JL**		
Checked by:			
Test type (rising/falling):	**Rising**		

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.095	Meter
Total screen length (L)	3	Meter
Depths to:		
water level (DTW)	4.28	Meter
top of screen (TOS)	4.95	Meter
base of aquifer (DTB)	7.95	Meter
'Slug' details:		
length	0.75	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

COMPUTED

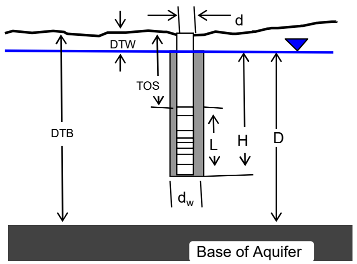
L_{wetted}	3	Meter
D =	3.67	Meter
H =	3.67	Meter
L/r_w =	41.38	-
$y_{0\text{-DISPLACEMENT}}$ =	0.24	meter
$y_{0\text{-SLUG}}$ eff casing=	0.11	meter
$y_{0\text{-SLUG}}$ =	0.39	meter
Fully penetrate C =	2.494	
ln(Re/rw) =	2.936	
Re =	4.49	meter
Slope =	0.05166	$\log_{10}$/sec
$t_{90\%}$ recovery =	19	sec

Input is consistent.

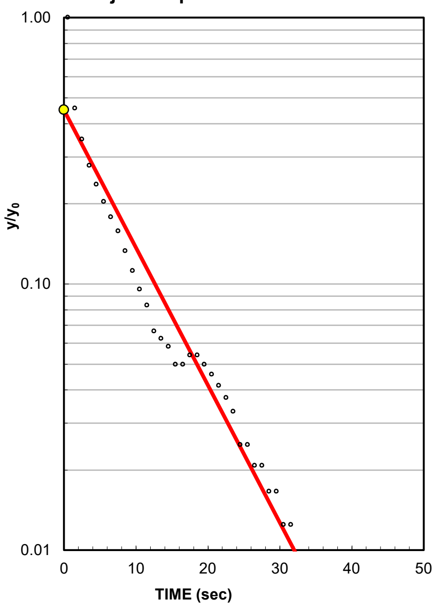
K =	**11**	**meter/day**

Observed slug discrepancy: 47%

Eff casing slug discrepancy: 76%



Adjust slope of line to estimate K



Bouwer and Rice analysis of slug test, WRR 1976

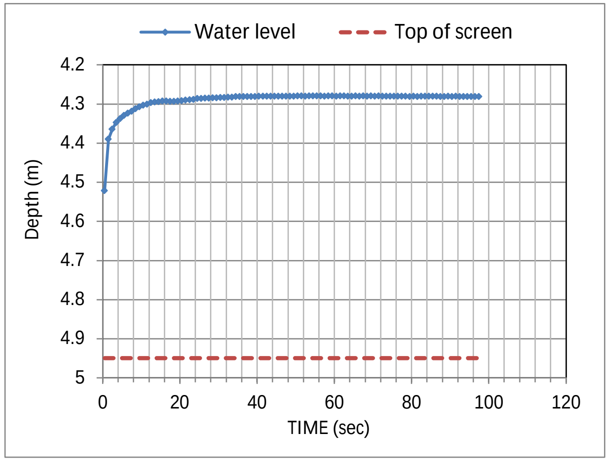
Spreadsheet adapted from one developed by USGS

No. of data points: 98

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.28	
Final obs:	0:01:38.0	4.279	0.001

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	4.521	0.241
3	0:00:03.0	4.364	0.084
5	0:00:05.0	4.337	0.057
7	0:00:07.0	4.323	0.043
9	0:00:09.0	4.312	0.032
11	0:00:11.0	4.303	0.023
13	0:00:13.0	4.296	0.016
15	0:00:15.0	4.294	0.014
17	0:00:17.0	4.292	0.012
19	0:00:19.0	4.293	0.013
21	0:00:21.0	4.291	0.011
23	0:00:23.0	4.289	0.009
25	0:00:25.0	4.286	0.006
27	0:00:27.0	4.285	0.005
29	0:00:29.0	4.284	0.004
31	0:00:31.0	4.283	0.003
33	0:00:33.0	4.282	0.002
35	0:00:35.0	4.281	0.001
37	0:00:37.0	4.281	0.001
39	0:00:39.0	4.281	0.001
41	0:00:41.0	4.280	0.000
43	0:00:43.0	4.280	0.000
45	0:00:45.0	4.280	0.000
47	0:00:47.0	4.280	0.000
49	0:00:49.0	4.280	0.000
51	0:00:51.0	4.279	0.001
53	0:00:53.0	4.280	0.000
55	0:00:55.0	4.279	0.001
57	0:00:57.0	4.279	0.001
59	0:00:59.0	4.279	0.001
61	0:01:01.0	4.280	0.000
63	0:01:03.0	4.279	0.001
65	0:01:05.0	4.280	0.000
67	0:01:07.0	4.280	0.000
69	0:01:09.0	4.280	0.000
71	0:01:11.0	4.280	0.000
73	0:01:13.0	4.280	0.000
75	0:01:15.0	4.280	0.000
77	0:01:17.0	4.280	0.000



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.45
Observed drawdown (m)	0.2410
Inferred drawdown for formation (m)	0.1085
Expected displacement based on slug volume (m)	0.3888
Vol. water recharged by filter pack (m3)	0.0006
Vol. filter pack that recharged water originated from (m3)	0.0015
Specific yield of filter pack (-)	0.38
Effective casing radius (m)	0.047
Effective casing diameter (m)	0.095

Butler, 1997

Effective casing radius (m)	0.047
Effective casing diameter (m)	0.095

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Base of screen in well is 7.5m bgl (8.45m btoc) but base of sand is 7m bgl so effective base of screen set to 7m bgl (7.95m btoc). Top of screen 3m bgl but aquifer (sand) starts at 4m bgl so effective top of screen set at 4m bgl (4.95m btoc).

Site: Riverlea **Well ID:** MW02-Q1 **Test No:** RH-2

Date:	05/10/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.112	Meter
Total screen length (L)	3	Meter
Depths to:		
water level (DTW)	4.28	Meter
top of screen (TOS)	4.95	Meter
base of aquifer (DTB)	7.95	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

COMPUTED

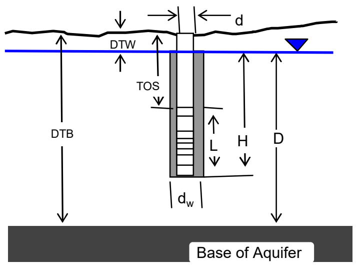
L_{wetted}	3	Meter
D =	3.67	Meter
H =	3.67	Meter
L/r_w =	41.38	-
$y_{0\text{-DISPLACEMENT}}$ =	0.23	meter
$y_{0\text{-SLUG}}$ eff casing=	0.10	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.494	
ln(Re/rw) =	2.936	
Re =	4.49	meter
Slope =	0.046362	$\log_{10}$/sec
$t_{90\%}$ recovery =	22	sec

Input is consistent.

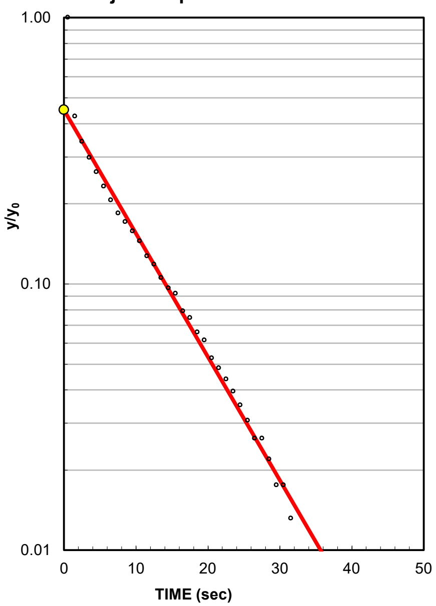
K =	**14**	**meter/day**

Observed slug discrepancy: 78%

Eff casing slug discrepancy: 76%



Adjust slope of line to estimate K



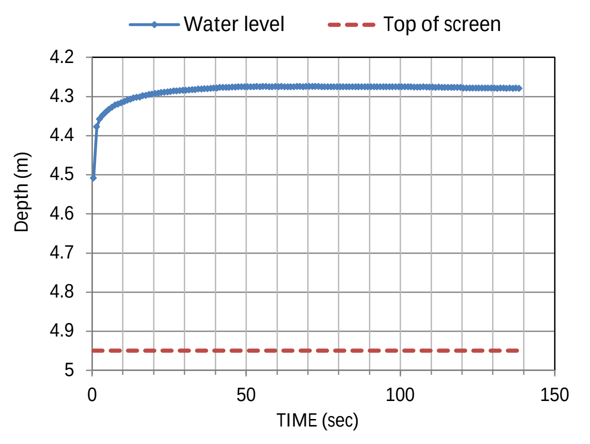
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 139

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.28	
Final obs:	0:02:19.0	4.274	0.006

Entry	Reduced Dataset		
1	0:00:01.0	4.508	0.228
4	0:00:04.0	4.348	0.068
7	0:00:07.0	4.327	0.047
10	0:00:10.0	4.316	0.036
13	0:00:13.0	4.307	0.027
16	0:00:16.0	4.301	0.021
19	0:00:19.0	4.295	0.015
22	0:00:22.0	4.291	0.011
25	0:00:25.0	4.288	0.008
28	0:00:28.0	4.286	0.006
31	0:00:31.0	4.284	0.004
34	0:00:34.0	4.282	0.002
37	0:00:37.0	4.280	0.000
40	0:00:40.0	4.278	0.002
43	0:00:43.0	4.277	0.003
46	0:00:46.0	4.276	0.004
49	0:00:49.0	4.275	0.005
52	0:00:52.0	4.275	0.005
55	0:00:55.0	4.275	0.005
58	0:00:58.0	4.275	0.005
61	0:01:01.0	4.275	0.005
64	0:01:04.0	4.275	0.005
67	0:01:07.0	4.274	0.006
70	0:01:10.0	4.274	0.006
73	0:01:13.0	4.274	0.006
76	0:01:16.0	4.275	0.005
79	0:01:19.0	4.275	0.005
82	0:01:22.0	4.275	0.005
85	0:01:25.0	4.275	0.005
88	0:01:28.0	4.275	0.005
91	0:01:31.0	4.275	0.005
94	0:01:34.0	4.275	0.005
97	0:01:37.0	4.275	0.005
100	0:01:40.0	4.275	0.005
103	0:01:43.0	4.275	0.005
106	0:01:46.0	4.276	0.004
109	0:01:49.0	4.276	0.004
112	0:01:52.0	4.277	0.003
115	0:01:55.0	4.277	0.003



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.45
Observed drawdown (m)	0.2280
Inferred drawdown for formation (m)	0.1026
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0008
Vol. filter pack that recharged water originated from (m3)	0.0014
Specific yield of filter pack (-)	0.59
Effective casing radius (m)	0.056
Effective casing diameter (m)	0.112

Butler, 1997

Effective casing radius (m)	0.056
Effective casing diameter (m)	0.112

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Base of screen in well is 7.5m bgl (8.45m btoc) but base of sand is 7m bgl so effective base of screen set to 7m bgl (7.95m btoc). Top of screen 3m bgl but aquifer (sand) starts at 4m bgl so effective top of screen set at 4m bgl (4.95m btoc).

Site:	Riverlea	Well ID:	MW03-Q1	Test No:	FH-1
				Date:	05/10/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.089	Meter
Total screen length (L)	2	Meter
Depths to:		
water level (DTW)	4.91	Meter
top of screen (TOS)	4.8	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

COMPUTED

L_{wetted}	1.89	Meter
D =	1.89	Meter
H =	1.89	Meter
L/r_w =	26.07	-
$y_{0\text{-DISPLACEMENT}}$ =	2.95	meter
$y_{0\text{-SLUG}}$ eff casing=	1.62	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	1.944	
ln(Re/rw) =	2.428	
Re =	2.70	meter
Slope =	0.00232	$\log_{10}$/sec
$t_{90\%}$ recovery =	431	sec

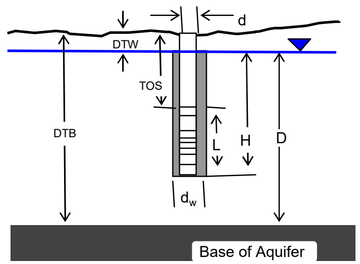
Input is consistent.

K =	0.59	meter/day

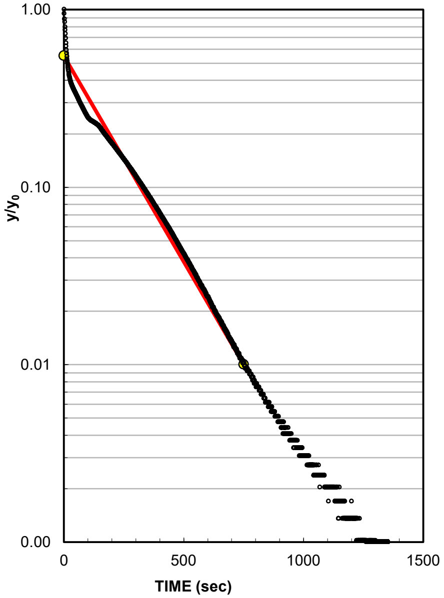
Observed slug discrepancy: 55%

Eff casing slug discrepancy: 58%

K= 0.59 is less than likely minimum of 0.914 for Fine Sand



Adjust slope of line to estimate K



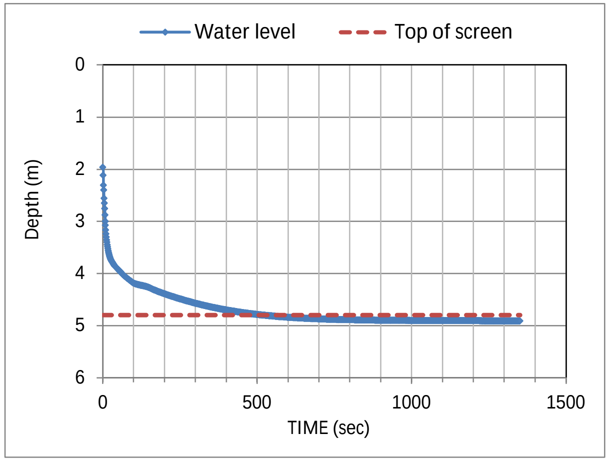
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 1352

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.91	
Final obs:	0:22:32.0	4.909	0.001

Entry	Reduced Dataset		
1	0:00:01.0	1.963	2.947
34	0:00:34.0	3.805	1.105
67	0:01:07.0	4.023	0.887
100	0:01:40.0	4.180	0.730
133	0:02:13.0	4.237	0.673
166	0:02:46.0	4.311	0.599
199	0:03:19.0	4.385	0.525
232	0:03:52.0	4.452	0.458
265	0:04:25.0	4.511	0.399
298	0:04:58.0	4.565	0.345
331	0:05:31.0	4.614	0.296
364	0:06:04.0	4.657	0.253
397	0:06:37.0	4.695	0.215
430	0:07:10.0	4.728	0.182
463	0:07:43.0	4.757	0.153
496	0:08:16.0	4.783	0.127
529	0:08:49.0	4.803	0.107
562	0:09:22.0	4.822	0.088
595	0:09:55.0	4.836	0.074
628	0:10:28.0	4.850	0.060
661	0:11:01.0	4.860	0.050
694	0:11:34.0	4.869	0.041
727	0:12:07.0	4.876	0.034
760	0:12:40.0	4.882	0.028
793	0:13:13.0	4.886	0.024
826	0:13:46.0	4.890	0.020
859	0:14:19.0	4.893	0.017
892	0:14:52.0	4.895	0.015
925	0:15:25.0	4.898	0.012
958	0:15:58.0	4.899	0.011
991	0:16:31.0	4.900	0.010
1024	0:17:04.0	4.902	0.008
1057	0:17:37.0	4.903	0.007
1090	0:18:10.0	4.904	0.006
1123	0:18:43.0	4.904	0.006
1156	0:19:16.0	4.905	0.005
1189	0:19:49.0	4.906	0.004
1222	0:20:22.0	4.907	0.003
1255	0:20:55.0	4.907	0.003



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.55
Observed drawdown (m)	2.9470
Inferred drawdown for formation (m)	1.6209
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0070
Vol. filter pack that recharged water originated from (m3)	0.0217
Specific yield of filter pack (-)	0.32
Effective casing radius (m)	0.045
Effective casing diameter (m)	0.089

Butler, 1997

Effective casing radius (m)	0.045
Effective casing diameter (m)	0.089

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	156%

REMARKS:

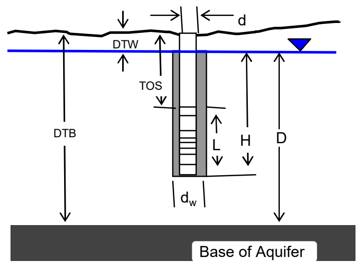
Base of screen in well is 6.5m bgl (7.3m btoc) but base of sand is 6m so effective base of screen set to 6m bgl (6.8m btoc). Top of screen 4m bgl (4.8m btoc) at inferred top of Q1.

Site: Riverlea **Well ID:** MW03-Q1 **Test No:** FH-2

Date:	05/10/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.085	Meter
Total screen length (L)	2	Meter
Depths to:		
water level (DTW)	4.91	Meter
top of screen (TOS)	4.8	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	1.89	Meter
D =	1.89	Meter
H =	1.89	Meter
L/r_w =	26.07	-
$y_{0\text{-DISPLACEMENT}}$ =	1.80	meter
$y_{0\text{-SLUG}}$ eff casing=	0.90	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	1.944	
ln(Re/rw) =	2.428	
Re =	2.70	meter
Slope =	0.002265	$\log_{10}$/sec
$t_{90\%}$ recovery =	441	sec

Input is consistent.

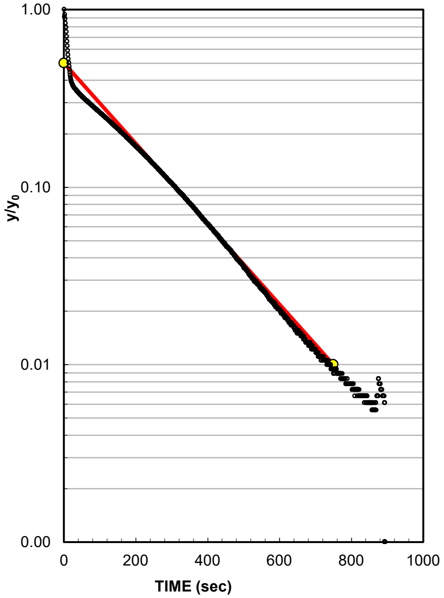
K =	**0.52**	**meter/day**

Observed slug discrepancy: 36%

Eff casing slug discrepancy: 67%

K= 0.52 is less than likely minimum of 0.914 for Fine Sand

Adjust slope of line to estimate K



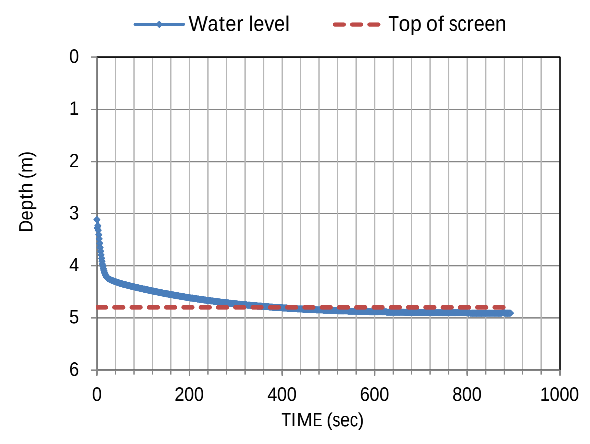
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 894

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.92	
Final obs:	0:14:54.0	4.91	0.01

Entry	Reduced Dataset		
1	0:00:01.0	3.116	1.804
23	0:00:23.0	4.229	0.691
45	0:00:45.0	4.319	0.601
67	0:01:07.0	4.375	0.545
89	0:01:29.0	4.422	0.498
111	0:01:51.0	4.466	0.454
133	0:02:13.0	4.506	0.414
155	0:02:35.0	4.544	0.376
177	0:02:57.0	4.579	0.341
199	0:03:19.0	4.612	0.308
221	0:03:41.0	4.641	0.279
243	0:04:03.0	4.669	0.251
265	0:04:25.0	4.694	0.226
287	0:04:47.0	4.717	0.203
309	0:05:09.0	4.738	0.182
331	0:05:31.0	4.758	0.162
353	0:05:53.0	4.776	0.144
375	0:06:15.0	4.792	0.128
397	0:06:37.0	4.806	0.114
419	0:06:59.0	4.819	0.101
441	0:07:21.0	4.831	0.089
463	0:07:43.0	4.840	0.080
485	0:08:05.0	4.850	0.070
507	0:08:27.0	4.858	0.062
529	0:08:49.0	4.866	0.054
551	0:09:11.0	4.872	0.048
573	0:09:33.0	4.878	0.042
595	0:09:55.0	4.883	0.037
617	0:10:17.0	4.886	0.034
639	0:10:39.0	4.890	0.030
661	0:11:01.0	4.893	0.027
683	0:11:23.0	4.896	0.024
705	0:11:45.0	4.899	0.021
727	0:12:07.0	4.901	0.019
749	0:12:29.0	4.903	0.017
771	0:12:51.0	4.905	0.015
793	0:13:13.0	4.906	0.014
815	0:13:35.0	4.907	0.013
837	0:13:57.0	4.909	0.011



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.50
Observed drawdown (m)	1.8040
Inferred drawdown for formation (m)	0.9020
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0033
Vol. filter pack that recharged water originated from (m3)	0.0121
Specific yield of filter pack (-)	0.27
Effective casing radius (m)	0.042
Effective casing diameter (m)	0.085

Butler, 1997

Effective casing radius (m)	0.042
Effective casing diameter (m)	0.085

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	95%

REMARKS:

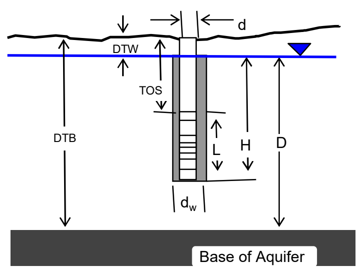
Base of screen in well is 6.5m bgl (7.3m btoc) but base of sand is 6m so effective base of screen set to 6m bgl (6.8m btoc). Top of screen 4m bgl (4.8m btoc) at inferred top of Q1.

Site: Riverlea **Well ID:** MW03-Q1 **Test No:** RH-1

Date:	05/10/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.110	Meter
Total screen length (L)	2	Meter
Depths to:		
water level (DTW)	4.91	Meter
top of screen (TOS)	4.8	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

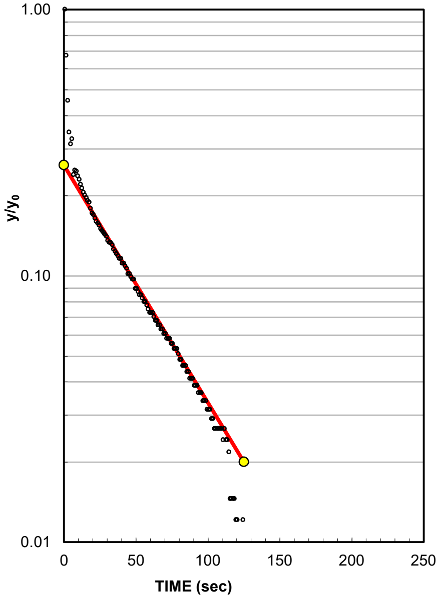
L_{wetted}	1.89	Meter
D =	1.89	Meter
H =	1.89	Meter
L/r_w =	26.07	-
$y_{0\text{-DISPLACEMENT}}$ =	0.41	meter
$y_{0\text{-SLUG}}$ eff casing=	0.11	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.944	
ln(Re/rw) =	2.428	
Re =	2.70	meter
Slope =	0.008912	$\log_{10}$/sec
$t_{90\%}$ recovery =	112	sec

Input is consistent.

K =	3.4	meter/day

Observed slug discrepancy: 23%
Eff casing slug discrepancy: 117%

Adjust slope of line to estimate K



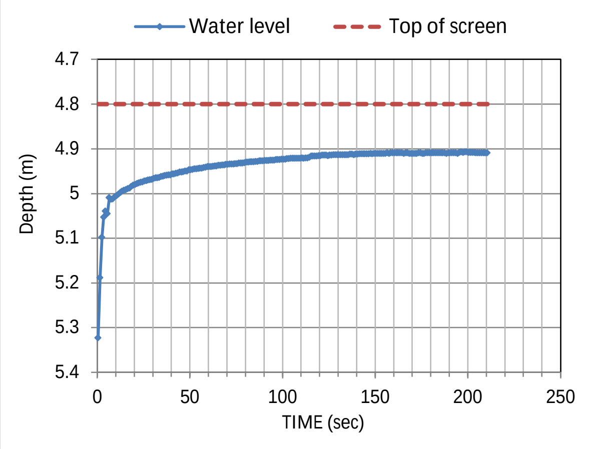
Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 211

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.91	
Final obs:	0:03:31.0	4.907	0.003

Reduced Dataset

Entry	Elapsed time	Water Level	Draw-down
1	0:00:01.0	5.323	0.413
6	0:00:06.0	5.045	0.135
11	0:00:11.0	5.005	0.095
16	0:00:16.0	4.991	0.081
21	0:00:21.0	4.980	0.070
26	0:00:26.0	4.972	0.062
31	0:00:31.0	4.966	0.056
36	0:00:36.0	4.961	0.051
41	0:00:41.0	4.956	0.046
46	0:00:46.0	4.952	0.042
51	0:00:51.0	4.947	0.037
56	0:00:56.0	4.943	0.033
61	0:01:01.0	4.940	0.030
66	0:01:06.0	4.937	0.027
71	0:01:11.0	4.935	0.025
76	0:01:16.0	4.933	0.023
81	0:01:21.0	4.930	0.020
86	0:01:26.0	4.928	0.018
91	0:01:31.0	4.926	0.016
96	0:01:36.0	4.925	0.015
101	0:01:41.0	4.923	0.013
106	0:01:46.0	4.921	0.011
111	0:01:51.0	4.920	0.010
116	0:01:56.0	4.916	0.006
121	0:02:01.0	4.915	0.005
126	0:02:06.0	4.914	0.004
131	0:02:11.0	4.913	0.003
136	0:02:16.0	4.913	0.003
141	0:02:21.0	4.912	0.002
146	0:02:26.0	4.911	0.001
151	0:02:31.0	4.910	0.000
156	0:02:36.0	4.910	0.000
161	0:02:41.0	4.909	0.001
166	0:02:46.0	4.910	0.000
171	0:02:51.0	4.910	0.000
176	0:02:56.0	4.910	0.000
181	0:03:01.0	4.909	0.001
186	0:03:06.0	4.909	0.001
191	0:03:11.0	4.909	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.26
Observed drawdown (m)	0.4130
Inferred drawdown for formation (m)	0.1074
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0008
Vol. filter pack that recharged water originated from (m3)	0.0014
Specific yield of filter pack (-)	0.56
Effective casing radius (m)	0.055
Effective casing diameter (m)	0.110

Butler, 1997

Effective casing radius (m)	0.055
Effective casing diameter (m)	0.110

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	22%

REMARKS:

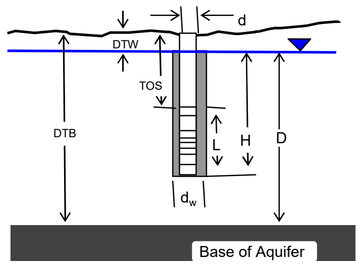
Base of screen in well is 6.5m bgl (7.3m btoc) but base of sand is 6m so effective base of screen set to 6m bgl (6.8m btoc). Top of screen 4m bgl (4.8m btoc) at inferred top of Q1.

Site: Riverlea **Well ID:** MW03-Q1 **Test No:** RH-2

Date:	05/10/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.100	Meter
Total screen length (L)	2	Meter
Depths to:		
water level (DTW)	4.91	Meter
top of screen (TOS)	4.8	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	0.6	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	1.89	Meter
D =	1.89	Meter
H =	1.89	Meter
L/r_w =	26.07	-
$y_{0\text{-DISPLACEMENT}}$ =	0.26	meter
$y_{0\text{-SLUG}}$ eff casing=	0.08	meter
$y_{0\text{-SLUG}}$ =	0.31	meter
Fully penetrate C =	1.944	
ln(Re/rw) =	2.428	
Re =	2.70	meter
Slope =	0.007893	$\log_{10}$/sec
$t_{90\%}$ recovery =	127	sec

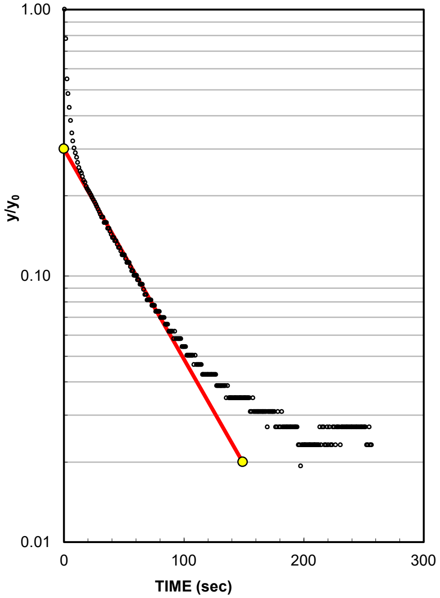
Input is consistent.

K =	**2.5**	**meter/day**

Observed slug discrepancy: 18%

Eff casing slug discrepancy: 108%

Adjust slope of line to estimate K



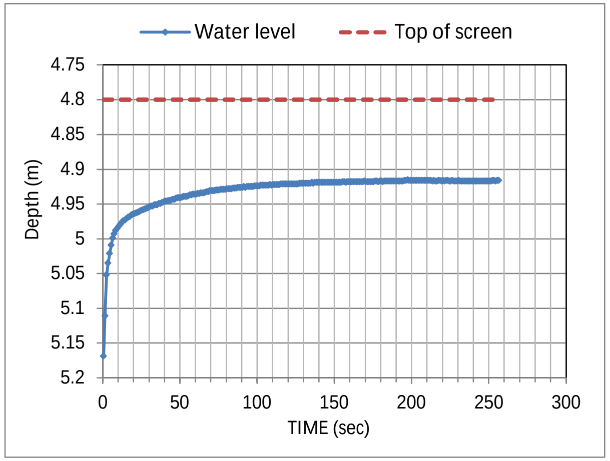
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 257

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.91	
Final obs:	0:04:17.0	4.915	-0.005

Entry	Reduced Dataset		
1	0:00:01.0	5.169	0.259
7	0:00:07.0	4.999	0.089
13	0:00:13.0	4.976	0.066
19	0:00:19.0	4.966	0.056
25	0:00:25.0	4.960	0.050
31	0:00:31.0	4.954	0.044
37	0:00:37.0	4.949	0.039
43	0:00:43.0	4.945	0.035
49	0:00:49.0	4.941	0.031
55	0:00:55.0	4.939	0.029
61	0:01:01.0	4.936	0.026
67	0:01:07.0	4.933	0.023
73	0:01:13.0	4.931	0.021
79	0:01:19.0	4.929	0.019
85	0:01:25.0	4.927	0.017
91	0:01:31.0	4.926	0.016
97	0:01:37.0	4.925	0.015
103	0:01:43.0	4.923	0.013
109	0:01:49.0	4.922	0.012
115	0:01:55.0	4.922	0.012
121	0:02:01.0	4.921	0.011
127	0:02:07.0	4.921	0.011
133	0:02:13.0	4.920	0.010
139	0:02:19.0	4.919	0.009
145	0:02:25.0	4.919	0.009
151	0:02:31.0	4.919	0.009
157	0:02:37.0	4.918	0.008
163	0:02:43.0	4.918	0.008
169	0:02:49.0	4.918	0.008
175	0:02:55.0	4.918	0.008
181	0:03:01.0	4.917	0.007
187	0:03:07.0	4.917	0.007
193	0:03:13.0	4.917	0.007
199	0:03:19.0	4.916	0.006
205	0:03:25.0	4.916	0.006
211	0:03:31.0	4.916	0.006
217	0:03:37.0	4.917	0.007
223	0:03:43.0	4.916	0.006
229	0:03:49.0	4.917	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.30
Observed drawdown (m)	0.2590
Inferred drawdown for formation (m)	0.0777
Expected displacement based on slug volume (m)	0.3110
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0010
Specific yield of filter pack (-)	0.44
Effective casing radius (m)	0.050
Effective casing diameter (m)	0.100

Butler, 1997

Effective casing radius (m)	0.050
Effective casing diameter (m)	0.100

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	14%

REMARKS:

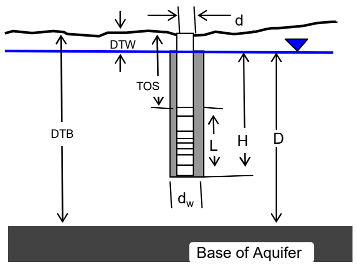
Base of screen in well is 6.5m bgl (7.3m btoc) but base of sand is 6m so effective base of screen set to 6m bgl (6.8m btoc). Top of screen 4m bgl (4.8m btoc) at inferred top of Q1.

Site: Riverlea **Well ID:** MW04-P **Test No:** FH-1

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.089	Meter
Total screen length (L)	1.95	Meter
Depths to:		
water level (DTW)	3.82	Meter
top of screen (TOS)	3.6	Meter
base of aquifer (DTB)	5.55	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

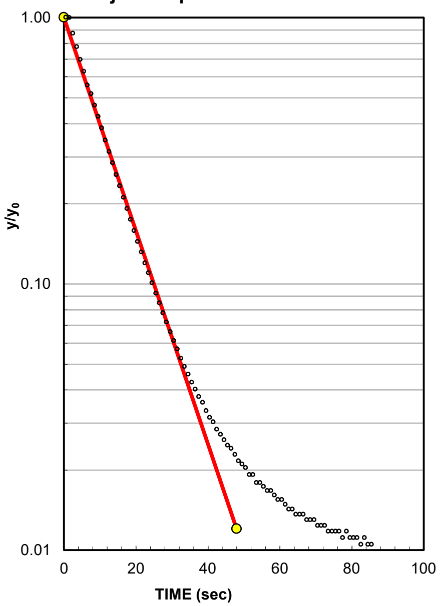
L_{wetted}	1.73	Meter
D =	1.73	Meter
H =	1.73	Meter
L/r_w =	23.86	-
$y_{0\text{-DISPLACEMENT}}$ =	1.62	meter
$y_{0\text{-SLUG}}$ eff casing=	1.64	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	1.871	
ln(Re/rw) =	2.352	
Re =	2.50	meter
Slope =	0.040017	$\log_{10}$/sec
$t_{90\%}$ recovery =	25	sec

Input is consistent.

K = 11 meter/day

Observed slug discrepancy: 105%
Eff casing slug discrepancy: 1%

Adjust slope of line to estimate K

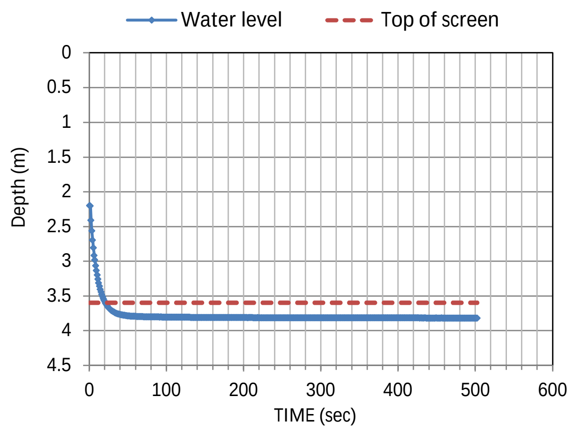


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 503

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.82	
Final obs:	0:08:23.0	3.82	0

Entry	Reduced Dataset		
1	0:00:01.0	2.201	1.619
13	0:00:13.0	3.313	0.507
25	0:00:25.0	3.657	0.163
37	0:00:37.0	3.755	0.065
49	0:00:49.0	3.785	0.035
61	0:01:01.0	3.795	0.025
73	0:01:13.0	3.800	0.020
85	0:01:25.0	3.803	0.017
97	0:01:37.0	3.805	0.015
109	0:01:49.0	3.806	0.014
121	0:02:01.0	3.808	0.012
133	0:02:13.0	3.809	0.011
145	0:02:25.0	3.810	0.010
157	0:02:37.0	3.810	0.010
169	0:02:49.0	3.811	0.009
181	0:03:01.0	3.812	0.008
193	0:03:13.0	3.812	0.008
205	0:03:25.0	3.813	0.007
217	0:03:37.0	3.814	0.006
229	0:03:49.0	3.814	0.006
241	0:04:01.0	3.814	0.006
253	0:04:13.0	3.815	0.005
265	0:04:25.0	3.815	0.005
277	0:04:37.0	3.815	0.005
289	0:04:49.0	3.816	0.004
301	0:05:01.0	3.816	0.004
313	0:05:13.0	3.816	0.004
325	0:05:25.0	3.816	0.004
337	0:05:37.0	3.817	0.003
349	0:05:49.0	3.817	0.003
361	0:06:01.0	3.818	0.002
373	0:06:13.0	3.818	0.002
385	0:06:25.0	3.818	0.002
397	0:06:37.0	3.818	0.002
409	0:06:49.0	3.818	0.002
421	0:07:01.0	3.818	0.002
433	0:07:13.0	3.818	0.002
445	0:07:25.0	3.819	0.001
457	0:07:37.0	3.818	0.002



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.6190
Inferred drawdown for formation (m)	1.6190
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0070
Vol. filter pack that recharged water originated from (m3)	0.0217
Specific yield of filter pack (-)	0.32
Effective casing radius (m)	0.045
Effective casing diameter (m)	0.089

Butler, 1997

Effective casing radius (m)	0.045
Effective casing diameter (m)	0.089

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	94%

REMARKS:

BH log shows mainly sand from 2.8m to 4.75m bgl (3.6 to 5.55m btoc) with predominantly clay above and below. Effective base of screen and aquifer assumed to be 4.75m bgl (5.55m btoc).

Site: Riverlea | **Well ID:** MW04-P | **Test No:** FH-2

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.087	Meter
Total screen length (L)	1.95	Meter
Depths to:		
water level (DTW)	3.82	Meter
top of screen (TOS)	3.6	Meter
base of aquifer (DTB)	5.55	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

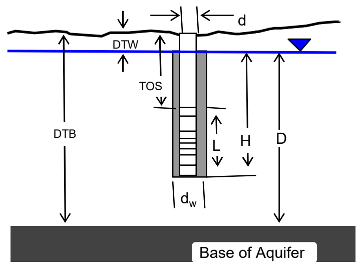
COMPUTED

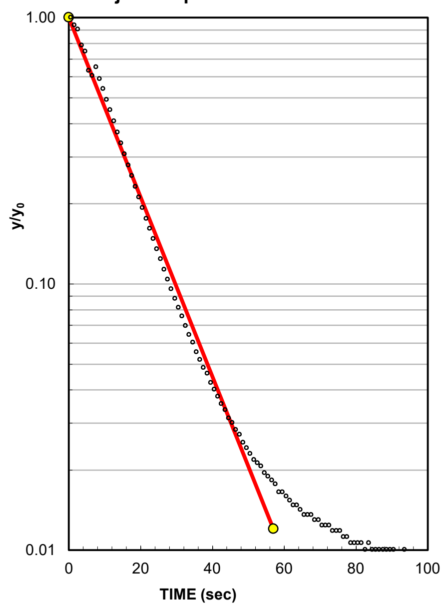
L_{wetted}	1.73	Meter
D =	1.73	Meter
H =	1.73	Meter
L/r_w =	23.86	-
$y_{0\text{-DISPLACEMENT}}$ =	1.69	meter
$y_{0\text{-SLUG}}$ eff casing=	1.71	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	1.871	
ln(Re/rw) =	2.352	
Re =	2.50	meter
Slope =	0.033699	$\log_{10}$/sec
$t_{90\%}$ recovery =	30	sec

Input is consistent.

K =	**8.6**	**meter/day**

Observed slug discrepancy: 101%
Eff casing slug discrepancy: 1%



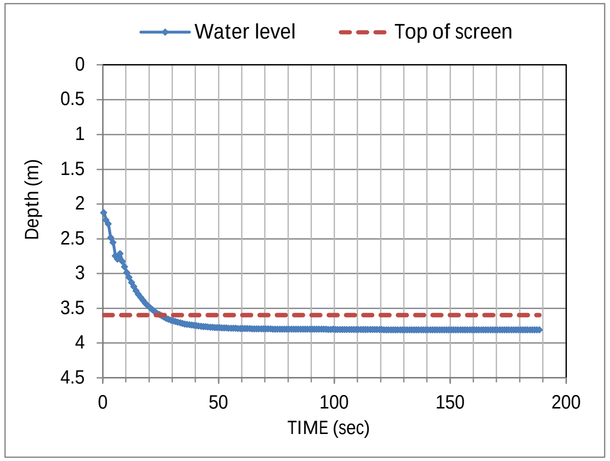


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 189

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.82	
Final obs:	0:03:09.0	3.813	0.007

Entry	Elapsed time	Reduced Dataset (Water Level)	Draw-down
1	0:00:01.0	2.126	1.694
5	0:00:05.0	2.555	1.265
9	0:00:09.0	2.824	0.996
13	0:00:13.0	3.128	0.692
17	0:00:17.0	3.347	0.473
21	0:00:21.0	3.493	0.327
25	0:00:25.0	3.591	0.229
29	0:00:29.0	3.658	0.162
33	0:00:33.0	3.702	0.118
37	0:00:37.0	3.732	0.088
41	0:00:41.0	3.752	0.068
45	0:00:45.0	3.767	0.053
49	0:00:49.0	3.777	0.043
53	0:00:53.0	3.784	0.036
57	0:00:57.0	3.789	0.031
61	0:01:01.0	3.793	0.027
65	0:01:05.0	3.796	0.024
69	0:01:09.0	3.798	0.022
73	0:01:13.0	3.799	0.021
77	0:01:17.0	3.801	0.019
81	0:01:21.0	3.802	0.018
85	0:01:25.0	3.803	0.017
89	0:01:29.0	3.803	0.017
93	0:01:33.0	3.804	0.016
97	0:01:37.0	3.804	0.016
101	0:01:41.0	3.805	0.015
105	0:01:45.0	3.805	0.015
109	0:01:49.0	3.806	0.014
113	0:01:53.0	3.807	0.013
117	0:01:57.0	3.807	0.013
121	0:02:01.0	3.808	0.012
125	0:02:05.0	3.809	0.011
129	0:02:09.0	3.809	0.011
133	0:02:13.0	3.809	0.011
137	0:02:17.0	3.810	0.010
141	0:02:21.0	3.810	0.010
145	0:02:25.0	3.810	0.010
149	0:02:29.0	3.811	0.009
153	0:02:33.0	3.811	0.009



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.6940
Inferred drawdown for formation (m)	1.6940
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0069
Vol. filter pack that recharged water originated from (m3)	0.0227
Specific yield of filter pack (-)	0.30
Effective casing radius (m)	0.044
Effective casing diameter (m)	0.087

Butler, 1997

Effective casing radius (m)	0.044
Effective casing diameter (m)	0.087

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	98%

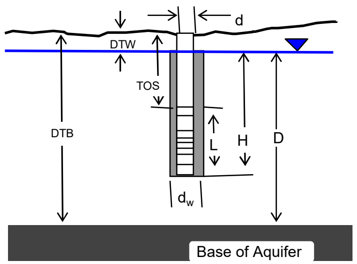
REMARKS:

BH log shows mainly sand from 2.8m to 4.75m bgl (3.6 to 5.55m btoc) with predominantly clay above and below. Effective base of screen and aquifer assumed to be 4.75m bgl (5.55m btoc).

Site:	**Riverlea**	**Well ID:**	**MW04-P**	**Test No:**	**RH-1**
				Date:	**05/10/2023**
				Fieldwork by:	**LBWco**
				Processed by:	**JL**
				Checked by:	
				Test type (rising/falling):	**Rising**

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.06	Meter
Total screen length (L)	1.95	Meter
Depths to:		
water level (DTW)	3.82	Meter
top of screen (TOS)	3.6	Meter
base of aquifer (DTB)	5.55	Meter
'Slug' details:		
length	0.6	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	1.73	Meter
D =	1.73	Meter
H =	1.73	Meter
L/r_w =	23.86	-
$y_{0\text{-DISPLACEMENT}}$ =	0.22	meter
$y_{0\text{-SLUG}}$ eff casing=	0.22	meter
$y_{0\text{-SLUG}}$ =	0.31	meter
Fully penetrate C =	1.871	
ln(Re/rw) =	2.352	
Re =	2.50	meter
Slope =	0.08731	$\log_{10}$/sec
$t_{90\%}$ recovery =	11	sec

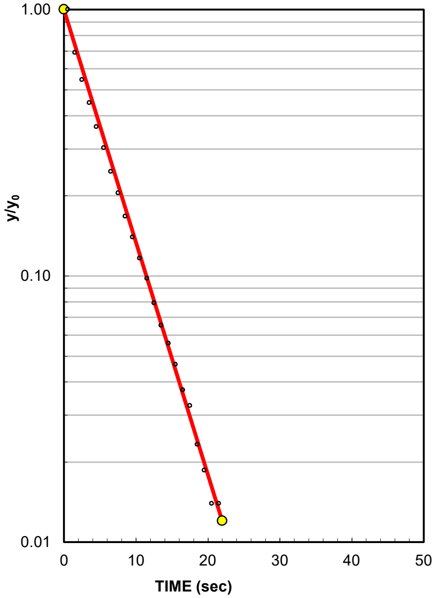
Input is consistent.

K =	**11**	**meter/day**

Observed slug discrepancy: 37%

Eff casing slug discrepancy: 0%

Adjust slope of line to estimate K



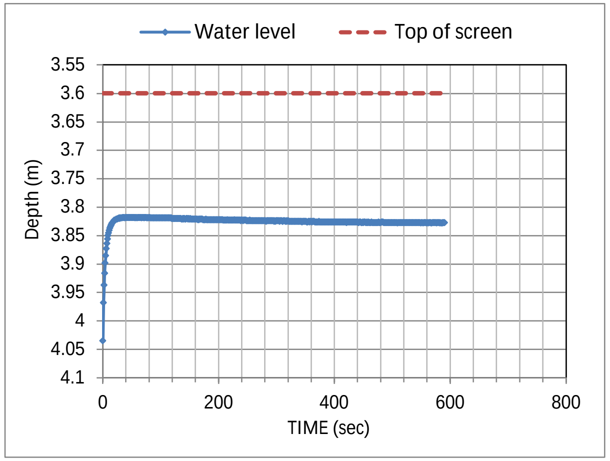
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 591

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.82	
Final obs:	0:09:51.0	3.818	0.002

Entry	Reduced Dataset		
1	0:00:01.0	4.035	0.215
15	0:00:15.0	3.832	0.012
29	0:00:29.0	3.819	0.001
43	0:00:43.0	3.818	0.002
57	0:00:57.0	3.819	0.001
71	0:01:11.0	3.818	0.002
85	0:01:25.0	3.819	0.001
99	0:01:39.0	3.819	0.001
113	0:01:53.0	3.819	0.001
127	0:02:07.0	3.820	0.000
141	0:02:21.0	3.820	0.000
155	0:02:35.0	3.821	0.001
169	0:02:49.0	3.821	0.001
183	0:03:03.0	3.822	0.002
197	0:03:17.0	3.822	0.002
211	0:03:31.0	3.823	0.003
225	0:03:45.0	3.823	0.003
239	0:03:59.0	3.824	0.004
253	0:04:13.0	3.824	0.004
267	0:04:27.0	3.824	0.004
281	0:04:41.0	3.824	0.004
295	0:04:55.0	3.824	0.004
309	0:05:09.0	3.824	0.004
323	0:05:23.0	3.825	0.005
337	0:05:37.0	3.825	0.005
351	0:05:51.0	3.825	0.005
365	0:06:05.0	3.825	0.005
379	0:06:19.0	3.826	0.006
393	0:06:33.0	3.826	0.006
407	0:06:47.0	3.826	0.006
421	0:07:01.0	3.826	0.006
435	0:07:15.0	3.826	0.006
449	0:07:29.0	3.827	0.007
463	0:07:43.0	3.827	0.007
477	0:07:57.0	3.826	0.006
491	0:08:11.0	3.827	0.007
505	0:08:25.0	3.827	0.007
519	0:08:39.0	3.827	0.007
533	0:08:53.0	3.827	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.2150
Inferred drawdown for formation (m)	0.2150
Expected displacement based on slug volume (m)	0.3110
Vol. water recharged by filter pack (m3)	0.0002
Vol. filter pack that recharged water originated from (m3)	0.0029
Specific yield of filter pack (-)	0.07
Effective casing radius (m)	0.030
Effective casing diameter (m)	0.060

Butler, 1997

Effective casing radius (m)	0.030
Effective casing diameter (m)	0.060

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	12%

REMARKS:

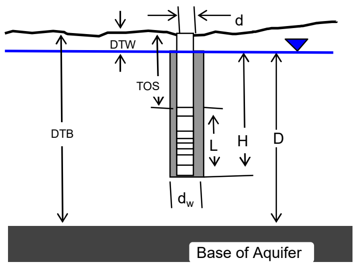
BH log shows mainly sand from 2.8m to 4.75m bgl (3.6 to 5.55m btoc) with predominantly clay above and below. Effective base of screen and aquifer assumed to be 4.75m bgl (5.55m btoc).

Site: Riverlea **Well ID:** MW04-P **Test No:** RH-2

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.087	Meter
Total screen length (L)	1.95	Meter
Depths to:		
water level (DTW)	3.82	Meter
top of screen (TOS)	3.6	Meter
base of aquifer (DTB)	5.55	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	1.73	Meter
D =	1.73	Meter
H =	1.73	Meter
L/r_w =	23.86	-
$y_{0\text{-DISPLACEMENT}}$ =	0.17	meter
$y_{0\text{-SLUG}}$ eff casing=	0.17	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.871	
ln(Re/rw) =	2.352	
Re =	2.50	meter
Slope =	0.106712	$\log_{10}$/sec
$t_{90\%}$ recovery =	9	sec

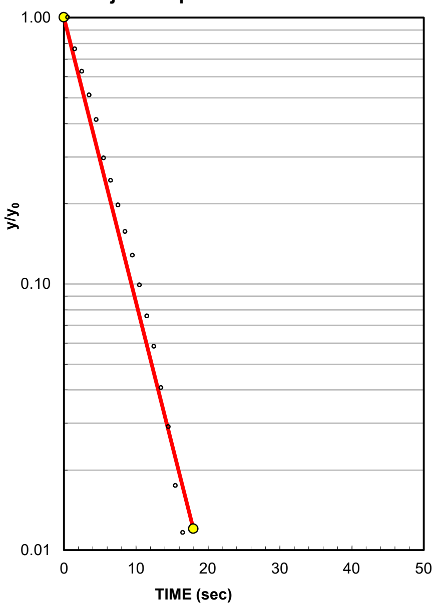
Input is consistent.

K =	**27**	**meter/day**

Observed slug discrepancy: 100%
Eff casing slug discrepancy: 0%
K= 27 is greater than likely maximum of 21.3 for Medium Sand

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

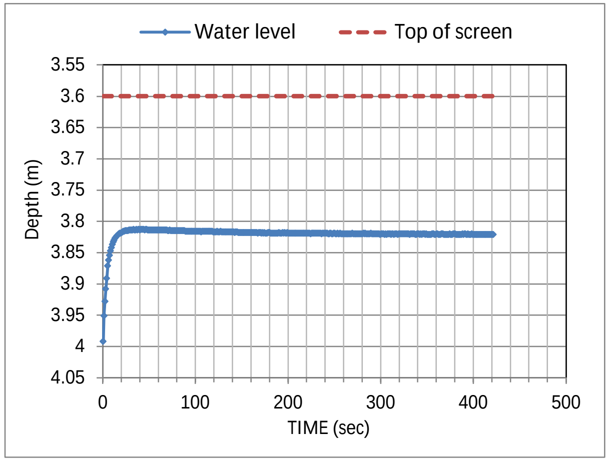
Adjust slope of line to estimate K



No. of data points: 422

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.82	
Final obs:	0:07:02.0	3.813	0.007

Entry	Reduced Dataset		
1	0:00:01.0	3.992	0.172
11	0:00:11.0	3.837	0.017
21	0:00:21.0	3.818	0.002
31	0:00:31.0	3.814	0.006
41	0:00:41.0	3.814	0.006
51	0:00:51.0	3.814	0.006
61	0:01:01.0	3.814	0.006
71	0:01:11.0	3.815	0.005
81	0:01:21.0	3.815	0.005
91	0:01:31.0	3.816	0.004
101	0:01:41.0	3.816	0.004
111	0:01:51.0	3.816	0.004
121	0:02:01.0	3.817	0.003
131	0:02:11.0	3.817	0.003
141	0:02:21.0	3.817	0.003
151	0:02:31.0	3.818	0.002
161	0:02:41.0	3.818	0.002
171	0:02:51.0	3.818	0.002
181	0:03:01.0	3.818	0.002
191	0:03:11.0	3.818	0.002
201	0:03:21.0	3.819	0.001
211	0:03:31.0	3.819	0.001
221	0:03:41.0	3.819	0.001
231	0:03:51.0	3.819	0.001
241	0:04:01.0	3.819	0.001
251	0:04:11.0	3.819	0.001
261	0:04:21.0	3.820	0.000
271	0:04:31.0	3.820	0.000
281	0:04:41.0	3.820	0.000
291	0:04:51.0	3.820	0.000
301	0:05:01.0	3.820	0.000
311	0:05:11.0	3.820	0.000
321	0:05:21.0	3.820	0.000
331	0:05:31.0	3.820	0.000
341	0:05:41.0	3.820	0.000
351	0:05:51.0	3.821	0.001
361	0:06:01.0	3.820	0.000
371	0:06:11.0	3.821	0.001
381	0:06:21.0	3.820	0.000



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.1720
Inferred drawdown for formation (m)	0.1720
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0007
Vol. filter pack that recharged water originated from (m3)	0.0023
Specific yield of filter pack (-)	0.30
Effective casing radius (m)	0.043
Effective casing diameter (m)	0.087

Butler, 1997

Effective casing radius (m)	0.043
Effective casing diameter (m)	0.087

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	10%

REMARKS:

BH log shows mainly sand from 2.8m to 4.75m bgl (3.6 to 5.55m btoc) with predominantly clay above and below. Effective base of screen and aquifer assumed to be 4.75m bgl (5.55m btoc).

Site: Riverlea **Well ID:** MW06-Q1 **Test No:** FH-1

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.145	Meter
Total screen length (L)	3.9	Meter
Depths to:		
water level (DTW)	3.47	Meter
top of screen (TOS)	2.9	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

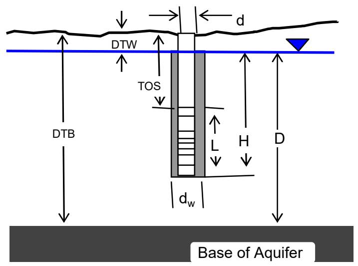
COMPUTED

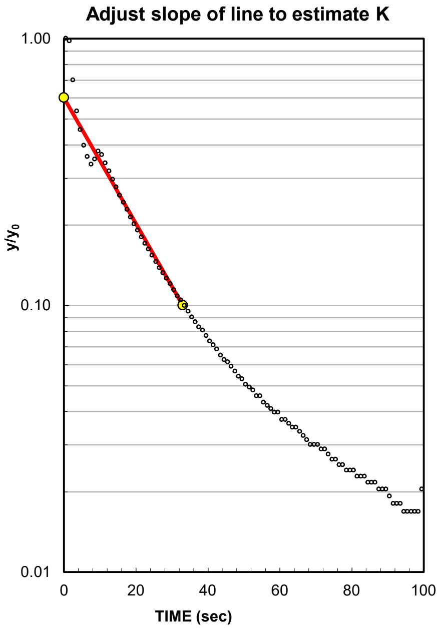
L_{wetted}	3.33	Meter
D =	3.33	Meter
H =	3.33	Meter
L/r_w =	45.93	-
$y_{0\text{-DISPLACEMENT}}$ =	0.83	meter
$y_{0\text{-SLUG}}$ eff casing=	0.62	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	2.629	
ln(Re/rw) =	2.901	
Re =	4.33	meter
Slope =	0.02358	$\log_{10}$/sec
$t_{90\%}$ recovery =	42	sec

Input is consistent.

K =	11	meter/day

Observed slug discrepancy: 145%
Eff casing slug discrepancy: 30%



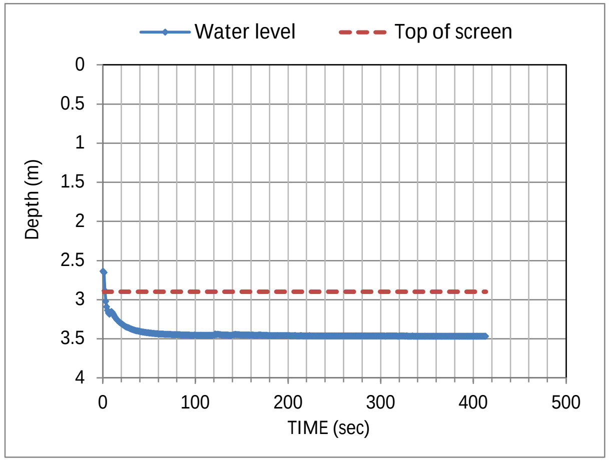


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 414

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.47	
Final obs:	0:06:54.0	3.47	0

Entry	Reduced Dataset		
1	0:00:01.0	2.638	0.832
11	0:00:11.0	3.165	0.305
21	0:00:21.0	3.311	0.159
31	0:00:31.0	3.375	0.095
41	0:00:41.0	3.409	0.061
51	0:00:51.0	3.428	0.042
61	0:01:01.0	3.439	0.031
71	0:01:11.0	3.445	0.025
81	0:01:21.0	3.450	0.020
91	0:01:31.0	3.454	0.016
101	0:01:41.0	3.456	0.014
111	0:01:51.0	3.459	0.011
121	0:02:01.0	3.459	0.011
131	0:02:11.0	3.453	0.017
141	0:02:21.0	3.455	0.015
151	0:02:31.0	3.453	0.017
161	0:02:41.0	3.456	0.014
171	0:02:51.0	3.455	0.015
181	0:03:01.0	3.460	0.010
191	0:03:11.0	3.462	0.008
201	0:03:21.0	3.463	0.007
211	0:03:31.0	3.464	0.006
221	0:03:41.0	3.464	0.006
231	0:03:51.0	3.465	0.005
241	0:04:01.0	3.465	0.005
251	0:04:11.0	3.465	0.005
261	0:04:21.0	3.466	0.004
271	0:04:31.0	3.467	0.003
281	0:04:41.0	3.466	0.004
291	0:04:51.0	3.466	0.004
301	0:05:01.0	3.466	0.004
311	0:05:11.0	3.467	0.003
321	0:05:21.0	3.467	0.003
331	0:05:31.0	3.468	0.002
341	0:05:41.0	3.469	0.001
351	0:05:51.0	3.468	0.002
361	0:06:01.0	3.469	0.001
371	0:06:11.0	3.469	0.001
381	0:06:21.0	3.469	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.60
Observed drawdown (m)	0.8320
Inferred drawdown for formation (m)	0.4992
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0092
Vol. filter pack that recharged water originated from (m3)	0.0067
Specific yield of filter pack (-)	1.38
Effective casing radius (m)	0.081
Effective casing diameter (m)	0.161

Butler, 1997

Effective casing radius (m)	0.081
Effective casing diameter (m)	0.161

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	25%

REMARKS:

Base of screen in well is 6.5m bgl (7.4m btoc) but base of sand is 5.9m so effective base of screen set to 5.9m (6.8m btoc).

Site: **Riverlea** | Well ID: **MW06-Q1** | Test No: **FH-2**

Date:	05/10/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.145	Meter
Total screen length (L)	3.9	Meter
Depths to:		
water level (DTW)	3.47	Meter
top of screen (TOS)	2.9	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	10	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

COMPUTED

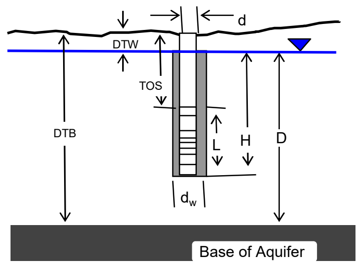
L_{wetted}	3.33	Meter
D =	3.33	Meter
H =	3.33	Meter
L/r_w =	45.93	-
$y_{0\text{-DISPLACEMENT}}$ =	0.94	meter
$y_{0\text{-SLUG}}$ eff casing=	0.62	meter
$y_{0\text{-SLUG}}$ =	5.18	meter
Fully penetrate C =	2.629	
ln(Re/rw) =	2.901	
Re =	4.33	meter
Slope =	0.014231	$\log_{10}$/sec
$t_{90\%}$ recovery =	70	sec

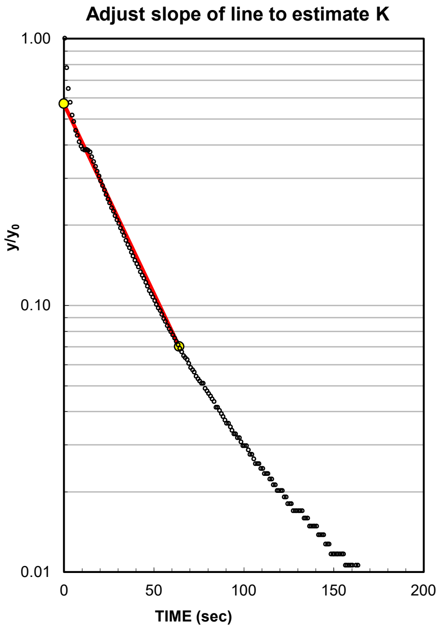
Input is consistent.

K =	**6.5**	**meter/day**

Observed slug discrepancy: 138%

Eff casing slug discrepancy: 42%





Bouwer and Rice analysis of slug test, WRR 1976

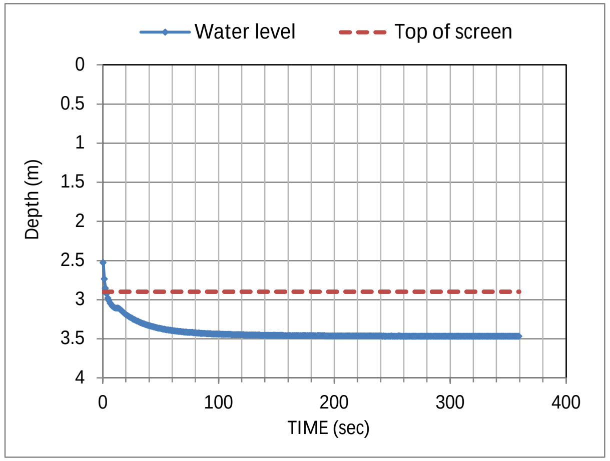
Spreadsheet adapted from one developed by USGS

No. of data points: 360

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.47	
Final obs:	0:06:00.0	3.47	0

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	2.526	0.944
10	0:00:10.0	3.098	0.372
19	0:00:19.0	3.170	0.300
28	0:00:28.0	3.258	0.212
37	0:00:37.0	3.315	0.155
46	0:00:46.0	3.355	0.115
55	0:00:55.0	3.383	0.087
64	0:01:04.0	3.403	0.067
73	0:01:13.0	3.417	0.053
82	0:01:22.0	3.427	0.043
91	0:01:31.0	3.436	0.034
100	0:01:40.0	3.442	0.028
109	0:01:49.0	3.446	0.024
118	0:01:58.0	3.450	0.020
127	0:02:07.0	3.453	0.017
136	0:02:16.0	3.455	0.015
145	0:02:25.0	3.457	0.013
154	0:02:34.0	3.459	0.011
163	0:02:43.0	3.460	0.010
172	0:02:52.0	3.461	0.009
181	0:03:01.0	3.463	0.007
190	0:03:10.0	3.463	0.007
199	0:03:19.0	3.464	0.006
208	0:03:28.0	3.465	0.005
217	0:03:37.0	3.466	0.004
226	0:03:46.0	3.466	0.004
235	0:03:55.0	3.467	0.003
244	0:04:04.0	3.468	0.002
253	0:04:13.0	3.468	0.002
262	0:04:22.0	3.468	0.002
271	0:04:31.0	3.469	0.001
280	0:04:40.0	3.469	0.001
289	0:04:49.0	3.469	0.001
298	0:04:58.0	3.468	0.002
307	0:05:07.0	3.469	0.001
316	0:05:16.0	3.469	0.001
325	0:05:25.0	3.469	0.001
334	0:05:34.0	3.469	0.001
343	0:05:43.0	3.470	0.000



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.57
Observed drawdown (m)	0.9440
Inferred drawdown for formation (m)	0.5381
Expected displacement based on slug volume (m)	5.1840
Vol. water recharged by filter pack (m3)	0.0091
Vol. filter pack that recharged water originated from (m3)	0.0072
Specific yield of filter pack (-)	1.27
Effective casing radius (m)	0.078
Effective casing diameter (m)	0.155

Butler, 1997

Effective casing radius (m)	0.078
Effective casing diameter (m)	0.155

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	28%

REMARKS:

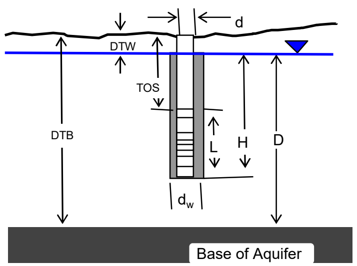
Base of screen in well is 6.5m bgl (7.4m btoc) but base of sand is 5.9m so effective base of screen set to 5.9m (6.8m btoc).

Site: Riverlea **Well ID:** MW06-Q1 **Test No:** RH-1

Date: 05/10/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:		
Drilling technique	Hollow auger	
Bore diameter (d_w)	0.145	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.145	Meter
Total screen length (L)	3.9	Meter
Depths to:		
water level (DTW)	3.47	Meter
top of screen (TOS)	2.9	Meter
base of aquifer (DTB)	6.8	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

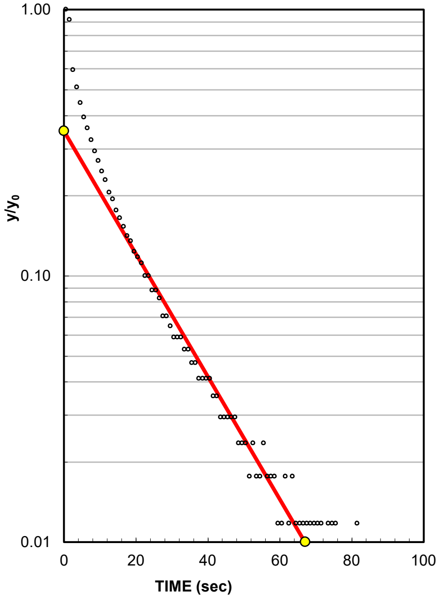
L_{wetted}	3.33	Meter
D =	3.33	Meter
H =	3.33	Meter
L/r_w =	45.93	-
$y_{0\text{-DISPLACEMENT}}$ =	0.17	meter
$y_{0\text{-SLUG}}$ eff casing=	0.06	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.629	
ln(Re/rw) =	2.901	
Re =	4.33	meter
Slope =	0.023046	$\log_{10}$/sec
$t_{90\%}$ recovery =	43	sec

Input is consistent.

K =	**10**	**meter/day**

Observed slug discrepancy: 101%
Eff casing slug discrepancy: 94%

Adjust slope of line to estimate K



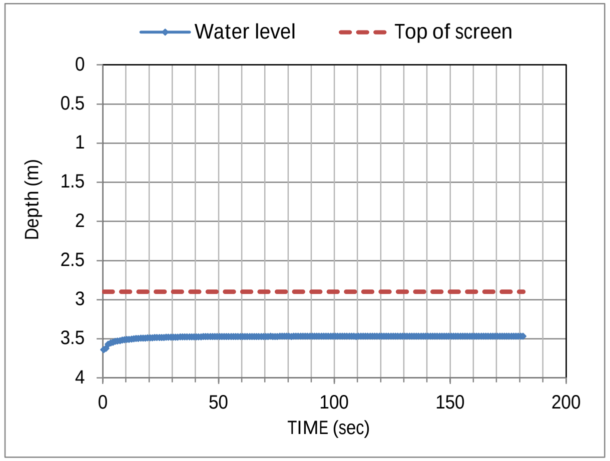
Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 182

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.47	
Final obs:	0:03:02.0	3.47	0

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	3.640	0.170
5	0:00:05.0	3.546	0.076
9	0:00:09.0	3.520	0.050
13	0:00:13.0	3.505	0.035
17	0:00:17.0	3.496	0.026
21	0:00:21.0	3.490	0.020
25	0:00:25.0	3.485	0.015
29	0:00:29.0	3.482	0.012
33	0:00:33.0	3.480	0.010
37	0:00:37.0	3.478	0.008
41	0:00:41.0	3.477	0.007
45	0:00:45.0	3.475	0.005
49	0:00:49.0	3.474	0.004
53	0:00:53.0	3.474	0.004
57	0:00:57.0	3.473	0.003
61	0:01:01.0	3.472	0.002
65	0:01:05.0	3.472	0.002
69	0:01:09.0	3.472	0.002
73	0:01:13.0	3.471	0.001
77	0:01:17.0	3.471	0.001
81	0:01:21.0	3.471	0.001
85	0:01:25.0	3.471	0.001
89	0:01:29.0	3.471	0.001
93	0:01:33.0	3.471	0.001
97	0:01:37.0	3.471	0.001
101	0:01:41.0	3.471	0.001
105	0:01:45.0	3.470	0.000
109	0:01:49.0	3.470	0.000
113	0:01:53.0	3.471	0.001
117	0:01:57.0	3.471	0.001
121	0:02:01.0	3.470	0.000
125	0:02:05.0	3.470	0.000
129	0:02:09.0	3.470	0.000
133	0:02:13.0	3.470	0.000
137	0:02:17.0	3.470	0.000
141	0:02:21.0	3.470	0.000
145	0:02:25.0	3.470	0.000
149	0:02:29.0	3.471	0.001
153	0:02:33.0	3.470	0.000



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.35
Observed drawdown (m)	0.1700
Inferred drawdown for formation (m)	0.0595
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0009
Vol. filter pack that recharged water originated from (m3)	0.0008
Specific yield of filter pack (-)	1.13
Effective casing radius (m)	0.074
Effective casing diameter (m)	0.148

Butler, 1997

Effective casing radius (m)	0.074
Effective casing diameter (m)	0.148

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	5%

REMARKS:

Base of screen in well is 6.5m bgl (7.4m btoc) but base of sand is 5.9m so effective base of screen set to 5.9m (6.8m btoc).

Site:	Riverlea	Well ID:	MW10-A
Test No:	FHT-3		
Date:	08/11/2023		
Fieldwork by:	LBWco		
Processed by:	JL		
Checked by:			
Test type (rising/falling):	Falling		

INPUT

Well construction:

Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.071	Meter
Total screen length (L)	0.6	Meter

Depths to:

water level (DTW)	5.112	Meter
top of screen (TOS)	6.5	Meter
base of aquifer (DTB)	7.1	Meter

'Slug' details:

length	1	Meter
diameter	0.036	Meter
type:	Poured	

Geology and annular fill materials:

across screen --	Coarse Sand
above screen --	Cement
aquifer material --	Sand and Gravel Mixes

COMPUTED

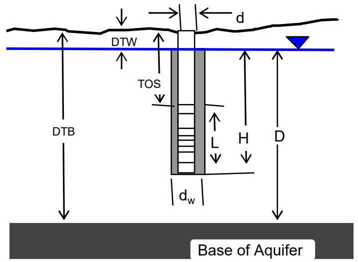
L_{wetted}	0.6	Meter
D =	1.988	Meter
H =	1.988	Meter
L/r_w =	12.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.75	meter
$y_{0\text{-SLUG}}$ eff casing=	0.25	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.345	
ln(Re/rw) =	2.434	
Re =	1.87	meter
Slope =	0.036964	$\log_{10}$/sec
$t_{90\%}$ recovery =	27	sec

Input is consistent.

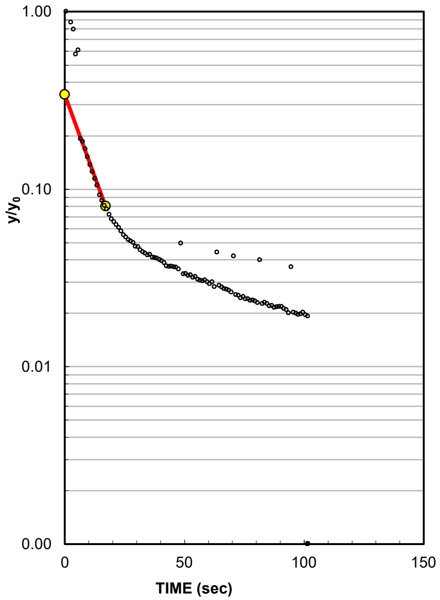
K =	19.0	meter/day

Observed slug discrepancy: 36%

Eff casing slug discrepancy: 99%



Adjust slope of line to estimate K



Bouwer and Rice analysis of slug test, WRR 1976

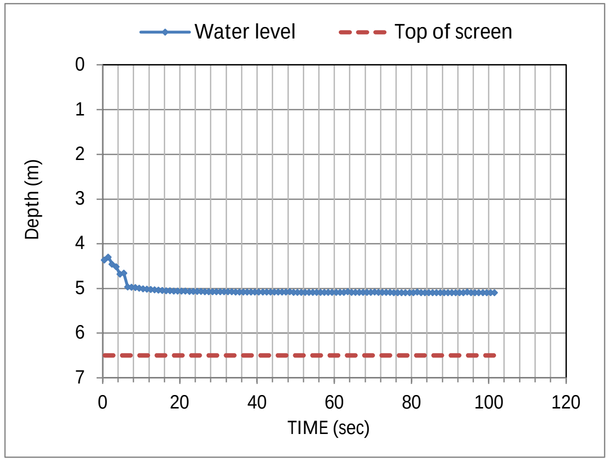
Spreadsheet adapted from one developed by USGS

No. of data points: 102

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.112	
Final obs:	0:01:42.0	5.0976	0.0144

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	4.364	0.748
3	0:00:03.0	4.460	0.652
5	0:00:05.0	4.683	0.429
7	0:00:07.0	4.969	0.144
9	0:00:09.0	4.986	0.126
11	0:00:11.0	5.009	0.103
13	0:00:13.0	5.027	0.085
15	0:00:15.0	5.043	0.069
17	0:00:17.0	5.052	0.061
19	0:00:19.0	5.058	0.054
21	0:00:21.0	5.063	0.049
23	0:00:23.0	5.067	0.045
25	0:00:25.0	5.071	0.041
27	0:00:27.0	5.073	0.039
29	0:00:29.0	5.075	0.037
31	0:00:31.0	5.077	0.035
33	0:00:33.0	5.079	0.033
35	0:00:35.0	5.080	0.032
37	0:00:37.0	5.081	0.031
39	0:00:39.0	5.082	0.031
41	0:00:41.0	5.083	0.030
43	0:00:43.0	5.084	0.028
45	0:00:45.0	5.085	0.027
47	0:00:47.0	5.085	0.027
49	0:00:49.0	5.075	0.037
51	0:00:51.0	5.087	0.025
53	0:00:53.0	5.087	0.025
55	0:00:55.0	5.088	0.024
57	0:00:57.0	5.089	0.023
59	0:00:59.0	5.089	0.023
61	0:01:01.0	5.090	0.022
63	0:01:03.0	5.091	0.021
65	0:01:05.0	5.091	0.021
67	0:01:07.0	5.092	0.021
69	0:01:09.0	5.092	0.020
71	0:01:11.0	5.081	0.031
73	0:01:13.0	5.093	0.019
75	0:01:15.0	5.094	0.019
77	0:01:17.0	5.094	0.018



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.34
Observed drawdown (m)	0.7483
Inferred drawdown for formation (m)	0.2544
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0012
Specific yield of filter pack (-)	0.43
Effective casing radius (m)	0.036
Effective casing diameter (m)	0.071

Butler, 1997

Effective casing radius (m)	0.036
Effective casing diameter (m)	0.071

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Top of screen in well is 5.2m bgl (6.1m btoc) but until 5.6m (6.5m btoc) is stiff clay, so excluded from assessment. Screened interval from 5.6 to 6.2m (6.5 to 7.1m btoc) is sandy clay then gravelly clay, with soft to stiff clay beneath (assumed aquitard).

Site:	Riverlea	Well ID:	MW10-A	Test No:	RHT-1
				Date:	08/11/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.072	Meter
Total screen length (L)	0.6	Meter
Depths to:		
water level (DTW)	5.112	Meter
top of screen (TOS)	6.5	Meter
base of aquifer (DTB)	7.1	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Sand and Gravel Mixes	

COMPUTED

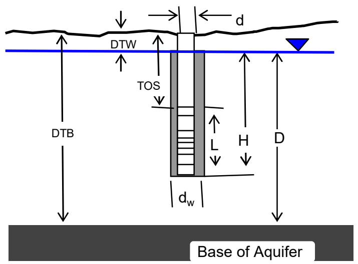
L_{wetted}	0.6	Meter
D =	1.988	Meter
H =	1.988	Meter
L/r_w =	12.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.71	meter
$y_{0\text{-SLUG}}$ eff casing=	0.25	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.345	
ln(Re/rw) =	2.434	
Re =	1.87	meter
Slope =	0.028074	$\log_{10}$/sec
$t_{90\%}$ recovery =	36	sec

Input is consistent.

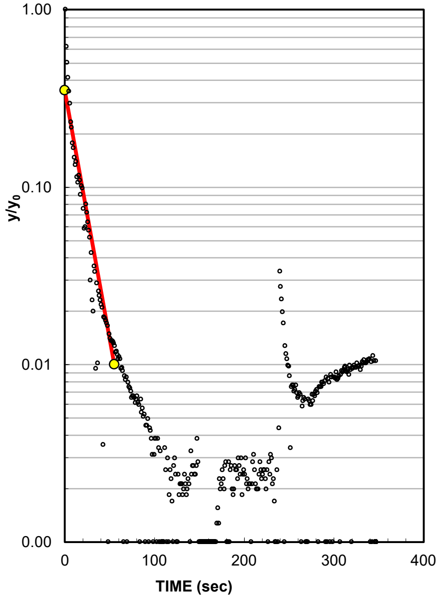
K =	**15.0**	**meter/day**

Observed slug discrepancy: 31%

Eff casing slug discrepancy: 96%



Adjust slope of line to estimate K

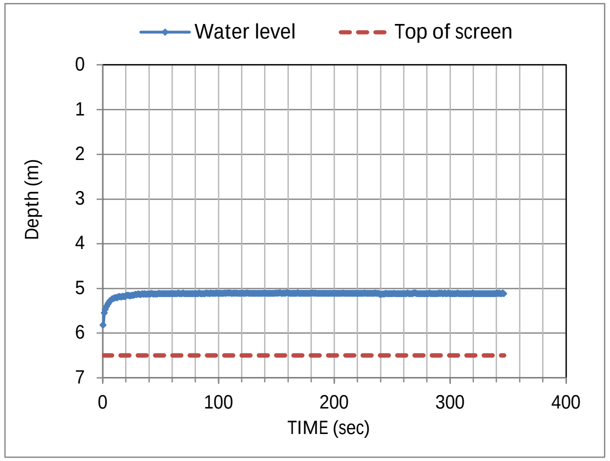


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 347

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.112	
Final obs:	0:05:47.0	5.0947	0.0173

Entry	Reduced Dataset		
1	0:00:01.0	5.818	0.706
9	0:00:09.0	5.237	0.125
17	0:00:17.0	5.189	0.077
25	0:00:25.0	5.163	0.051
33	0:00:33.0	5.137	0.025
41	0:00:41.0	5.127	0.015
49	0:00:49.0	5.112	0.000
57	0:00:57.0	5.120	0.008
65	0:01:05.0	5.119	0.006
73	0:01:13.0	5.117	0.005
81	0:01:21.0	5.117	0.005
89	0:01:29.0	5.116	0.004
97	0:01:37.0	5.115	0.003
105	0:01:45.0	5.114	0.002
113	0:01:53.0	5.114	0.002
121	0:02:01.0	5.102	0.010
129	0:02:09.0	5.114	0.002
137	0:02:17.0	5.113	0.001
145	0:02:25.0	5.114	0.002
153	0:02:33.0	5.107	0.005
161	0:02:41.0	5.108	0.004
169	0:02:49.0	5.101	0.011
177	0:02:57.0	5.114	0.002
185	0:03:05.0	5.114	0.002
193	0:03:13.0	5.114	0.002
201	0:03:21.0	5.114	0.002
209	0:03:29.0	5.114	0.002
217	0:03:37.0	5.114	0.002
225	0:03:45.0	5.113	0.001
233	0:03:53.0	5.114	0.002
241	0:04:01.0	5.131	0.019
249	0:04:09.0	5.119	0.007
257	0:04:17.0	5.117	0.005
265	0:04:25.0	5.116	0.004
273	0:04:33.0	5.116	0.004
281	0:04:41.0	5.117	0.005
289	0:04:49.0	5.118	0.005
297	0:04:57.0	5.118	0.006
305	0:05:05.0	5.118	0.006



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.35
Observed drawdown (m)	0.7064
Inferred drawdown for formation (m)	0.2472
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0012
Specific yield of filter pack (-)	0.45
Effective casing radius (m)	0.036
Effective casing diameter (m)	0.072

Butler, 1997

Effective casing radius (m)	0.036
Effective casing diameter (m)	0.072

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

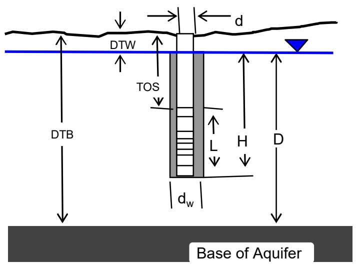
Top of screen in well is 5.2m bgl (6.1m btoc) but until 5.6m (6.5m btoc) is stiff clay, so excluded from assessment. Screened interval from 5.6 to 6.2m (6.5 to 7.1m btoc) is sandy clay then gravelly clay, with soft to stiff clay beneath (assumed aquitard).

Site: Riverlea **Well ID:** MW10-A **Test No:** RHT-3

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.069	Meter
Total screen length (L)	0.6	Meter
Depths to:		
water level (DTW)	5.112	Meter
top of screen (TOS)	6.5	Meter
base of aquifer (DTB)	7.1	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Sand and Gravel Mixes	



COMPUTED

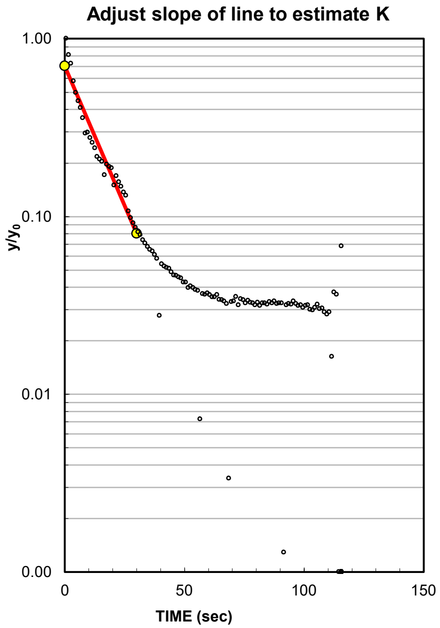
L_{wetted}	0.6	Meter
D =	1.988	Meter
H =	1.988	Meter
L/r_w =	12.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.39	meter
$y_{0\text{-SLUG}}$ eff casing=	0.27	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.345	
ln(Re/rw) =	2.434	
Re =	1.87	meter
Slope =	0.0314	$\log_{10}$/sec
$t_{90\%}$ recovery =	32	sec

Input is consistent.

K =	**15.0**	**meter/day**

Observed slug discrepancy: 29%

Eff casing slug discrepancy: 35%



Bouwer and Rice analysis of slug test, WRR 1976

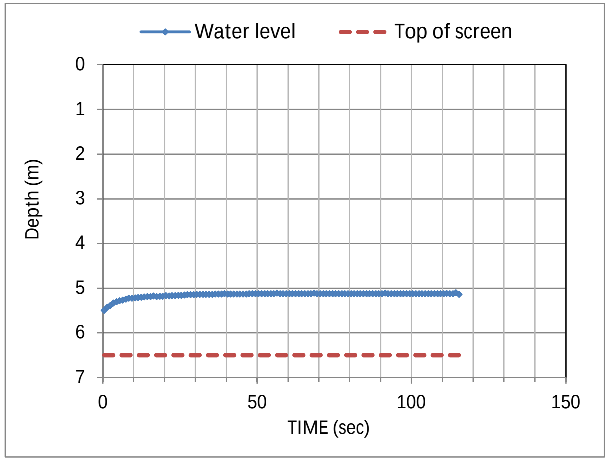
Spreadsheet adapted from one developed by USGS

No. of data points: 116

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.112	
Final obs:	0:01:56.0	5.106	0.006

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	5.499	0.387
3	0:00:03.0	5.392	0.280
5	0:00:05.0	5.304	0.192
7	0:00:07.0	5.270	0.158
9	0:00:09.0	5.225	0.113
11	0:00:11.0	5.219	0.107
13	0:00:13.0	5.206	0.094
15	0:00:15.0	5.193	0.081
17	0:00:17.0	5.178	0.066
19	0:00:19.0	5.186	0.074
21	0:00:21.0	5.170	0.058
23	0:00:23.0	5.173	0.061
25	0:00:25.0	5.165	0.053
27	0:00:27.0	5.154	0.042
29	0:00:29.0	5.148	0.036
31	0:00:31.0	5.144	0.032
33	0:00:33.0	5.141	0.029
35	0:00:35.0	5.138	0.026
37	0:00:37.0	5.137	0.025
39	0:00:39.0	5.134	0.022
41	0:00:41.0	5.133	0.021
43	0:00:43.0	5.132	0.020
45	0:00:45.0	5.131	0.019
47	0:00:47.0	5.130	0.018
49	0:00:49.0	5.129	0.017
51	0:00:51.0	5.129	0.016
53	0:00:53.0	5.128	0.016
55	0:00:55.0	5.127	0.015
57	0:00:57.0	5.115	0.003
59	0:00:59.0	5.126	0.014
61	0:01:01.0	5.126	0.014
63	0:01:03.0	5.126	0.014
65	0:01:05.0	5.125	0.013
67	0:01:07.0	5.125	0.013
69	0:01:09.0	5.113	0.001
71	0:01:11.0	5.125	0.013
73	0:01:13.0	5.124	0.012
75	0:01:15.0	5.125	0.013
77	0:01:17.0	5.125	0.013



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.70
Observed drawdown (m)	0.3870
Inferred drawdown for formation (m)	0.2709
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0013
Specific yield of filter pack (-)	0.38
Effective casing radius (m)	0.035
Effective casing diameter (m)	0.069

Butler, 1997

Effective casing radius (m)	0.035
Effective casing diameter (m)	0.069

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Top of screen in well is 5.2m bgl (6.1m btoc) but until 5.6m (6.5m btoc) is stiff clay, so excluded from assessment. Screened interval from 5.6 to 6.2m (6.5 to 7.1m btoc) is sandy clay then gravelly clay, with soft to stiff clay beneath (assumed aquitard).

Site:	Riverlea	Well ID:	MW10-B	Test No:	FHT-3
				Date:	08/11/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1	Meter
Depths to:		
water level (DTW)	5.02	Meter
top of screen (TOS)	9.1	Meter
base of aquifer (DTB)	10.2	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

COMPUTED

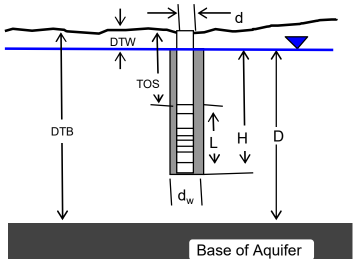
L_{wetted}	1	Meter
D =	5.18	Meter
H =	5.08	Meter
L/r_w =	20.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.77	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.726	
ln(Re/rw) =	3.083	
Re =	3.58	meter
Slope =	0.038266	$\log_{10}$/sec
$t_{90\%}$ recovery =	26	sec

Input is consistent.

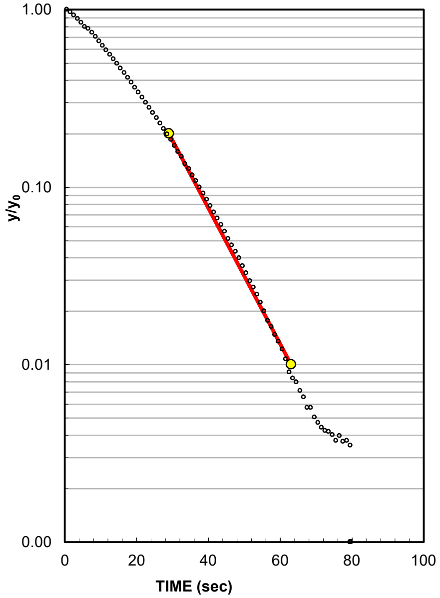
K =	**7.3**	**meter/day**

Observed slug discrepancy: 109%

Eff casing slug discrepancy: 109%



Adjust slope of line to estimate K



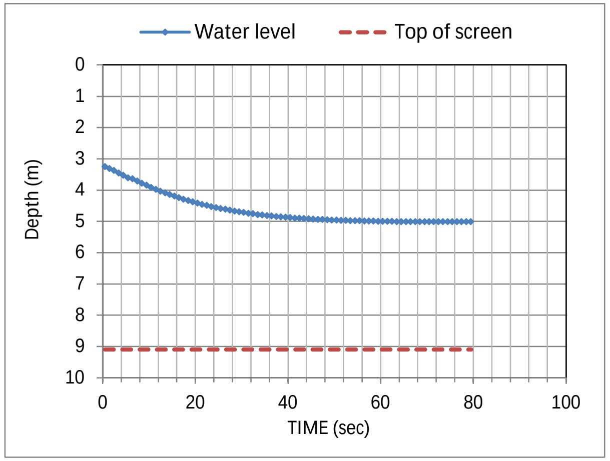
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 80

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.02	
Final obs:	0:01:20.0	5.0138	0.0062

Entry	Reduced Dataset		
1	0:00:01.0	3.254	1.766
3	0:00:03.0	3.376	1.644
5	0:00:05.0	3.530	1.490
7	0:00:07.0	3.639	1.381
9	0:00:09.0	3.779	1.241
11	0:00:11.0	3.911	1.109
13	0:00:13.0	4.033	0.987
15	0:00:15.0	4.144	0.876
17	0:00:17.0	4.243	0.777
19	0:00:19.0	4.334	0.686
21	0:00:21.0	4.416	0.604
23	0:00:23.0	4.490	0.530
25	0:00:25.0	4.557	0.463
27	0:00:27.0	4.616	0.404
29	0:00:29.0	4.670	0.350
31	0:00:31.0	4.718	0.302
33	0:00:33.0	4.758	0.262
35	0:00:35.0	4.796	0.224
37	0:00:37.0	4.829	0.191
39	0:00:39.0	4.857	0.163
41	0:00:41.0	4.882	0.138
43	0:00:43.0	4.902	0.118
45	0:00:45.0	4.921	0.099
47	0:00:47.0	4.937	0.083
49	0:00:49.0	4.950	0.070
51	0:00:51.0	4.962	0.058
53	0:00:53.0	4.972	0.048
55	0:00:55.0	4.980	0.040
57	0:00:57.0	4.989	0.031
59	0:00:59.0	4.994	0.026
61	0:01:01.0	4.998	0.022
63	0:01:03.0	5.004	0.016
65	0:01:05.0	5.006	0.014
67	0:01:07.0	5.008	0.012
69	0:01:09.0	5.010	0.010
71	0:01:11.0	5.012	0.008
73	0:01:13.0	5.013	0.007
75	0:01:15.0	5.013	0.007
77	0:01:17.0	5.013	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	NO
Intercept of straight line on Y/Yo axis	0.20
Observed drawdown (m)	1.7656
Inferred drawdown for formation (m)	0.3531
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0003
Vol. filter pack that recharged water originated from (m3)	0.0017
Specific yield of filter pack (-)	0.19
Effective casing radius (m)	0.030
Effective casing diameter (m)	0.061

Butler, 1997

Effective casing radius (m)	0.030
Effective casing diameter (m)	0.061

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

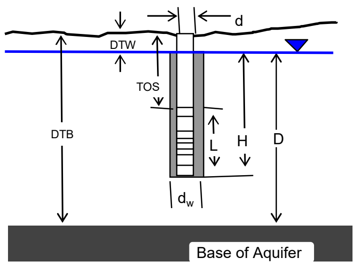
Log shows sand from 8.0 to 8.5m bgl (8.9 to 9.4m btoc) then soft gravelly clay to 9.3m (10.2m btoc). Screen from 8.2 to 9.2m (9.1 to 10.1m btoc).

Site: Riverlea **Well ID:** MW10-B **Test No:** RHT-1

Date: 08/11/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1	Meter
Depths to:		
water level (DTW)	5	Meter
top of screen (TOS)	9.1	Meter
base of aquifer (DTB)	10.2	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailer	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

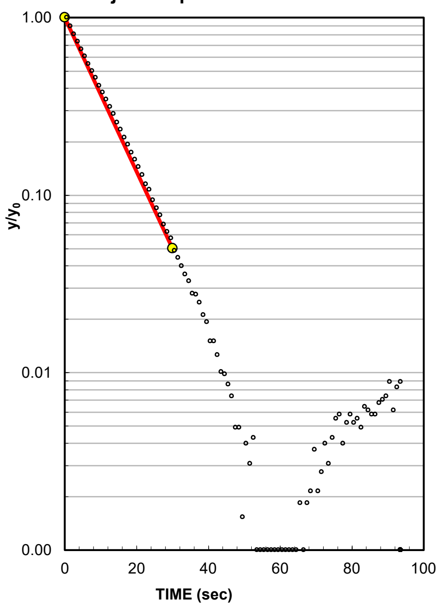
L_{wetted}	1	Meter
D =	5.2	Meter
H =	5.1	Meter
L/r_w =	20.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.33	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.726	
ln(Re/rw) =	3.085	
Re =	3.59	meter
Slope =	0.043368	$\log_{10}$/sec
$t_{90\%}$ recovery =	23	sec

Input is consistent.

K =	8.3	meter/day

Observed slug discrepancy: 46%
Eff casing slug discrepancy: 46%

Adjust slope of line to estimate K

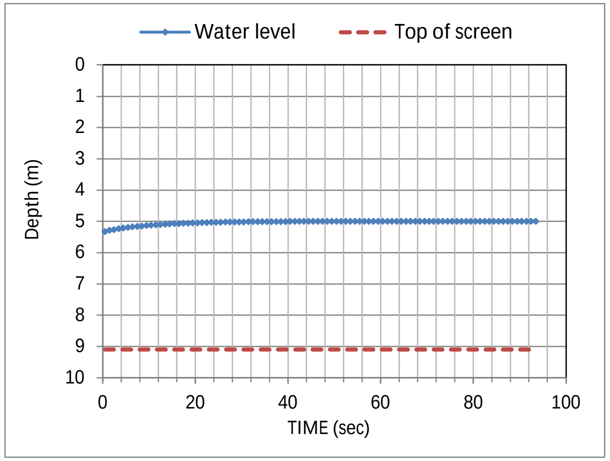


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 94

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5	
Final obs:	0:01:34.0	4.9992	0.0008

Entry	Reduced Dataset		
1	0:00:01.0	5.326	0.326
3	0:00:03.0	5.264	0.264
5	0:00:05.0	5.217	0.217
7	0:00:07.0	5.179	0.179
9	0:00:09.0	5.150	0.150
11	0:00:11.0	5.124	0.124
13	0:00:13.0	5.103	0.103
15	0:00:15.0	5.084	0.084
17	0:00:17.0	5.069	0.069
19	0:00:19.0	5.057	0.057
21	0:00:21.0	5.047	0.047
23	0:00:23.0	5.038	0.038
25	0:00:25.0	5.031	0.031
27	0:00:27.0	5.025	0.025
29	0:00:29.0	5.020	0.020
31	0:00:31.0	5.016	0.016
33	0:00:33.0	5.013	0.013
35	0:00:35.0	5.011	0.011
37	0:00:37.0	5.009	0.009
39	0:00:39.0	5.007	0.007
41	0:00:41.0	5.005	0.005
43	0:00:43.0	5.004	0.004
45	0:00:45.0	5.003	0.003
47	0:00:47.0	5.002	0.002
49	0:00:49.0	5.002	0.002
51	0:00:51.0	5.001	0.001
53	0:00:53.0	5.001	0.001
55	0:00:55.0	4.999	0.001
57	0:00:57.0	4.999	0.001
59	0:00:59.0	4.999	0.001
61	0:01:01.0	5.000	0.000
63	0:01:03.0	5.000	0.000
65	0:01:05.0	5.000	0.000
67	0:01:07.0	5.000	0.000
69	0:01:09.0	5.001	0.001
71	0:01:11.0	5.001	0.001
73	0:01:13.0	5.001	0.001
75	0:01:15.0	5.001	0.001
77	0:01:17.0	5.002	0.002



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.3262
Inferred drawdown for formation (m)	0.3262
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0004
Vol. filter pack that recharged water originated from (m3)	0.0015
Specific yield of filter pack (-)	0.24
Effective casing radius (m)	0.032
Effective casing diameter (m)	0.063

Butler, 1997

Effective casing radius (m)	0.032
Effective casing diameter (m)	0.063

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

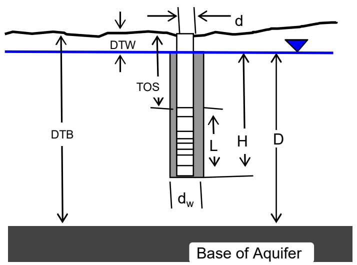
Log shows sand from 8.0 to 8.5m bgl (8.9 to 9.4m btoc) then soft gravelly clay to 9.3m (10.2m btoc). Screen from 8.2 to 9.2m (9.1 to 10.1m btoc).

Site: Riverlea **Well ID:** MW10-B **Test No:** RHT-2

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1	Meter
Depths to:		
water level (DTW)	5.004	Meter
top of screen (TOS)	9.1	Meter
base of aquifer (DTB)	10.2	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

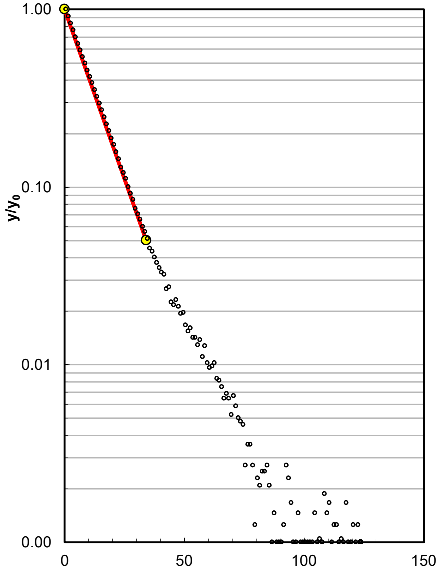
L_{wetted}	1	Meter
D =	5.196	Meter
H =	5.096	Meter
L/r_w =	20.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.48	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.726	
ln(Re/rw) =	3.084	
Re =	3.59	meter
Slope =	0.038266	$\log_{10}$/sec
$t_{90\%}$ recovery =	26	sec

Input is consistent.

K =	**7.3**	**meter/day**

Observed slug discrepancy: 8%
Eff casing slug discrepancy: 8%

Adjust slope of line to estimate K

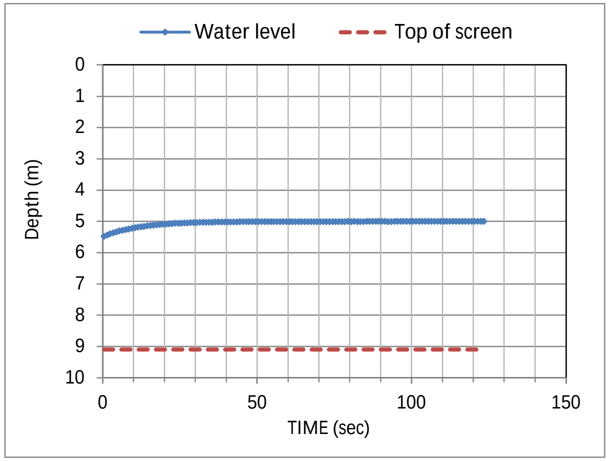


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 124

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.004	
Final obs:	0:02:04.0	5.0039	1E-04

Entry	Reduced Dataset		
1	0:00:01.0	5.484	0.480
4	0:00:04.0	5.371	0.367
7	0:00:07.0	5.286	0.282
10	0:00:10.0	5.222	0.218
13	0:00:13.0	5.173	0.169
16	0:00:16.0	5.134	0.130
19	0:00:19.0	5.103	0.099
22	0:00:22.0	5.080	0.076
25	0:00:25.0	5.062	0.058
28	0:00:28.0	5.048	0.044
31	0:00:31.0	5.038	0.034
34	0:00:34.0	5.031	0.027
37	0:00:37.0	5.025	0.021
40	0:00:40.0	5.021	0.017
43	0:00:43.0	5.017	0.013
46	0:00:46.0	5.014	0.010
49	0:00:49.0	5.013	0.009
52	0:00:52.0	5.011	0.007
55	0:00:55.0	5.011	0.007
58	0:00:58.0	5.009	0.005
61	0:01:01.0	5.009	0.005
64	0:01:04.0	5.008	0.004
67	0:01:07.0	5.007	0.003
70	0:01:10.0	5.007	0.003
73	0:01:13.0	5.006	0.002
76	0:01:16.0	5.005	0.001
79	0:01:19.0	5.005	0.001
82	0:01:22.0	5.005	0.001
85	0:01:25.0	5.005	0.001
88	0:01:28.0	5.005	0.001
91	0:01:31.0	5.004	0.000
94	0:01:34.0	5.005	0.001
97	0:01:37.0	5.004	0.000
100	0:01:40.0	5.004	0.000
103	0:01:43.0	5.004	0.000
106	0:01:46.0	5.004	0.000
109	0:01:49.0	5.005	0.001
112	0:01:52.0	5.004	0.000
115	0:01:55.0	5.004	0.000



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.4797
Inferred drawdown for formation (m)	0.4797
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0001
Vol. filter pack that recharged water originated from (m3)	0.0023
Specific yield of filter pack (-)	0.03
Effective casing radius (m)	0.026
Effective casing diameter (m)	0.052

Butler, 1997

Effective casing radius (m)	0.026
Effective casing diameter (m)	0.052

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

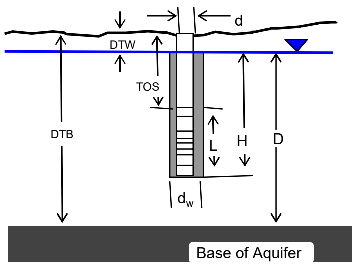
Log shows sand from 8.0 to 8.5m bgl (8.9 to 9.4m btoc) then soft gravelly clay to 9.3m (10.2m btoc). Screen from 8.2 to 9.2m (9.1 to 10.1m btoc).

Site: Riverlea | **Well ID:** MW10-C | **Test No:** FHT-2

Date: 08/11/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	2.5	Meter
Depths to:		
water level (DTW)	5.115	Meter
top of screen (TOS)	11.4	Meter
base of aquifer (DTB)	14	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

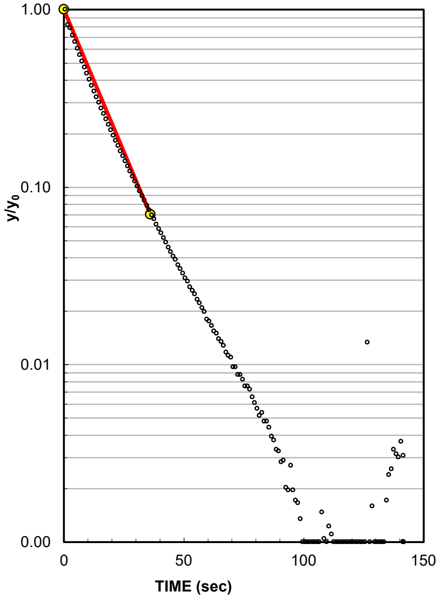
L_{wetted}	2.5	Meter
D =	8.885	Meter
H =	8.785	Meter
L/r_w =	50.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.63	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.754	
ln(Re/rw) =	3.733	
Re =	6.86	meter
Slope =	0.032081	$\log_{10}$/sec
$t_{90\%}$ recovery =	31	sec

Input is consistent.

K =	**3.0**	**meter/day**

Observed slug discrepancy: 103%
Eff casing slug discrepancy: 103%

Adjust slope of line to estimate K

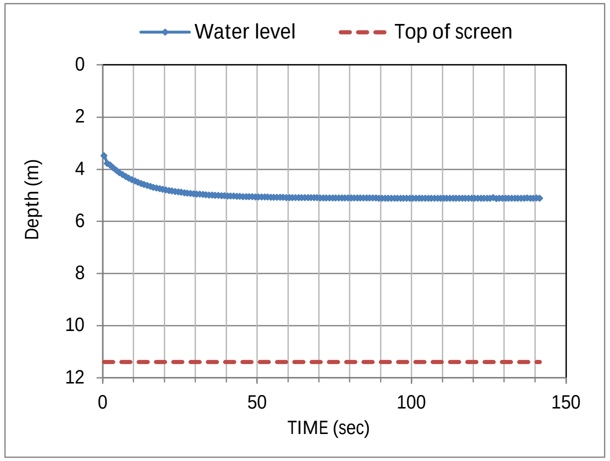


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 142

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.115	
Final obs:	0:02:22.0	5.1245	-0.0095

Entry	Reduced Dataset		
1	0:00:01.0	3.487	1.628
4	0:00:04.0	3.947	1.168
7	0:00:07.0	4.211	0.904
10	0:00:10.0	4.405	0.710
13	0:00:13.0	4.551	0.564
16	0:00:16.0	4.662	0.453
19	0:00:19.0	4.749	0.366
22	0:00:22.0	4.818	0.297
25	0:00:25.0	4.871	0.244
28	0:00:28.0	4.915	0.200
31	0:00:31.0	4.950	0.165
34	0:00:34.0	4.978	0.137
37	0:00:37.0	5.002	0.113
40	0:00:40.0	5.020	0.095
43	0:00:43.0	5.036	0.079
46	0:00:46.0	5.049	0.066
49	0:00:49.0	5.059	0.056
52	0:00:52.0	5.067	0.048
55	0:00:55.0	5.074	0.041
58	0:00:58.0	5.081	0.034
61	0:01:01.0	5.087	0.028
64	0:01:04.0	5.091	0.024
67	0:01:07.0	5.094	0.021
70	0:01:10.0	5.097	0.018
73	0:01:13.0	5.101	0.014
76	0:01:16.0	5.103	0.012
79	0:01:19.0	5.104	0.011
82	0:01:22.0	5.107	0.008
85	0:01:25.0	5.107	0.008
88	0:01:28.0	5.109	0.006
91	0:01:31.0	5.110	0.005
94	0:01:34.0	5.112	0.003
97	0:01:37.0	5.112	0.003
100	0:01:40.0	5.114	0.001
103	0:01:43.0	5.114	0.001
106	0:01:46.0	5.115	0.000
109	0:01:49.0	5.113	0.002
112	0:01:52.0	5.113	0.002
115	0:01:55.0	5.114	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.6284
Inferred drawdown for formation (m)	1.6284
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	-0.0022
Vol. filter pack that recharged water originated from (m3)	0.0077
Specific yield of filter pack (-)	-0.28
Effective casing radius (m)	0.014
Effective casing diameter (m)	0.028

Butler, 1997

Effective casing radius (m)	0.014
Effective casing diameter (m)	0.028

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Log shows sand from 10.2 to 10.3m bgl (11.1 to 11.2 m btoc) and from 10.6 to 13.0 mbgl (11.5 to 14m btoc) (end of hole).

Site: Riverlea **Well ID:** MW10-C **Test No:** RHT-1

Date: 08/11/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:

Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	2.5	Meter

Depths to:

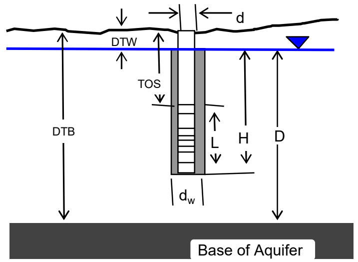
water level (DTW)	5.111	Meter
top of screen (TOS)	11.4	Meter
base of aquifer (DTB)	14	Meter

'Slug' details:

length	1	Meter
diameter	0.036	Meter
type:	Bailed	

Geology and annular fill materials:

across screen --	Coarse Sand
above screen --	Cement
aquifer material --	Fine Sand



COMPUTED

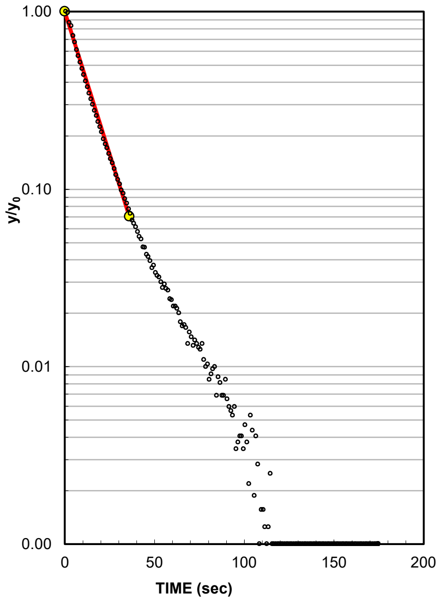
L_{wetted}	2.5	Meter
D =	8.889	Meter
H =	8.789	Meter
L/r_w =	50.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.32	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.754	
ln(Re/rw) =	3.733	
Re =	6.86	meter
Slope =	0.032081	$\log_{10}$/sec
$t_{90\%}$ recovery =	31	sec

Input is consistent.

K = 3.0 meter/day

Observed slug discrepancy: 47%
Eff casing slug discrepancy: 47%

Adjust slope of line to estimate K

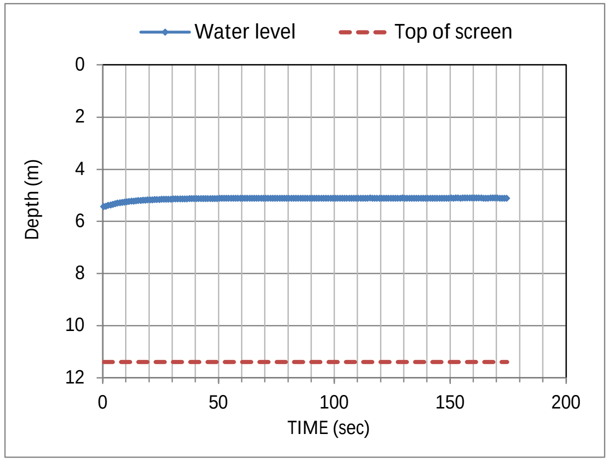


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 175

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.111	
Final obs:	0:02:55.0	5.1084	0.0026

Entry	Elapsed time	Reduced Dataset	
1	0:00:01.0	5.431	0.320
5	0:00:05.0	5.345	0.234
9	0:00:09.0	5.277	0.166
13	0:00:13.0	5.231	0.120
17	0:00:17.0	5.200	0.089
21	0:00:21.0	5.178	0.067
25	0:00:25.0	5.162	0.051
29	0:00:29.0	5.150	0.039
33	0:00:33.0	5.141	0.030
37	0:00:37.0	5.134	0.023
41	0:00:41.0	5.129	0.018
45	0:00:45.0	5.126	0.015
49	0:00:49.0	5.123	0.012
53	0:00:53.0	5.121	0.010
57	0:00:57.0	5.120	0.009
61	0:01:01.0	5.118	0.007
65	0:01:05.0	5.117	0.006
69	0:01:09.0	5.115	0.004
73	0:01:13.0	5.116	0.005
77	0:01:17.0	5.115	0.004
81	0:01:21.0	5.114	0.003
85	0:01:25.0	5.113	0.002
89	0:01:29.0	5.113	0.002
93	0:01:33.0	5.113	0.002
97	0:01:37.0	5.112	0.001
101	0:01:41.0	5.113	0.002
105	0:01:45.0	5.112	0.001
109	0:01:49.0	5.111	0.000
113	0:01:53.0	5.111	0.000
117	0:01:57.0	5.111	0.000
121	0:02:01.0	5.111	0.000
125	0:02:05.0	5.111	0.000
129	0:02:09.0	5.110	0.001
133	0:02:13.0	5.111	0.000
137	0:02:17.0	5.111	0.000
141	0:02:21.0	5.111	0.000
145	0:02:25.0	5.110	0.001
149	0:02:29.0	5.111	0.000
153	0:02:33.0	5.110	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.3202
Inferred drawdown for formation (m)	0.3202
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0004
Vol. filter pack that recharged water originated from (m3)	0.0015
Specific yield of filter pack (-)	0.26
Effective casing radius (m)	0.032
Effective casing diameter (m)	0.064

Butler, 1997

Effective casing radius (m)	0.032
Effective casing diameter (m)	0.064

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Log shows sand from 10.2 to 10.3m bgl (11.1 to 11.2 m btoc) and from 10.6 to 13.0 mbgl (11.5 to 14m btoc) (end of hole).

Site:	Riverlea	Well ID:	MW11-B	Test No:	FHT-3
				Date:	08/11/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	2.7	Meter
Depths to:		
water level (DTW)	5.115	Meter
top of screen (TOS)	6.1	Meter
base of aquifer (DTB)	8.8	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

COMPUTED

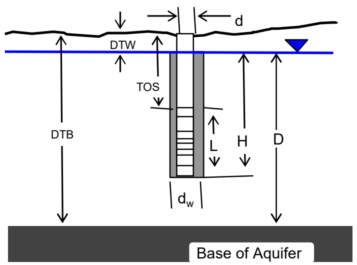
L_{wetted}	2.7	Meter
D =	3.685	Meter
H =	3.685	Meter
L/r_w =	54.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.34	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.891	
ln(Re/rw) =	3.233	
Re =	4.16	meter
Slope =	0.037348	$\log_{10}$/sec
$t_{90\%}$ recovery =	27	sec

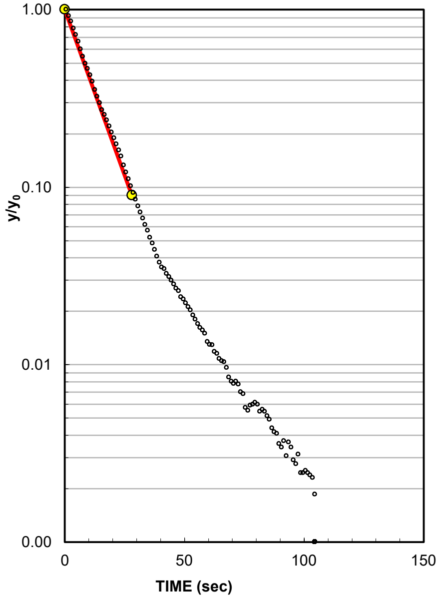
Input is consistent.

K =	**2.8**	**meter/day**

Observed slug discrepancy: 89%

Eff casing slug discrepancy: 89%





Bouwer and Rice analysis of slug test, WRR 1976

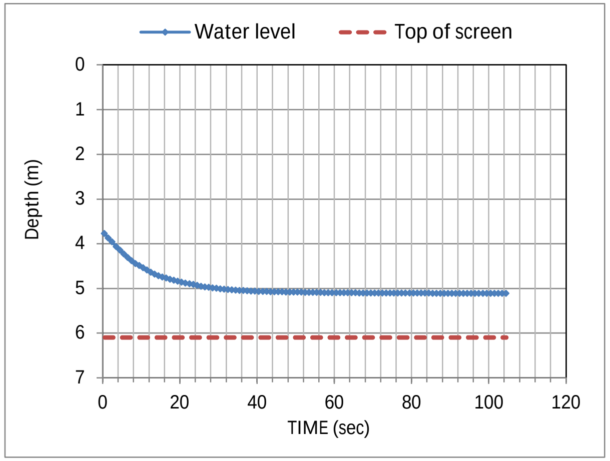
Spreadsheet adapted from one developed by USGS

No. of data points: 105

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.115	
Final obs:	0:01:45.0	5.1125	0.0025

Reduced Dataset

Entry	Elapsed time	Water Level	Draw-down
1	0:00:01.0	3.771	1.344
3	0:00:03.0	3.962	1.153
5	0:00:05.0	4.146	0.969
7	0:00:07.0	4.309	0.806
9	0:00:09.0	4.446	0.669
11	0:00:11.0	4.539	0.576
13	0:00:13.0	4.640	0.475
15	0:00:15.0	4.715	0.400
17	0:00:17.0	4.771	0.344
19	0:00:19.0	4.819	0.296
21	0:00:21.0	4.861	0.254
23	0:00:23.0	4.898	0.217
25	0:00:25.0	4.936	0.179
27	0:00:27.0	4.966	0.149
29	0:00:29.0	4.990	0.125
31	0:00:31.0	5.010	0.105
33	0:00:33.0	5.025	0.090
35	0:00:35.0	5.038	0.077
37	0:00:37.0	5.050	0.065
39	0:00:39.0	5.060	0.055
41	0:00:41.0	5.067	0.048
43	0:00:43.0	5.071	0.044
45	0:00:45.0	5.075	0.040
47	0:00:47.0	5.079	0.036
49	0:00:49.0	5.083	0.032
51	0:00:51.0	5.085	0.030
53	0:00:53.0	5.088	0.027
55	0:00:55.0	5.091	0.024
57	0:00:57.0	5.093	0.022
59	0:00:59.0	5.095	0.020
61	0:01:01.0	5.098	0.017
63	0:01:03.0	5.099	0.016
65	0:01:05.0	5.101	0.015
67	0:01:07.0	5.101	0.014
69	0:01:09.0	5.104	0.011
71	0:01:11.0	5.105	0.011
73	0:01:13.0	5.105	0.010
75	0:01:15.0	5.106	0.009
77	0:01:17.0	5.108	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.3436
Inferred drawdown for formation (m)	1.3436
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	-0.0016
Vol. filter pack that recharged water originated from (m3)	0.0064
Specific yield of filter pack (-)	-0.25
Effective casing radius (m)	0.016
Effective casing diameter (m)	0.031

Butler, 1997

Effective casing radius (m)	0.016
Effective casing diameter (m)	0.031

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Moist zone of mainly clayey sand and sandy clay from 5.0 to 7.7 m bgl (6.1 to 8.8m btoc), with stiff clay above and hard, high plasticity clay below

Site:	Riverlea
Well ID:	MW11-B
Test No:	RHT-1
Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	2.7	Meter
Depths to:		
water level (DTW)	5.119	Meter
top of screen (TOS)	6.1	Meter
base of aquifer (DTB)	8.8	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

COMPUTED

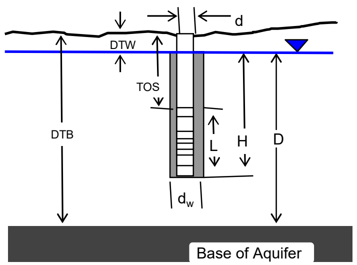
L_{wetted}	2.7	Meter
D =	3.681	Meter
H =	3.681	Meter
L/r_w =	54.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.28	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.891	
ln(Re/rw) =	3.232	
Re =	4.16	meter
Slope =	0.052632	log_{10}/sec
$t_{90\%}$ recovery =	19	sec

Input is consistent.

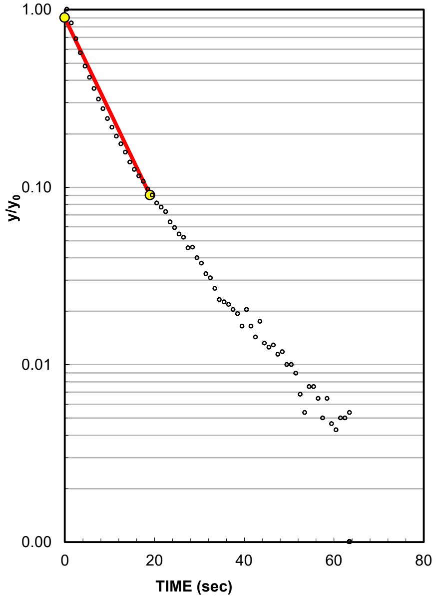
K =	3.9	meter/day

Observed slug discrepancy: 60%

Eff casing slug discrepancy: 60%



Adjust slope of line to estimate K



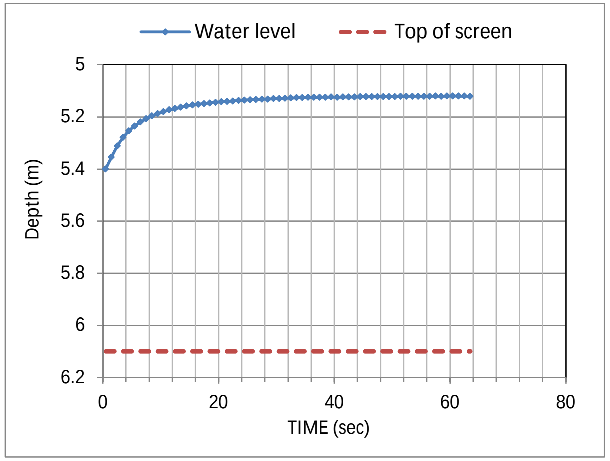
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 64

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.119	
Final obs:	0:01:04.0	5.1202	-0.0012

Entry	Reduced Dataset		
1	0:00:01.0	5.399	0.280
2	0:00:02.0	5.355	0.236
3	0:00:03.0	5.311	0.192
4	0:00:04.0	5.279	0.160
5	0:00:05.0	5.253	0.134
6	0:00:06.0	5.235	0.116
7	0:00:07.0	5.220	0.101
8	0:00:08.0	5.207	0.088
9	0:00:09.0	5.196	0.077
10	0:00:10.0	5.187	0.068
11	0:00:11.0	5.180	0.061
12	0:00:12.0	5.173	0.054
13	0:00:13.0	5.168	0.049
14	0:00:14.0	5.163	0.044
15	0:00:15.0	5.158	0.039
16	0:00:16.0	5.154	0.035
17	0:00:17.0	5.151	0.032
18	0:00:18.0	5.149	0.030
19	0:00:19.0	5.146	0.027
20	0:00:20.0	5.144	0.025
21	0:00:21.0	5.142	0.023
22	0:00:22.0	5.141	0.021
23	0:00:23.0	5.139	0.020
24	0:00:24.0	5.137	0.018
25	0:00:25.0	5.136	0.016
26	0:00:26.0	5.134	0.015
27	0:00:27.0	5.134	0.015
28	0:00:28.0	5.132	0.013
29	0:00:29.0	5.132	0.013
30	0:00:30.0	5.130	0.011
31	0:00:31.0	5.129	0.010
32	0:00:32.0	5.128	0.009
33	0:00:33.0	5.128	0.009
34	0:00:34.0	5.127	0.008
35	0:00:35.0	5.126	0.006
36	0:00:36.0	5.125	0.006
37	0:00:37.0	5.125	0.006
38	0:00:38.0	5.125	0.006
39	0:00:39.0	5.124	0.005



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.90
Observed drawdown (m)	0.2804
Inferred drawdown for formation (m)	0.2524
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0012
Specific yield of filter pack (-)	0.44
Effective casing radius (m)	0.036
Effective casing diameter (m)	0.072

Butler, 1997

Effective casing radius (m)	0.036
Effective casing diameter (m)	0.072

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Moist zone of mainly clayey sand and sandy clay from 5.0 to 7.7 m bgl (6.1 to 8.8m btoc), with stiff clay above and hard, high plasticity clay below

Site: Riverlea | **Well ID:** MW11-B | **Test No:** RHT-2

Date: 08/11/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	2.7	Meter
Depths to:		
water level (DTW)	5.128	Meter
top of screen (TOS)	6.1	Meter
base of aquifer (DTB)	8.8	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

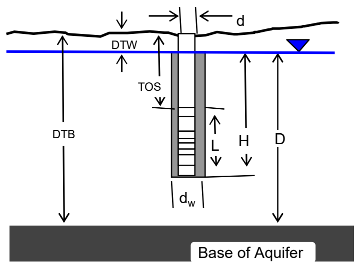
COMPUTED

L_{wetted}	2.7	Meter
D =	3.672	Meter
H =	3.672	Meter
L/r_w =	54.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.40	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	2.891	
ln(Re/rw) =	3.230	
Re =	4.15	meter
Slope =	0.058824	$\log_{10}$/sec
$t_{90\%}$ recovery =	17	sec

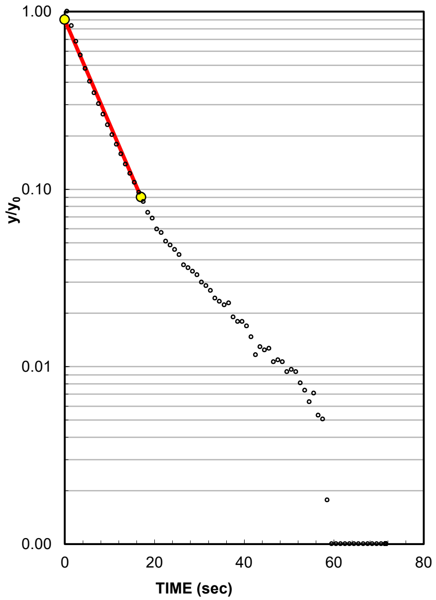
Input is consistent.

K =	**4.4**	**meter/day**

Observed slug discrepancy: 27%
Eff casing slug discrepancy: 27%



Adjust slope of line to estimate K

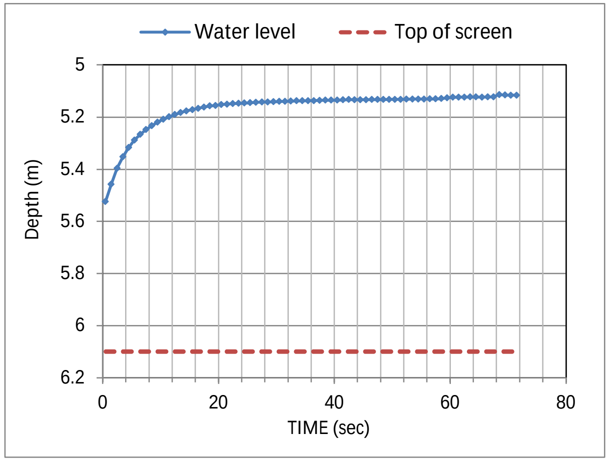


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 72

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.128	
Final obs:	0:01:12.0	5.1138	0.0142

Entry	Reduced Dataset		
1	0:00:01.0	5.524	0.396
2	0:00:02.0	5.458	0.330
3	0:00:03.0	5.396	0.268
4	0:00:04.0	5.352	0.224
5	0:00:05.0	5.317	0.189
6	0:00:06.0	5.288	0.160
7	0:00:07.0	5.265	0.137
8	0:00:08.0	5.248	0.119
9	0:00:09.0	5.232	0.104
10	0:00:10.0	5.219	0.091
11	0:00:11.0	5.208	0.080
12	0:00:12.0	5.199	0.071
13	0:00:13.0	5.190	0.062
14	0:00:14.0	5.183	0.054
15	0:00:15.0	5.176	0.048
16	0:00:16.0	5.171	0.043
17	0:00:17.0	5.166	0.038
18	0:00:18.0	5.162	0.034
19	0:00:19.0	5.157	0.029
20	0:00:20.0	5.155	0.027
21	0:00:21.0	5.152	0.023
22	0:00:22.0	5.151	0.022
23	0:00:23.0	5.148	0.020
24	0:00:24.0	5.147	0.019
25	0:00:25.0	5.146	0.018
26	0:00:26.0	5.145	0.017
27	0:00:27.0	5.143	0.015
28	0:00:28.0	5.142	0.014
29	0:00:29.0	5.142	0.014
30	0:00:30.0	5.141	0.013
31	0:00:31.0	5.140	0.012
32	0:00:32.0	5.139	0.011
33	0:00:33.0	5.139	0.011
34	0:00:34.0	5.138	0.010
35	0:00:35.0	5.137	0.009
36	0:00:36.0	5.137	0.009
37	0:00:37.0	5.137	0.009
38	0:00:38.0	5.136	0.007
39	0:00:39.0	5.135	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.90
Observed drawdown (m)	0.3958
Inferred drawdown for formation (m)	0.3562
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0003
Vol. filter pack that recharged water originated from (m3)	0.0017
Specific yield of filter pack (-)	0.19
Effective casing radius (m)	0.030
Effective casing diameter (m)	0.060

Butler, 1997

Effective casing radius (m)	0.030
Effective casing diameter (m)	0.060

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

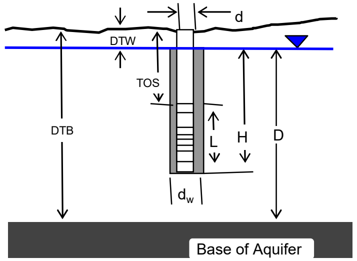
Moist zone of mainly clayey sand and sandy clay from 5.0 to 7.7 m bgl (6.1 to 8.8m btoc), with stiff clay above and hard, high plasticity clay below

Site: Riverlea | **Well ID:** MW11-C | **Test No:** FHT-3

Date: 08/11/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1	Meter
Depths to:		
water level (DTW)	5.19	Meter
top of screen (TOS)	13.05	Meter
base of aquifer (DTB)	14.05	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

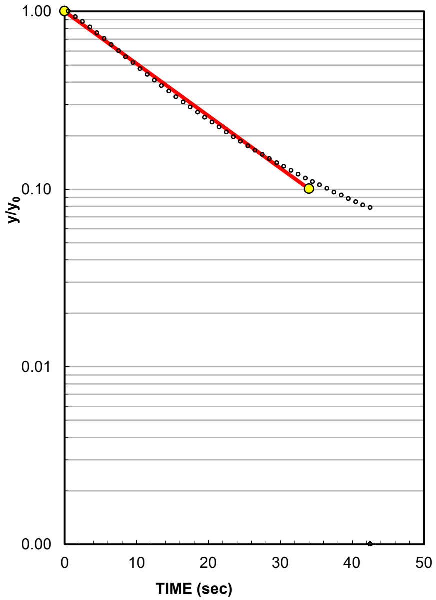
L_{wetted}	1	Meter
D =	8.86	Meter
H =	8.86	Meter
L/r_w =	20.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.31	meter
$y_{0\text{-SLUG}}$ eff casing=	2.59	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	1.726	
ln(Re/rw) =	3.347	
Re =	4.66	meter
Slope =	0.029412	$\log_{10}$/sec
$t_{90\%}$ recovery =	34	sec

Input is consistent.

K =	**6.1**	**meter/day**

Observed slug discrepancy: 66%
Eff casing slug discrepancy: 66%

Adjust slope of line to estimate K

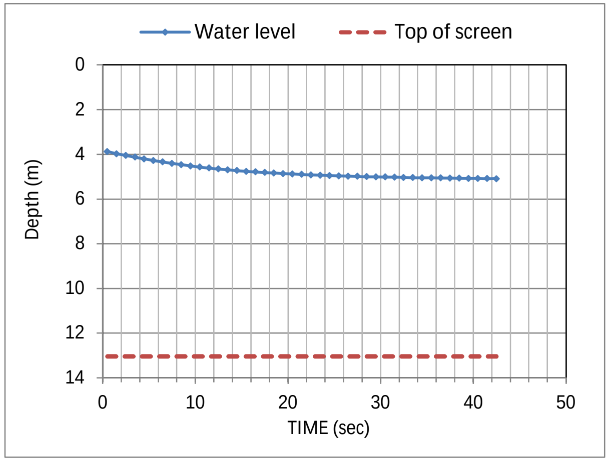


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 43

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.19	
Final obs:	0:00:43.0	5.0873	0.1027

Entry	Reduced Dataset		
1	0:00:01.0	3.881	1.309
2	0:00:02.0	3.972	1.218
3	0:00:03.0	4.047	1.144
4	0:00:04.0	4.124	1.066
5	0:00:05.0	4.200	0.990
6	0:00:06.0	4.272	0.918
7	0:00:07.0	4.342	0.848
8	0:00:08.0	4.405	0.785
9	0:00:09.0	4.464	0.726
10	0:00:10.0	4.518	0.672
11	0:00:11.0	4.567	0.623
12	0:00:12.0	4.613	0.577
13	0:00:13.0	4.654	0.536
14	0:00:14.0	4.692	0.498
15	0:00:15.0	4.726	0.464
16	0:00:16.0	4.758	0.432
17	0:00:17.0	4.786	0.404
18	0:00:18.0	4.812	0.378
19	0:00:19.0	4.837	0.353
20	0:00:20.0	4.859	0.331
21	0:00:21.0	4.880	0.310
22	0:00:22.0	4.898	0.292
23	0:00:23.0	4.916	0.274
24	0:00:24.0	4.933	0.257
25	0:00:25.0	4.948	0.242
26	0:00:26.0	4.961	0.229
27	0:00:27.0	4.974	0.216
28	0:00:28.0	4.985	0.205
29	0:00:29.0	4.996	0.194
30	0:00:30.0	5.006	0.184
31	0:00:31.0	5.015	0.175
32	0:00:32.0	5.024	0.166
33	0:00:33.0	5.032	0.158
34	0:00:34.0	5.040	0.150
35	0:00:35.0	5.046	0.144
36	0:00:36.0	5.052	0.138
37	0:00:37.0	5.058	0.132
38	0:00:38.0	5.065	0.125
39	0:00:39.0	5.069	0.121



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.3090
Inferred drawdown for formation (m)	1.3090
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0025
Vol. filter pack that recharged water originated from (m3)	0.0062
Specific yield of filter pack (-)	0.41
Effective casing radius (m)	0.035
Effective casing diameter (m)	0.070

Butler, 1997

Effective casing radius (m)	0.035
Effective casing diameter (m)	0.070

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Screen 10 to 13 m bgl (11.05 to 14.05 m btoc) in mainly clay and sandy clay but which contains pocktes of gravelly sand with wet (saturated) zones from 10.8 to 11.3m (11.85 to 12.35m btoc) and from 12.5 to 13 m (13.55 to 14.05m btoc), so effective screen length is 1 m

Site:	Riverlea	Well ID:	MW11-C
Test No:	RHT-1		
Date:	08/11/2023		
Fieldwork by:	LBWco		
Processed by:	JL		
Checked by:			
Test type (rising/falling):	Rising		

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1	Meter
Depths to:		
water level (DTW)	5.192	Meter
top of screen (TOS)	13.05	Meter
base of aquifer (DTB)	14.05	Meter
'Slug' details:		
length	0.6	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

COMPUTED

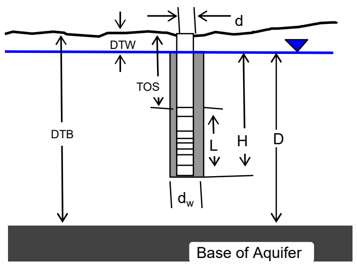
L_{wetted}	1	Meter
D =	8.858	Meter
H =	8.858	Meter
L/r_w =	20.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.29	meter
$y_{0\text{-SLUG}}$ eff casing=	0.31	meter
$y_{0\text{-SLUG}}$ =	0.31	meter
Fully penetrate C =	1.726	
ln(Re/rw) =	3.347	
Re =	4.66	meter
Slope =	0.032702	$\log_{10}$/sec
$t_{90\%}$ recovery =	31	sec

Input is consistent.

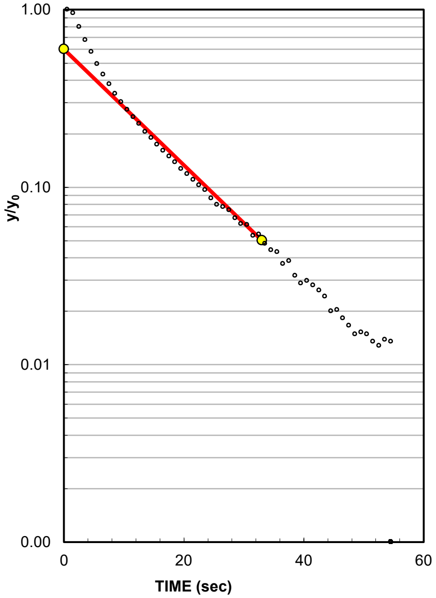
K =	**6.8**	**meter/day**

Observed slug discrepancy: 7%

Eff casing slug discrepancy: 7%



Adjust slope of line to estimate K



Bouwer and Rice analysis of slug test, WRR 1976

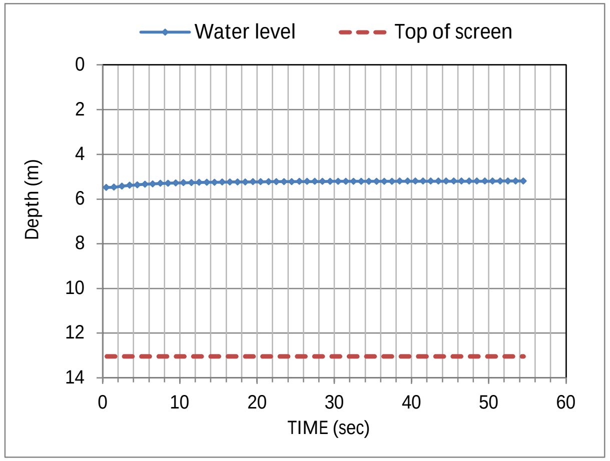
Spreadsheet adapted from one developed by USGS

No. of data points: 55

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.192	
Final obs:	0:00:55.0	5.1957	-0.0037

Reduced Dataset

Entry	Elapsed time	Water Level	Draw-down
1	0:00:01.0	5.481	0.289
2	0:00:02.0	5.469	0.277
3	0:00:03.0	5.424	0.232
4	0:00:04.0	5.387	0.195
5	0:00:05.0	5.360	0.168
6	0:00:06.0	5.335	0.143
7	0:00:07.0	5.317	0.125
8	0:00:08.0	5.302	0.110
9	0:00:09.0	5.289	0.097
10	0:00:10.0	5.279	0.087
11	0:00:11.0	5.271	0.079
12	0:00:12.0	5.264	0.072
13	0:00:13.0	5.258	0.066
14	0:00:14.0	5.251	0.059
15	0:00:15.0	5.247	0.055
16	0:00:16.0	5.242	0.050
17	0:00:17.0	5.239	0.047
18	0:00:18.0	5.235	0.043
19	0:00:19.0	5.232	0.040
20	0:00:20.0	5.229	0.037
21	0:00:21.0	5.226	0.034
22	0:00:22.0	5.224	0.032
23	0:00:23.0	5.222	0.030
24	0:00:24.0	5.220	0.028
25	0:00:25.0	5.217	0.025
26	0:00:26.0	5.215	0.023
27	0:00:27.0	5.214	0.022
28	0:00:28.0	5.214	0.022
29	0:00:29.0	5.211	0.019
30	0:00:30.0	5.210	0.018
31	0:00:31.0	5.210	0.018
32	0:00:32.0	5.207	0.015
33	0:00:33.0	5.208	0.016
34	0:00:34.0	5.206	0.014
35	0:00:35.0	5.205	0.013
36	0:00:36.0	5.205	0.013
37	0:00:37.0	5.203	0.011
38	0:00:38.0	5.203	0.011
39	0:00:39.0	5.201	0.009



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.60
Observed drawdown (m)	0.2894
Inferred drawdown for formation (m)	0.1736
Expected displacement based on slug volume (m)	0.3110
Vol. water recharged by filter pack (m3)	0.0003
Vol. filter pack that recharged water originated from (m3)	0.0008
Specific yield of filter pack (-)	0.33
Effective casing radius (m)	0.033
Effective casing diameter (m)	0.067

Butler, 1997

Effective casing radius (m)	0.033
Effective casing diameter (m)	0.067

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

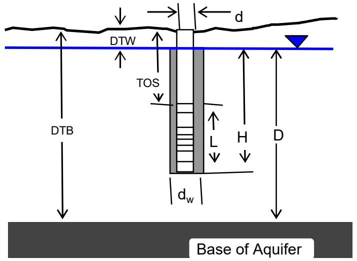
Screen 10 to 13 m bgl (11.05 to 14.05 m btoc) in mainly clay and sandy clay but which contains pocktes of gravelly sand with wet (saturated) zones from 10.8 to 11.3m (11.85 to 12.35m btoc) and from 12.5 to 13 m (13.55 to 14.05m btoc), so effective screen length is 1 m

Site:	Riverlea	Well ID:	MW11-C	Test No: RHT-2

Date: 08/11/2023
Fieldwork by: LBWco
Processed by: JL
Checked by:
Test type (rising/falling): Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1	Meter
Depths to:		
water level (DTW)	5.196	Meter
top of screen (TOS)	13.05	Meter
base of aquifer (DTB)	14.05	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

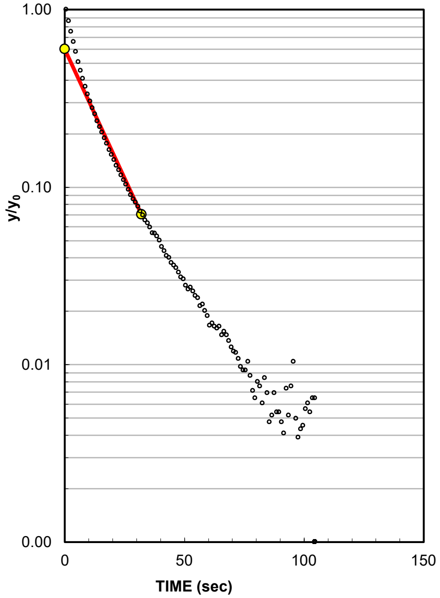
L_{wetted}	1	Meter
D =	8.854	Meter
H =	8.854	Meter
L/r_w =	20.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.46	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.726	
ln(Re/rw) =	3.347	
Re =	4.66	meter
Slope =	0.029158	$\log_{10}$/sec
$t_{90\%}$ recovery =	34	sec

Input is consistent.

K =	6.1	meter/day

Observed slug discrepancy: 11%
Eff casing slug discrepancy: 11%

Adjust slope of line to estimate K



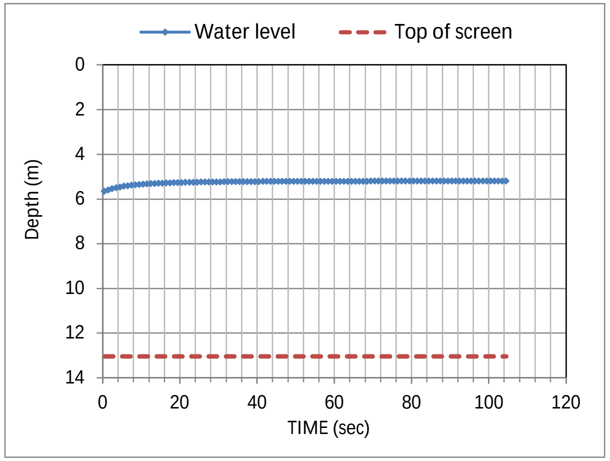
Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 105

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	5.196	
Final obs:	0:01:45.0	5.1978	-0.0018

Reduced Dataset

Entry	Elapsed time	Water Level	Draw-down
1	0:00:01.0	5.659	0.463
3	0:00:03.0	5.544	0.348
5	0:00:05.0	5.464	0.268
7	0:00:07.0	5.406	0.210
9	0:00:09.0	5.366	0.170
11	0:00:11.0	5.337	0.141
13	0:00:13.0	5.315	0.119
15	0:00:15.0	5.297	0.101
17	0:00:17.0	5.284	0.088
19	0:00:19.0	5.271	0.075
21	0:00:21.0	5.262	0.066
23	0:00:23.0	5.254	0.058
25	0:00:25.0	5.247	0.051
27	0:00:27.0	5.241	0.045
29	0:00:29.0	5.236	0.040
31	0:00:31.0	5.232	0.036
33	0:00:33.0	5.228	0.032
35	0:00:35.0	5.225	0.029
37	0:00:37.0	5.222	0.026
39	0:00:39.0	5.221	0.025
41	0:00:41.0	5.217	0.021
43	0:00:43.0	5.215	0.019
45	0:00:45.0	5.213	0.017
47	0:00:47.0	5.212	0.016
49	0:00:49.0	5.210	0.014
51	0:00:51.0	5.209	0.013
53	0:00:53.0	5.209	0.013
55	0:00:55.0	5.207	0.011
57	0:00:57.0	5.206	0.010
59	0:00:59.0	5.205	0.009
61	0:01:01.0	5.204	0.008
63	0:01:03.0	5.204	0.008
65	0:01:05.0	5.204	0.008
67	0:01:07.0	5.203	0.007
69	0:01:09.0	5.202	0.006
71	0:01:11.0	5.202	0.006
73	0:01:13.0	5.201	0.005
75	0:01:15.0	5.200	0.004
77	0:01:17.0	5.201	0.005



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.60
Observed drawdown (m)	0.4626
Inferred drawdown for formation (m)	0.2776
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0013
Specific yield of filter pack (-)	0.36
Effective casing radius (m)	0.034
Effective casing diameter (m)	0.068

Butler, 1997

Effective casing radius (m)	0.034
Effective casing diameter (m)	0.068

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

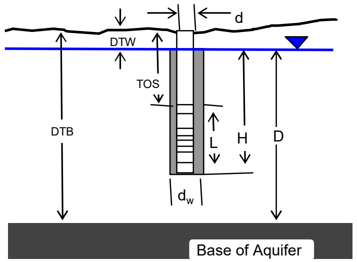
Screen 10 to 13 m bgl (11.05 to 14.05 m btoc) in mainly clay and sandy clay but which contains pocktes of gravelly sand with wet (saturated) zones from 10.8 to 11.3m (11.85 to 12.35m btoc) and from 12.5 to 13 m (13.55 to 14.05m btoc), so effective screen length is 1 m

Site: **Riverlea** | Well ID: **MW12-A** | Test No: **FHT-1**

Date: **08/11/2023**
Fieldwork by: **LBWco**
Processed by: **JL**
Checked by:
Test type (rising/falling): **Falling**

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.088	Meter
Total screen length (L)	1.2	Meter
Depths to:		
water level (DTW)	4.482	Meter
top of screen (TOS)	3.8	Meter
base of aquifer (DTB)	5.3	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

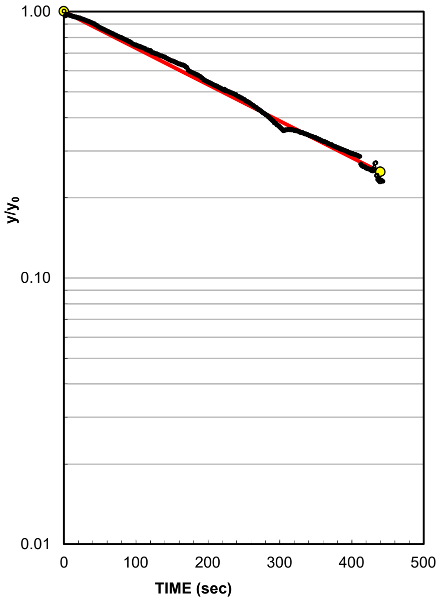
L_{wetted}	0.518	Meter
D =	0.818	Meter
H =	0.518	Meter
L/r_w =	10.36	-
$y_{0\text{-DISPLACEMENT}}$ =	0.83	meter
$y_{0\text{-SLUG}}$ eff casing=	0.83	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Partial penetrate A =	1.897	
B =	0.272	
ln(Re/rw) =	1.427	
Re =	0.68	meter
Slope =	0.001368	$\log_{10}$/sec
$t_{90\%}$ recovery =	731	sec

Input is consistent.

K =	**0.7**	**meter/day**

Observed slug discrepancy: 103%
Eff casing slug discrepancy: 0%
K= 0.73 is less than likely minimum of 0.914 for Fine Sand

Adjust slope of line to estimate K

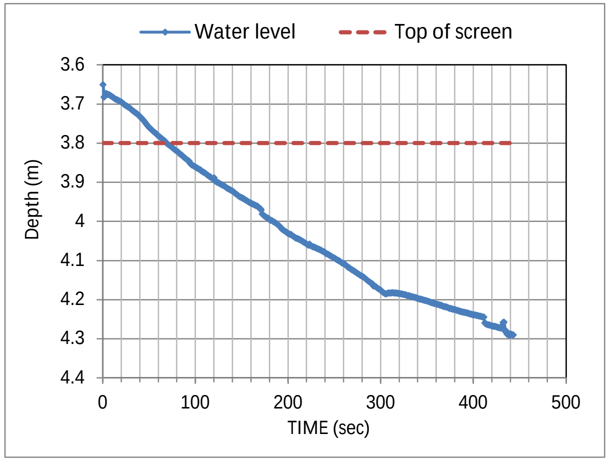


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 444

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.482	
Final obs:	0:07:24.0	4.2919	0.1901

Entry	Reduced Dataset		
1	0:00:01.0	3.650	0.832
12	0:00:12.0	3.683	0.799
23	0:00:23.0	3.699	0.783
34	0:00:34.0	3.719	0.763
45	0:00:45.0	3.743	0.740
56	0:00:56.0	3.771	0.711
67	0:01:07.0	3.793	0.689
78	0:01:18.0	3.816	0.666
89	0:01:29.0	3.837	0.645
100	0:01:40.0	3.860	0.622
111	0:01:51.0	3.877	0.606
122	0:02:02.0	3.897	0.585
133	0:02:13.0	3.912	0.570
144	0:02:24.0	3.929	0.553
155	0:02:35.0	3.946	0.537
166	0:02:46.0	3.960	0.522
177	0:02:57.0	3.990	0.493
188	0:03:08.0	4.006	0.476
199	0:03:19.0	4.028	0.454
210	0:03:30.0	4.043	0.439
221	0:03:41.0	4.059	0.424
232	0:03:52.0	4.070	0.412
243	0:04:03.0	4.084	0.399
254	0:04:14.0	4.099	0.383
265	0:04:25.0	4.116	0.366
276	0:04:36.0	4.134	0.348
287	0:04:47.0	4.152	0.330
298	0:04:58.0	4.172	0.310
309	0:05:09.0	4.184	0.299
320	0:05:20.0	4.184	0.298
331	0:05:31.0	4.190	0.292
342	0:05:42.0	4.198	0.284
353	0:05:53.0	4.205	0.277
364	0:06:04.0	4.214	0.269
375	0:06:15.0	4.222	0.260
386	0:06:26.0	4.230	0.253
397	0:06:37.0	4.237	0.245
408	0:06:48.0	4.242	0.240
419	0:06:59.0	4.266	0.216



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.8319
Inferred drawdown for formation (m)	0.8319
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0035
Vol. filter pack that recharged water originated from (m3)	0.0039
Specific yield of filter pack (-)	0.88
Effective casing radius (m)	0.044
Effective casing diameter (m)	0.088

Butler, 1997

Effective casing radius (m)	0.044
Effective casing diameter (m)	0.088

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	161%

REMARKS:

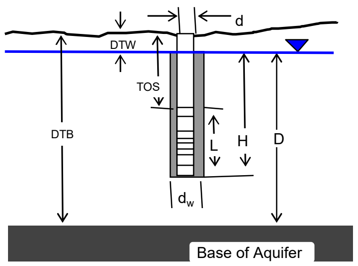
Screen 2.5 - 4.0m bgl (3.5 - 5.0m btoc) in sandy clay (except 3.2 - 3.5 m bgl clay), so effective screen length adjusted to 1.2 m

Site: **Riverlea** | Well ID: **MW12-B** | Test No: **FHT-1**

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1.4	Meter
Depths to:		
water level (DTW)	4.479	Meter
top of screen (TOS)	7.5	Meter
base of aquifer (DTB)	8.9	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	1.4	Meter
D =	4.421	Meter
H =	4.421	Meter
L/r_w =	28.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.50	meter
$y_{0\text{-SLUG}}$ eff casing=	2.59	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	2.003	
ln(Re/rw) =	3.155	
Re =	3.85	meter
Slope =	0.046196	$\log_{10}$/sec
$t_{90\%}$ recovery =	22	sec

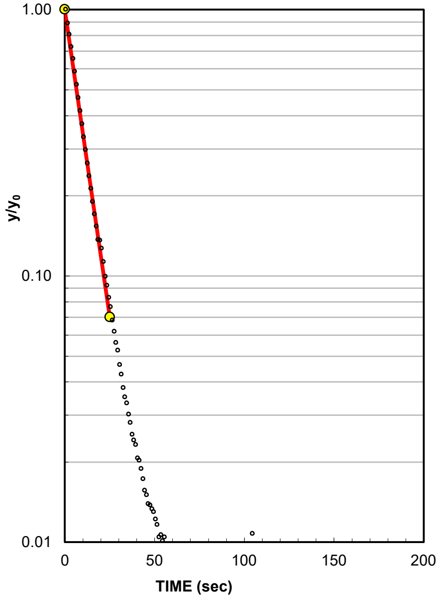
Input is consistent.

K =	**6.5**	**meter/day**

Observed slug discrepancy: 54%

Eff casing slug discrepancy: 54%

Adjust slope of line to estimate K



Bouwer and Rice analysis of slug test, WRR 1976

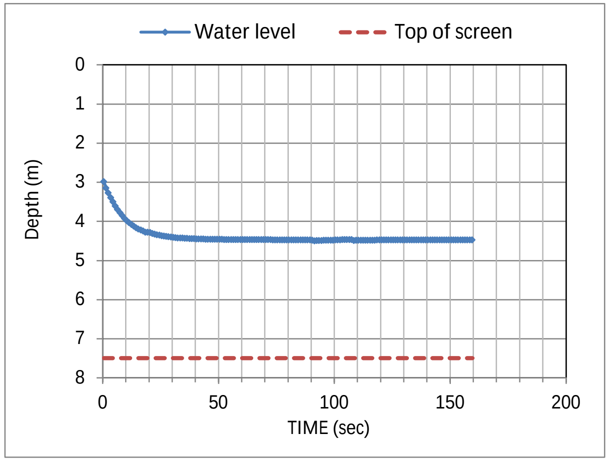
Spreadsheet adapted from one developed by USGS

No. of data points: 160

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.479	
Final obs:	0:02:40.0	4.4961	-0.0171

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	2.983	1.496
5	0:00:05.0	3.500	0.979
9	0:00:09.0	3.856	0.623
13	0:00:13.0	4.083	0.396
17	0:00:17.0	4.224	0.255
21	0:00:21.0	4.289	0.190
25	0:00:25.0	4.355	0.124
29	0:00:29.0	4.395	0.084
33	0:00:33.0	4.422	0.057
37	0:00:37.0	4.437	0.042
41	0:00:41.0	4.448	0.031
45	0:00:45.0	4.456	0.023
49	0:00:49.0	4.459	0.020
53	0:00:53.0	4.463	0.016
57	0:00:57.0	4.466	0.013
61	0:01:01.0	4.467	0.012
65	0:01:05.0	4.469	0.010
69	0:01:09.0	4.470	0.009
73	0:01:13.0	4.471	0.008
77	0:01:17.0	4.472	0.007
81	0:01:21.0	4.473	0.006
85	0:01:25.0	4.473	0.006
89	0:01:29.0	4.474	0.005
93	0:01:33.0	4.493	0.014
97	0:01:37.0	4.484	0.005
101	0:01:41.0	4.477	0.002
105	0:01:45.0	4.463	0.016
109	0:01:49.0	4.490	0.011
113	0:01:53.0	4.482	0.003
117	0:01:57.0	4.480	0.001
121	0:02:01.0	4.479	0.000
125	0:02:05.0	4.478	0.002
129	0:02:09.0	4.479	0.000
133	0:02:13.0	4.477	0.002
137	0:02:17.0	4.477	0.002
141	0:02:21.0	4.477	0.002
145	0:02:25.0	4.478	0.001
149	0:02:29.0	4.477	0.002
153	0:02:33.0	4.478	0.001



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.4957
Inferred drawdown for formation (m)	1.4957
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0022
Vol. filter pack that recharged water originated from (m3)	0.0071
Specific yield of filter pack (-)	0.30
Effective casing radius (m)	0.033
Effective casing diameter (m)	0.066

Butler, 1997

Effective casing radius (m)	0.033
Effective casing diameter (m)	0.066

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

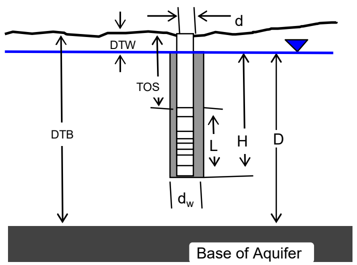
Screen 6.5 - 8.0m bgl (7.5 to 9.0m btoc) in sandy clay (5.8 - 6.8m bgl), sand (6.8 - 7.0m bgl, clay (7.0 - 7.3m bgl) and sandy clay (7.3 - 7.9m bgl). Effective screen length taken to be 1.4m from 6.5 to 7.9m bgl (7.5 to 8.9m btoc).

Site: Riverlea | **Well ID:** MW12-B | **Test No:** RHT-1

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	1.4	Meter
Depths to:		
water level (DTW)	4.479	Meter
top of screen (TOS)	7.5	Meter
base of aquifer (DTB)	8.9	Meter
'Slug' details:		
length	0.9	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	1.4	Meter
D =	4.421	Meter
H =	4.421	Meter
L/r_w =	28.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.41	meter
$y_{0\text{-SLUG}}$ eff casing=	0.47	meter
$y_{0\text{-SLUG}}$ =	0.47	meter
Fully penetrate C =	2.003	
ln(Re/rw) =	3.155	
Re =	3.85	meter
Slope =	0.060784	$\log_{10}$/sec
$t_{90\%}$ recovery =	16	sec

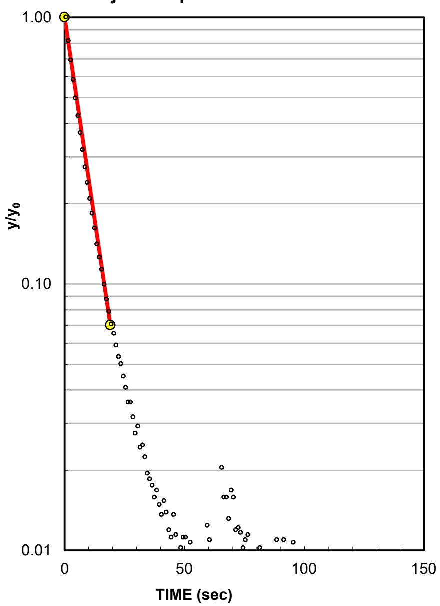
Input is consistent.

K =	**8.5**	**meter/day**

Observed slug discrepancy: 13%

Eff casing slug discrepancy: 13%

Adjust slope of line to estimate K



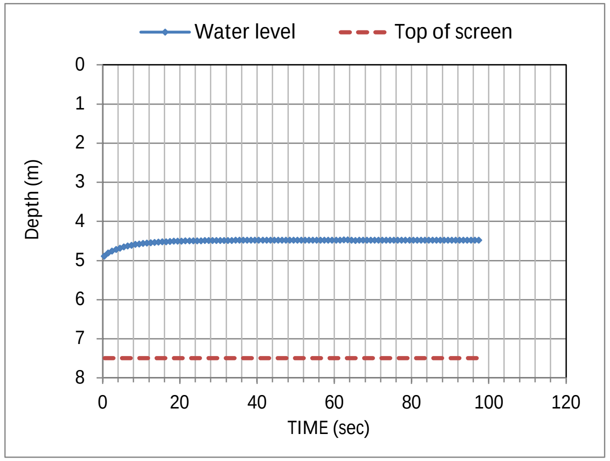
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 98

	Elapsed time	Water Level	Draw-down
	Hr:Min:Sec	Meter	Meter
Pre-start	0:00:00.0	4.479	
Final obs:	0:01:38.0	4.4746	0.0044

Entry	Reduced Dataset		
1	0:00:01.0	4.890	0.411
3	0:00:03.0	4.763	0.284
5	0:00:05.0	4.684	0.205
7	0:00:07.0	4.631	0.152
9	0:00:09.0	4.592	0.113
11	0:00:11.0	4.565	0.086
13	0:00:13.0	4.546	0.067
15	0:00:15.0	4.531	0.052
17	0:00:17.0	4.520	0.041
19	0:00:19.0	4.511	0.032
21	0:00:21.0	4.506	0.027
23	0:00:23.0	4.501	0.022
25	0:00:25.0	4.498	0.018
27	0:00:27.0	4.494	0.015
29	0:00:29.0	4.492	0.013
31	0:00:31.0	4.491	0.012
33	0:00:33.0	4.489	0.010
35	0:00:35.0	4.487	0.008
37	0:00:37.0	4.486	0.007
39	0:00:39.0	4.486	0.007
41	0:00:41.0	4.485	0.006
43	0:00:43.0	4.485	0.006
45	0:00:45.0	4.484	0.005
47	0:00:47.0	4.484	0.005
49	0:00:49.0	4.483	0.004
51	0:00:51.0	4.484	0.005
53	0:00:53.0	4.483	0.004
55	0:00:55.0	4.483	0.004
57	0:00:57.0	4.483	0.004
59	0:00:59.0	4.479	0.000
61	0:01:01.0	4.484	0.004
63	0:01:03.0	4.475	0.004
65	0:01:05.0	4.482	0.003
67	0:01:07.0	4.486	0.006
69	0:01:09.0	4.484	0.005
71	0:01:11.0	4.486	0.006
73	0:01:13.0	4.484	0.005
75	0:01:15.0	4.483	0.004
77	0:01:17.0	4.484	0.005



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	0.4114
Inferred drawdown for formation (m)	0.4114
Expected displacement based on slug volume (m)	0.4666
Vol. water recharged by filter pack (m3)	0.0001
Vol. filter pack that recharged water originated from (m3)	0.0019
Specific yield of filter pack (-)	0.06
Effective casing radius (m)	0.027
Effective casing diameter (m)	0.053

Butler, 1997

Effective casing radius (m)	0.027
Effective casing diameter (m)	0.053

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Screen 6.5 - 8.0m bgl (7.5 to 9.0m btoc) in sandy clay (5.8 - 6.8m bgl), sand (6.8 - 7.0m bgl, clay (7.0 - 7.3m bgl) and sandy clay (7.3 - 7.9m bgl). Effective screen length taken to be 1.4m from 6.5 to 7.9m bgl (7.5 to 8.9m btoc).

Site:	Riverlea	Well ID:	MW12-C	Test No:	FHT-1
				Date:	08/11/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	0.8	Meter
Depths to:		
water level (DTW)	4.482	Meter
top of screen (TOS)	11.7	Meter
base of aquifer (DTB)	12.5	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

COMPUTED

L_{wetted}	0.8	Meter
D =	8.018	Meter
H =	8.018	Meter
L/r_w =	16.00	-
$y_{0\text{-DISPLACEMENT}}$ =	2.04	meter
$y_{0\text{-SLUG}}$ eff casing=	2.59	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	1.558	
ln(Re/rw) =	3.184	
Re =	3.96	meter
Slope =	0.002265	$\log_{10}$/sec
$t_{90\%}$ recovery =	442	sec

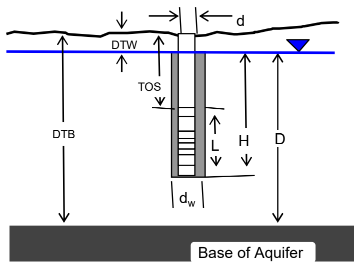
Input is consistent.

K =	**0.6**	**meter/day**

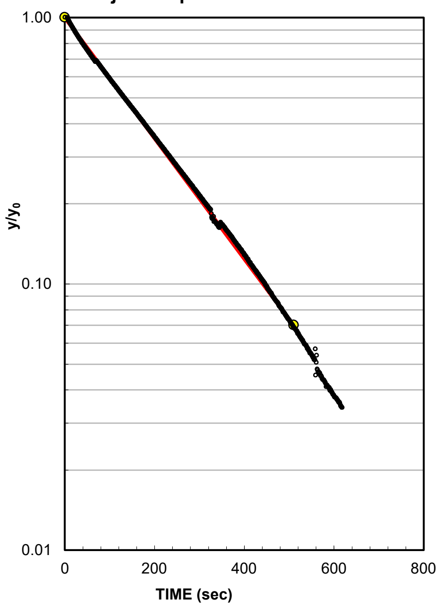
Observed slug discrepancy: 24%

Eff casing slug discrepancy: 24%

K= 0.56 is less than likely minimum of 0.914 for Fine Sand



Adjust slope of line to estimate K



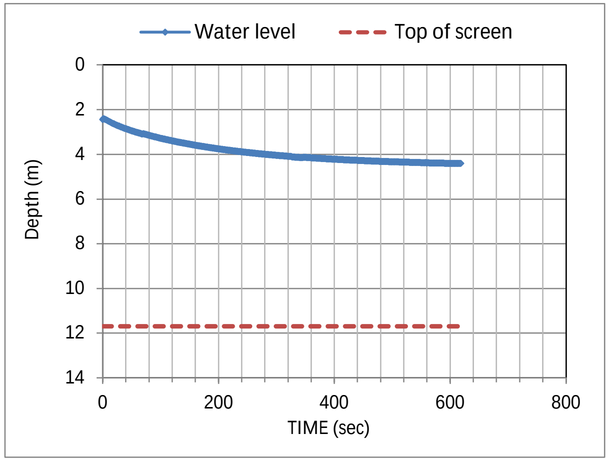
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 619

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.482	
Final obs:	0:10:19.0	2.4059	2.0761

Entry	Reduced Dataset		
1	0:00:01.0	2.441	2.041
16	0:00:16.0	2.588	1.894
31	0:00:31.0	2.760	1.722
46	0:00:46.0	2.903	1.579
61	0:01:01.0	3.029	1.453
76	0:01:16.0	3.116	1.366
91	0:01:31.0	3.218	1.264
106	0:01:46.0	3.312	1.170
121	0:02:01.0	3.398	1.084
136	0:02:16.0	3.476	1.006
151	0:02:31.0	3.548	0.934
166	0:02:46.0	3.616	0.866
181	0:03:01.0	3.679	0.803
196	0:03:16.0	3.738	0.744
211	0:03:31.0	3.793	0.689
226	0:03:46.0	3.842	0.640
241	0:04:01.0	3.889	0.593
256	0:04:16.0	3.933	0.549
271	0:04:31.0	3.973	0.509
286	0:04:46.0	4.009	0.473
301	0:05:01.0	4.045	0.437
316	0:05:16.0	4.076	0.406
331	0:05:31.0	4.123	0.359
346	0:05:46.0	4.148	0.334
361	0:06:01.0	4.158	0.324
376	0:06:16.0	4.182	0.301
391	0:06:31.0	4.205	0.277
406	0:06:46.0	4.227	0.255
421	0:07:01.0	4.247	0.235
436	0:07:16.0	4.265	0.217
451	0:07:31.0	4.283	0.199
466	0:07:46.0	4.301	0.181
481	0:08:01.0	4.316	0.166
496	0:08:16.0	4.329	0.153
511	0:08:31.0	4.342	0.140
526	0:08:46.0	4.354	0.128
541	0:09:01.0	4.366	0.116
556	0:09:16.0	4.376	0.106
571	0:09:31.0	4.390	0.092



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	2.0406
Inferred drawdown for formation (m)	2.0406
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0011
Vol. filter pack that recharged water originated from (m3)	0.0097
Specific yield of filter pack (-)	0.11
Effective casing radius (m)	0.028
Effective casing diameter (m)	0.056

Butler, 1997

Effective casing radius (m)	0.028
Effective casing diameter (m)	0.056

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

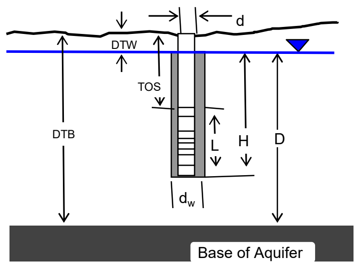
Screen 10.5 - 11.5m bgl (11.5 to 12.5m btoc) mainly in sandy clay (10.7 - 11.5m bgl = 11.7-12.5m btoc) with clay above

Site: **Riverlea** | Well ID: **MW12-C** | Test No: **RHT-1**

Date: **08/11/2023**
Fieldwork by: **LBWco**
Processed by: **JL**
Checked by:
Test type (rising/falling): **Rising**

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	0.8	Meter
Depths to:		
water level (DTW)	4.482	Meter
top of screen (TOS)	11.7	Meter
base of aquifer (DTB)	12.5	Meter
'Slug' details:		
length	1	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	0.8	Meter
D =	8.018	Meter
H =	8.018	Meter
L/r_w =	16.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.51	meter
$y_{0\text{-SLUG}}$ eff casing=	0.52	meter
$y_{0\text{-SLUG}}$ =	0.52	meter
Fully penetrate C =	1.558	
ln(Re/rw) =	3.184	
Re =	3.96	meter
Slope =	0.002863	$\log_{10}$/sec
$t_{90\%}$ recovery =	349	sec

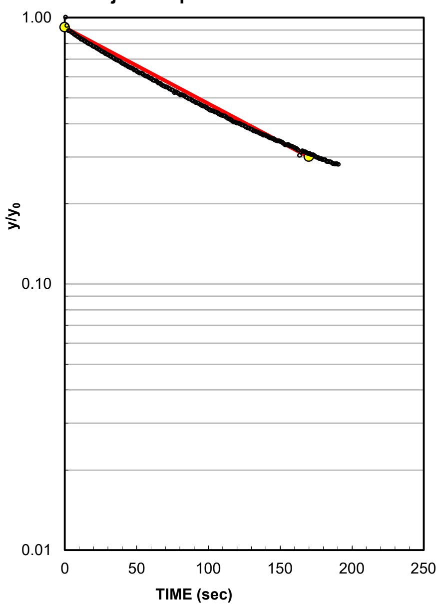
Input is consistent.

K =	0.7	meter/day

Observed slug discrepancy: 2%
Eff casing slug discrepancy: 2%

K= 0.71 is less than likely minimum of 0.914 for Fine Sand

Adjust slope of line to estimate K

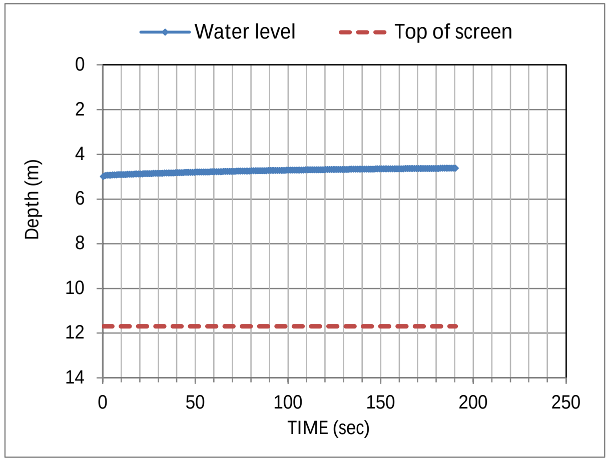


Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted from one developed by USGS

No. of data points: 191

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	4.482	
Final obs:	0:03:11.0	4.6247	-0.1427

Entry	Reduced Dataset		
1	0:00:01.0	4.991	0.509
5	0:00:05.0	4.930	0.448
9	0:00:09.0	4.915	0.433
13	0:00:13.0	4.901	0.419
17	0:00:17.0	4.889	0.407
21	0:00:21.0	4.877	0.395
25	0:00:25.0	4.866	0.384
29	0:00:29.0	4.854	0.372
33	0:00:33.0	4.844	0.362
37	0:00:37.0	4.834	0.352
41	0:00:41.0	4.823	0.341
45	0:00:45.0	4.814	0.332
49	0:00:49.0	4.805	0.323
53	0:00:53.0	4.796	0.314
57	0:00:57.0	4.788	0.306
61	0:01:01.0	4.781	0.299
65	0:01:05.0	4.773	0.291
69	0:01:09.0	4.764	0.282
73	0:01:13.0	4.757	0.275
77	0:01:17.0	4.747	0.265
81	0:01:21.0	4.742	0.260
85	0:01:25.0	4.737	0.255
89	0:01:29.0	4.731	0.249
93	0:01:33.0	4.724	0.242
97	0:01:37.0	4.718	0.236
101	0:01:41.0	4.712	0.230
105	0:01:45.0	4.707	0.225
109	0:01:49.0	4.701	0.219
113	0:01:53.0	4.696	0.214
117	0:01:57.0	4.691	0.209
121	0:02:01.0	4.686	0.204
125	0:02:05.0	4.682	0.200
129	0:02:09.0	4.677	0.195
133	0:02:13.0	4.672	0.190
137	0:02:17.0	4.668	0.186
141	0:02:21.0	4.664	0.182
145	0:02:25.0	4.661	0.179
149	0:02:29.0	4.656	0.174
153	0:02:33.0	4.653	0.171



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.92
Observed drawdown (m)	0.5087
Inferred drawdown for formation (m)	0.4680
Expected displacement based on slug volume (m)	0.5184
Vol. water recharged by filter pack (m3)	0.0001
Vol. filter pack that recharged water originated from (m3)	0.0022
Specific yield of filter pack (-)	0.04
Effective casing radius (m)	0.026
Effective casing diameter (m)	0.053

Butler, 1997

Effective casing radius (m)	0.026
Effective casing diameter (m)	0.053

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

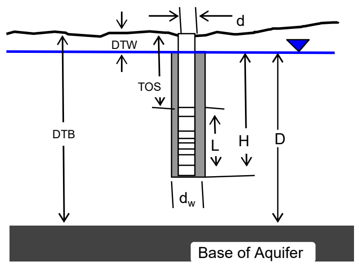
REMARKS:

Screen 10.5 - 11.5m bgl (11.5 to 12.5m btoc) mainly in sandy clay (10.7 - 11.5m bgl = 11.7-12.5m btoc) with clay above

Site:	Riverlea	Well ID:	MW13-A	Test No:	FHT-1
				Date:	08/11/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.071	Meter
Total screen length (L)	1.5	Meter
Depths to:		
water level (DTW)	3.97	Meter
top of screen (TOS)	3.8	Meter
base of aquifer (DTB)	5.5	Meter
'Slug' details:		
length	4	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	



COMPUTED

L_{wetted}	1.33	Meter
D =	1.53	Meter
H =	1.33	Meter
L/r_w =	26.60	-
$y_{0\text{-DISPLACEMENT}}$ =	1.03	meter
$y_{0\text{-SLUG}}$ eff casing=	1.03	meter
$y_{0\text{-SLUG}}$ =	2.07	meter
Partial penetrate A =	2.409	
B =	0.394	
ln(Re/rw) =	2.240	
Re =	1.54	meter
Slope =	0.046196	$\log_{10}$/sec
$t_{90\%}$ recovery =	22	sec

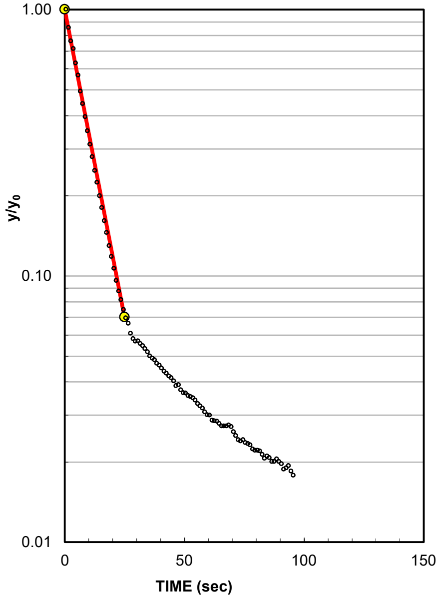
Input is consistent.

K =	9.7	meter/day

Observed slug discrepancy: 67%

Eff casing slug discrepancy: 0%

Adjust slope of line to estimate K



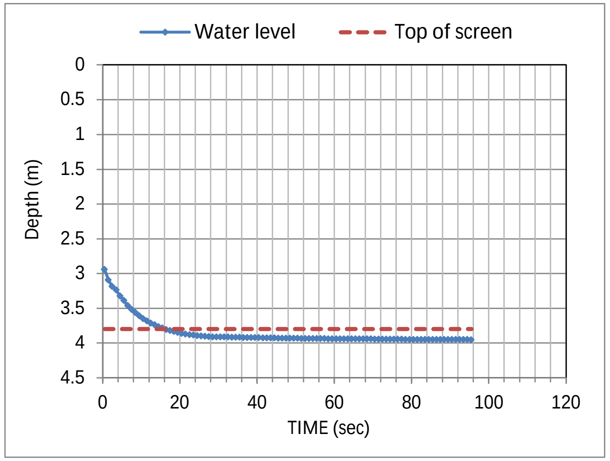
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 96

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.97	
Final obs:	0:01:36.0	3.9517	0.0183

Entry	Reduced Dataset		
1	0:00:01.0	2.941	1.029
3	0:00:03.0	3.187	0.783
5	0:00:05.0	3.322	0.648
7	0:00:07.0	3.462	0.508
9	0:00:09.0	3.563	0.407
11	0:00:11.0	3.649	0.321
13	0:00:13.0	3.714	0.256
15	0:00:15.0	3.764	0.206
17	0:00:17.0	3.805	0.165
19	0:00:19.0	3.836	0.134
21	0:00:21.0	3.861	0.110
23	0:00:23.0	3.880	0.090
25	0:00:25.0	3.893	0.077
27	0:00:27.0	3.902	0.068
29	0:00:29.0	3.910	0.060
31	0:00:31.0	3.912	0.059
33	0:00:33.0	3.914	0.056
35	0:00:35.0	3.917	0.053
37	0:00:37.0	3.920	0.050
39	0:00:39.0	3.922	0.048
41	0:00:41.0	3.924	0.046
43	0:00:43.0	3.926	0.044
45	0:00:45.0	3.927	0.043
47	0:00:47.0	3.930	0.040
49	0:00:49.0	3.932	0.038
51	0:00:51.0	3.933	0.037
53	0:00:53.0	3.934	0.036
55	0:00:55.0	3.935	0.035
57	0:00:57.0	3.937	0.033
59	0:00:59.0	3.938	0.032
61	0:01:01.0	3.939	0.031
63	0:01:03.0	3.941	0.029
65	0:01:05.0	3.941	0.029
67	0:01:07.0	3.942	0.028
69	0:01:09.0	3.942	0.028
71	0:01:11.0	3.943	0.027
73	0:01:13.0	3.945	0.025
75	0:01:15.0	3.945	0.025
77	0:01:17.0	3.946	0.024



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.0290
Inferred drawdown for formation (m)	1.0290
Expected displacement based on slug volume (m)	2.0736
Vol. water recharged by filter pack (m3)	0.0021
Vol. filter pack that recharged water originated from (m3)	0.0049
Specific yield of filter pack (-)	0.42
Effective casing radius (m)	0.035
Effective casing diameter (m)	0.071

Butler, 1997

Effective casing radius (m)	0.035
Effective casing diameter (m)	0.071

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	77%

REMARKS:

Screen 3.0 - 4.5m bgl (3.8 - 5.3m btoc) in sandy clay (3.1 - 4.0m bgl) and sand (4.0 - 4.7m bgl)

Site: Riverlea | **Well ID:** MW13-A | **Test No:** RHT-1

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.095	Meter
Total screen length (L)	1.5	Meter
Depths to:		
water level (DTW)	3.97	Meter
top of screen (TOS)	3.8	Meter
base of aquifer (DTB)	5.5	Meter
'Slug' details:		
length	0.65	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Medium Sand	

COMPUTED

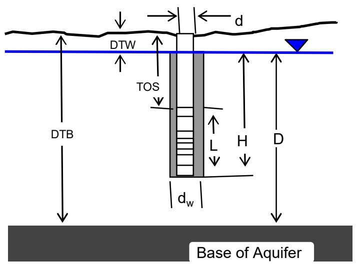
L_{wetted}	1.33	Meter
D =	1.53	Meter
H =	1.33	Meter
L/r_w =	26.60	-
$y_{0\text{-DISPLACEMENT}}$ =	0.18	meter
$y_{0\text{-SLUG}}$ eff casing=	0.09	meter
$y_{0\text{-SLUG}}$ =	0.34	meter
Partial penetrate A =	2.409	
B =	0.394	
ln(Re/rw) =	2.240	
Re =	1.54	meter
Slope =	0.031625	log_{10}/sec
$t_{90\%}$ recovery =	32	sec

Input is consistent.

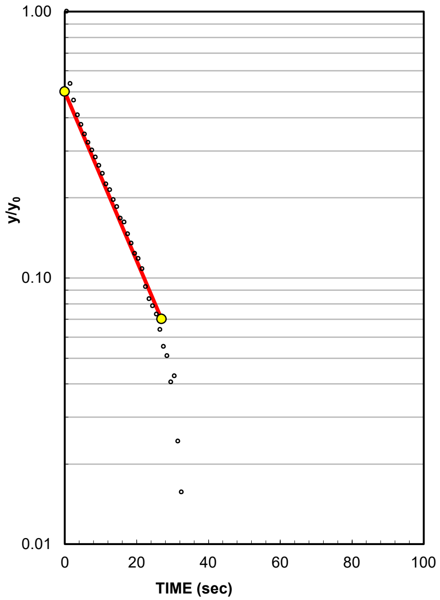
K =	12.0	meter/day

Observed slug discrepancy: 58%

Eff casing slug discrepancy: 66%



Adjust slope of line to estimate K



Bouwer and Rice analysis of slug test, WRR 1976

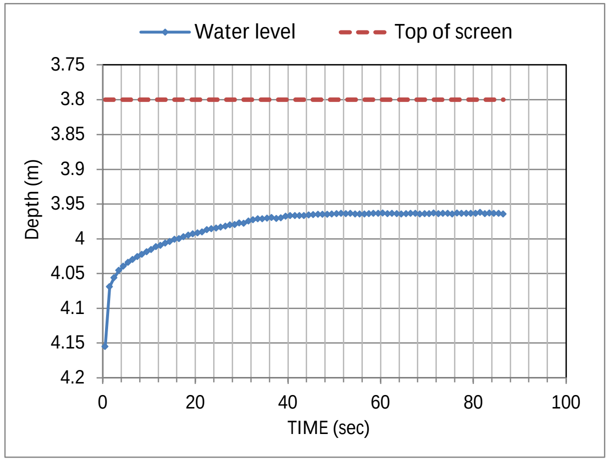
Spreadsheet adapted from one developed by USGS

No. of data points: 87

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.97	
Final obs:	0:01:27.0	3.9619	0.0081

Reduced Dataset

Entry			
1	0:00:01.0	4.155	0.185
3	0:00:03.0	4.056	0.086
5	0:00:05.0	4.040	0.070
7	0:00:07.0	4.030	0.060
9	0:00:09.0	4.022	0.052
11	0:00:11.0	4.016	0.046
13	0:00:13.0	4.010	0.040
15	0:00:15.0	4.004	0.034
17	0:00:17.0	4.000	0.030
19	0:00:19.0	3.995	0.025
21	0:00:21.0	3.992	0.022
23	0:00:23.0	3.987	0.017
25	0:00:25.0	3.985	0.015
27	0:00:27.0	3.982	0.012
29	0:00:29.0	3.979	0.009
31	0:00:31.0	3.978	0.008
33	0:00:33.0	3.973	0.003
35	0:00:35.0	3.971	0.001
37	0:00:37.0	3.970	0.000
39	0:00:39.0	3.970	0.000
41	0:00:41.0	3.967	0.003
43	0:00:43.0	3.967	0.003
45	0:00:45.0	3.966	0.004
47	0:00:47.0	3.965	0.005
49	0:00:49.0	3.965	0.005
51	0:00:51.0	3.964	0.006
53	0:00:53.0	3.964	0.006
55	0:00:55.0	3.964	0.006
57	0:00:57.0	3.965	0.006
59	0:00:59.0	3.964	0.006
61	0:01:01.0	3.963	0.007
63	0:01:03.0	3.964	0.006
65	0:01:05.0	3.964	0.006
67	0:01:07.0	3.963	0.007
69	0:01:09.0	3.965	0.005
71	0:01:11.0	3.964	0.006
73	0:01:13.0	3.964	0.006
75	0:01:15.0	3.964	0.006
77	0:01:17.0	3.963	0.007



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.50
Observed drawdown (m)	0.1849
Inferred drawdown for formation (m)	0.0925
Expected displacement based on slug volume (m)	0.3370
Vol. water recharged by filter pack (m3)	0.0005
Vol. filter pack that recharged water originated from (m3)	0.0004
Specific yield of filter pack (-)	1.10
Effective casing radius (m)	0.048
Effective casing diameter (m)	0.095

Butler, 1997

Effective casing radius (m)	0.048
Effective casing diameter (m)	0.095

Check significance of varying screen length during test

Was the water level always above top of screen?	No
Displacement (yo) as % of initial saturated screen length	14%

REMARKS:

Screen 3.0 - 4.5m bgl (3.8 - 5.3m btoc) in sandy clay (3.1 - 4.0m bgl) and sand (4.0 - 4.7m bgl)

Site:	**Riverlea**	**Well ID:**	**MW13-B**	**Test No:**	**FHT-1**
				Date:	**08/11/2023**
				Fieldwork by:	**LBWco**
				Processed by:	**JL**
				Checked by:	
				Test type (rising/falling):	**Falling**

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	0.3	Meter
Depths to:		
water level (DTW)	3.9	Meter
top of screen (TOS)	9.1	Meter
base of aquifer (DTB)	9.4	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

COMPUTED

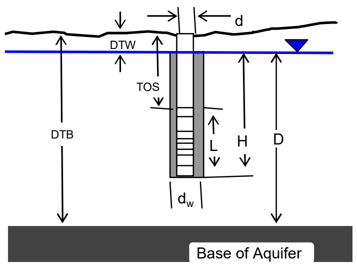
L_{wetted}	0.3	Meter
D =	5.5	Meter
H =	5.5	Meter
L/r_w =	6.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.53	meter
$y_{0\text{-SLUG}}$ eff casing=	2.59	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	0.947	
ln(Re/rw) =	2.552	
Re =	2.11	meter
Slope =	0.001867	$\log_{10}$/sec
$t_{90\%}$ recovery =	535	sec

Input is consistent.

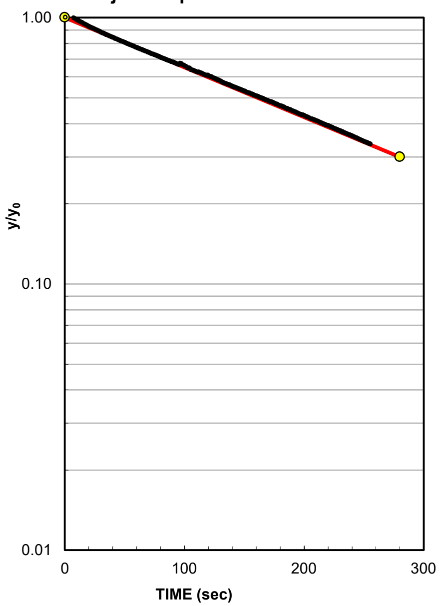
K =	**1.0**	**meter/day**

Observed slug discrepancy: 51%

Eff casing slug discrepancy: 51%



Adjust slope of line to estimate K



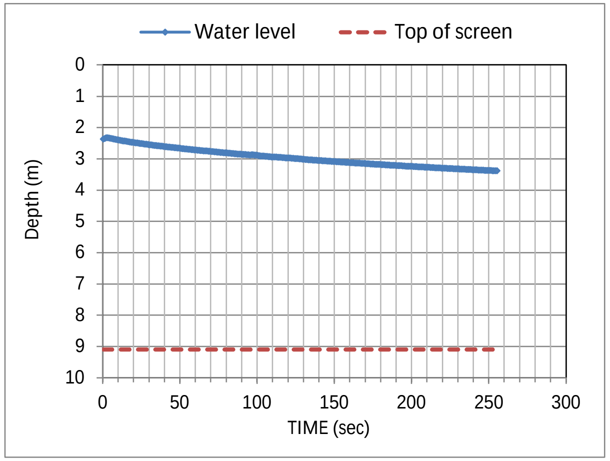
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 256

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.9	
Final obs:	0:04:16.0	2.3321	1.5679

Entry	Reduced Dataset		
1	0:00:01.0	2.366	1.534
7	0:00:07.0	2.363	1.537
13	0:00:13.0	2.420	1.480
19	0:00:19.0	2.468	1.432
25	0:00:25.0	2.510	1.390
31	0:00:31.0	2.550	1.351
37	0:00:37.0	2.587	1.313
43	0:00:43.0	2.622	1.278
49	0:00:49.0	2.656	1.244
55	0:00:55.0	2.688	1.212
61	0:01:01.0	2.719	1.181
67	0:01:07.0	2.748	1.152
73	0:01:13.0	2.778	1.122
79	0:01:19.0	2.805	1.095
85	0:01:25.0	2.833	1.067
91	0:01:31.0	2.858	1.042
97	0:01:37.0	2.868	1.032
103	0:01:43.0	2.908	0.992
109	0:01:49.0	2.935	0.965
115	0:01:55.0	2.954	0.946
121	0:02:01.0	2.973	0.927
127	0:02:07.0	2.999	0.901
133	0:02:13.0	3.026	0.874
139	0:02:19.0	3.048	0.852
145	0:02:25.0	3.069	0.831
151	0:02:31.0	3.090	0.810
157	0:02:37.0	3.109	0.791
163	0:02:43.0	3.129	0.771
169	0:02:49.0	3.149	0.751
175	0:02:55.0	3.167	0.733
181	0:03:01.0	3.186	0.714
187	0:03:07.0	3.204	0.696
193	0:03:13.0	3.222	0.678
199	0:03:19.0	3.240	0.660
205	0:03:25.0	3.257	0.643
211	0:03:31.0	3.274	0.627
217	0:03:37.0	3.289	0.611
223	0:03:43.0	3.305	0.595
229	0:03:49.0	3.321	0.579



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.5344
Inferred drawdown for formation (m)	1.5344
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0021
Vol. filter pack that recharged water originated from (m3)	0.0073
Specific yield of filter pack (-)	0.29
Effective casing radius (m)	0.032
Effective casing diameter (m)	0.065

Butler, 1997

Effective casing radius (m)	0.032
Effective casing diameter (m)	0.065

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Screen 7.1 - 8.6m bgl (7.9 - 9.4m btoc) in mostly clay with thin sandy or gravelly clay horizons (0.3 m total so 0.3m effective screen length)

Site:	Riverlea	Well ID:	MW13-B	Test No:	RHT-1
				Date:	08/11/2023
				Fieldwork by:	LBWco
				Processed by:	JL
				Checked by:	
				Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	0.3	Meter
Depths to:		
water level (DTW)	3.9	Meter
top of screen (TOS)	9.1	Meter
base of aquifer (DTB)	9.4	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	

COMPUTED

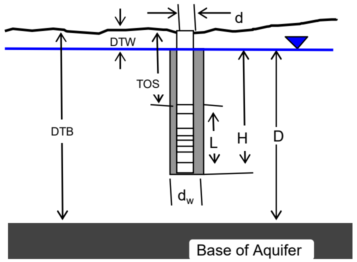
L_{wetted}	0.3	Meter
D =	5.5	Meter
H =	5.5	Meter
L/r_w =	6.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.69	meter
$y_{0\text{-SLUG}}$ eff casing=	2.59	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	0.947	
ln(Re/rw) =	2.552	
Re =	2.11	meter
Slope =	0.002511	$\log_{10}$/sec
$t_{90\%}$ recovery =	398	sec

Input is consistent.

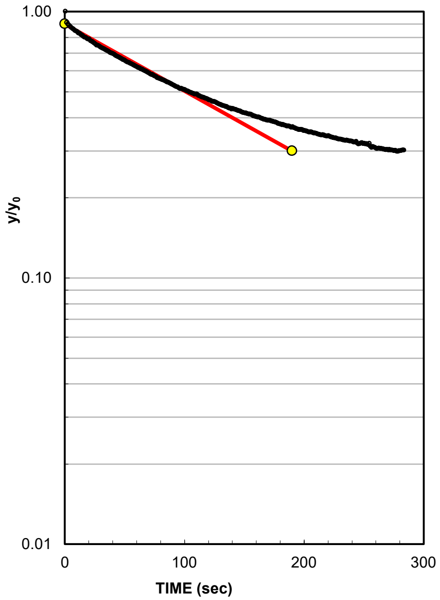
K =	**1.3**	**meter/day**

Observed slug discrepancy: 116%

Eff casing slug discrepancy: 116%



Adjust slope of line to estimate K



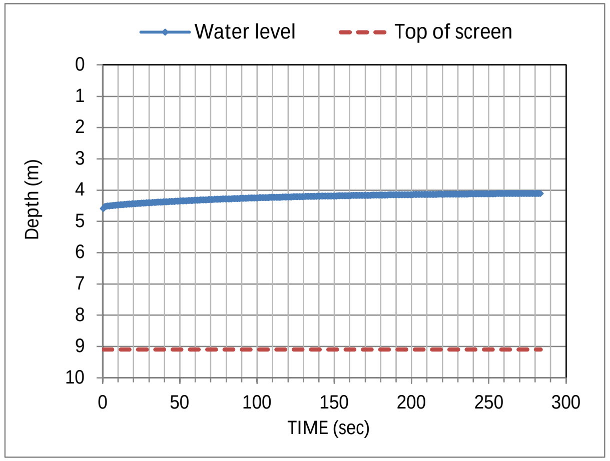
Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 284

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.9	
Final obs:	0:04:44.0	4.1051	-0.2051

Entry	Reduced Dataset		
1	0:00:01.0	4.589	0.689
8	0:00:08.0	4.490	0.590
15	0:00:15.0	4.460	0.560
22	0:00:22.0	4.435	0.535
29	0:00:29.0	4.411	0.511
36	0:00:36.0	4.390	0.490
43	0:00:43.0	4.371	0.471
50	0:00:50.0	4.353	0.453
57	0:00:57.0	4.335	0.435
64	0:01:04.0	4.319	0.419
71	0:01:11.0	4.304	0.404
78	0:01:18.0	4.288	0.388
85	0:01:25.0	4.276	0.376
92	0:01:32.0	4.263	0.363
99	0:01:39.0	4.252	0.352
106	0:01:46.0	4.242	0.342
113	0:01:53.0	4.232	0.332
120	0:02:00.0	4.223	0.323
127	0:02:07.0	4.213	0.313
134	0:02:14.0	4.204	0.304
141	0:02:21.0	4.197	0.297
148	0:02:28.0	4.189	0.289
155	0:02:35.0	4.183	0.283
162	0:02:42.0	4.176	0.276
169	0:02:49.0	4.169	0.269
176	0:02:56.0	4.164	0.264
183	0:03:03.0	4.159	0.259
190	0:03:10.0	4.153	0.253
197	0:03:17.0	4.148	0.248
204	0:03:24.0	4.143	0.243
211	0:03:31.0	4.140	0.240
218	0:03:38.0	4.135	0.235
225	0:03:45.0	4.131	0.231
232	0:03:52.0	4.128	0.228
239	0:03:59.0	4.124	0.224
246	0:04:06.0	4.119	0.219
253	0:04:13.0	4.120	0.220
260	0:04:20.0	4.112	0.212
267	0:04:27.0	4.109	0.209



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.90
Observed drawdown (m)	0.6885
Inferred drawdown for formation (m)	0.6197
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0039
Vol. filter pack that recharged water originated from (m3)	0.0029
Specific yield of filter pack (-)	1.32
Effective casing radius (m)	0.051
Effective casing diameter (m)	0.102

Butler, 1997

Effective casing radius (m)	0.051
Effective casing diameter (m)	0.102

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

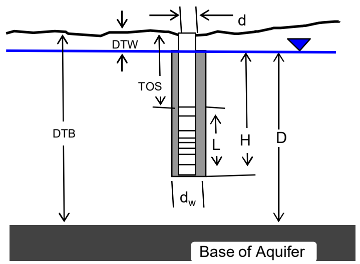
Screen 7.1 - 8.6m bgl (7.9 - 9.4m btoc) in mostly clay with thin sandy or gravelly clay horizons (0.3 m total so 0.3m effective screen length)

Site: **Riverlea** | Well ID: **MW13-C** | Test No: **FHT-1**

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Falling

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	3	Meter
Depths to:		
water level (DTW)	3.889	Meter
top of screen (TOS)	10.3	Meter
base of aquifer (DTB)	13.3	Meter
'Slug' details:		
length	5	Meter
diameter	0.036	Meter
type:	Poured	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	3	Meter
D =	9.411	Meter
H =	9.411	Meter
L/r_w =	60.00	-
$y_{0\text{-DISPLACEMENT}}$ =	1.65	meter
$y_{0\text{-SLUG}}$ eff casing=	2.59	meter
$y_{0\text{-SLUG}}$ =	2.59	meter
Fully penetrate C =	3.080	
ln(Re/rw) =	3.826	
Re =	7.53	meter
Slope =	0.0107	$\log_{10}$/sec
$t_{90\%}$ recovery =	93	sec

Input is consistent.

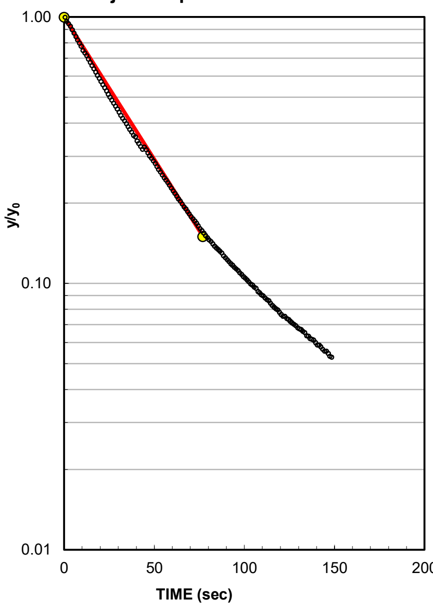
K =	**0.9**	**meter/day**

Observed slug discrepancy: 45%

Eff casing slug discrepancy: 45%

K= 0.85 is less than likely minimum of 0.914 for Fine Sand

Adjust slope of line to estimate K

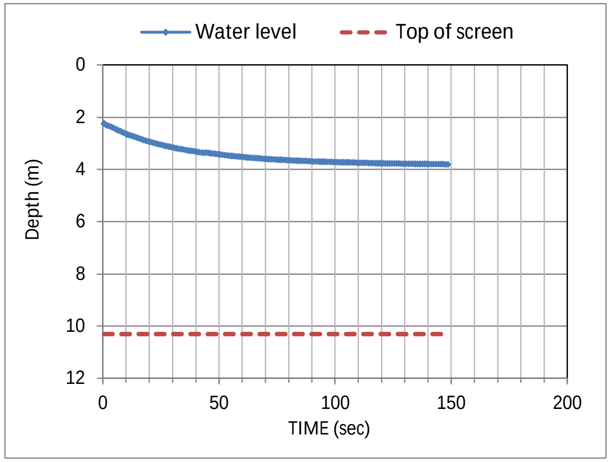


Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted from one developed by USGS

No. of data points: 149

Entry	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.889	
Final obs:	0:02:29.0	3.8018	0.0872
	Reduced Dataset		
1	0:00:01.0	2.243	1.646
4	0:00:04.0	2.367	1.522
7	0:00:07.0	2.496	1.393
10	0:00:10.0	2.610	1.279
13	0:00:13.0	2.709	1.180
16	0:00:16.0	2.805	1.084
19	0:00:19.0	2.892	0.997
22	0:00:22.0	2.970	0.919
25	0:00:25.0	3.043	0.846
28	0:00:28.0	3.106	0.783
31	0:00:31.0	3.165	0.724
34	0:00:34.0	3.217	0.672
37	0:00:37.0	3.265	0.624
40	0:00:40.0	3.303	0.586
43	0:00:43.0	3.350	0.539
46	0:00:46.0	3.366	0.524
49	0:00:49.0	3.402	0.487
52	0:00:52.0	3.436	0.453
55	0:00:55.0	3.468	0.421
58	0:00:58.0	3.495	0.394
61	0:01:01.0	3.523	0.367
64	0:01:04.0	3.547	0.342
67	0:01:07.0	3.569	0.320
70	0:01:10.0	3.588	0.301
73	0:01:13.0	3.606	0.283
76	0:01:16.0	3.624	0.265
79	0:01:19.0	3.640	0.249
82	0:01:22.0	3.652	0.237
85	0:01:25.0	3.665	0.224
88	0:01:28.0	3.675	0.214
91	0:01:31.0	3.687	0.202
94	0:01:34.0	3.696	0.193
97	0:01:37.0	3.705	0.184
100	0:01:40.0	3.714	0.175
103	0:01:43.0	3.722	0.167
106	0:01:46.0	3.730	0.160
109	0:01:49.0	3.737	0.152
112	0:01:52.0	3.744	0.146
115	0:01:55.0	3.750	0.139



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	1.00
Observed drawdown (m)	1.6461
Inferred drawdown for formation (m)	1.6461
Expected displacement based on slug volume (m)	2.5920
Vol. water recharged by filter pack (m3)	0.0019
Vol. filter pack that recharged water originated from (m3)	0.0078
Specific yield of filter pack (-)	0.24
Effective casing radius (m)	0.031
Effective casing diameter (m)	0.063

Butler, 1997

Effective casing radius (m)	0.031
Effective casing diameter (m)	0.063

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

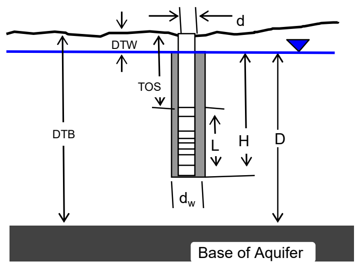
Screen 9.5 - 12.5m bgl (10.3 - 13.3m btoc) in mixed sandy clay, clay and clayey sand, with clay beneath

Site: Riverlea | **Well ID:** MW13-C | **Test No:** RHT-1

Date:	08/11/2023
Fieldwork by:	LBWco
Processed by:	JL
Checked by:	
Test type (rising/falling):	Rising

INPUT

Well construction:		
Drilling technique	Sonic / hollow auger	
Bore diameter (d_w)	0.1	Meter
Casing diameter external	0.063	Meter
Casing diameter internal	0.05	Meter
Effective diameter (d_c)	0.050	Meter
Total screen length (L)	3	Meter
Depths to:		
water level (DTW)	3.889	Meter
top of screen (TOS)	10.3	Meter
base of aquifer (DTB)	13.3	Meter
'Slug' details:		
length	0.9	Meter
diameter	0.036	Meter
type:	Bailed	
Geology and annular fill materials:		
across screen --	Coarse Sand	
above screen --	Cement	
aquifer material --	Fine Sand	



COMPUTED

L_{wetted}	3	Meter
D =	9.411	Meter
H =	9.411	Meter
L/r_w =	60.00	-
$y_{0\text{-DISPLACEMENT}}$ =	0.41	meter
$y_{0\text{-SLUG}}$ eff casing=	0.47	meter
$y_{0\text{-SLUG}}$ =	0.47	meter
Fully penetrate C =	3.080	
ln(Re/rw) =	3.826	
Re =	7.53	meter
Slope =	0.009985	$\log_{10}$/sec
$t_{90\%}$ recovery =	100	sec

Input is consistent.

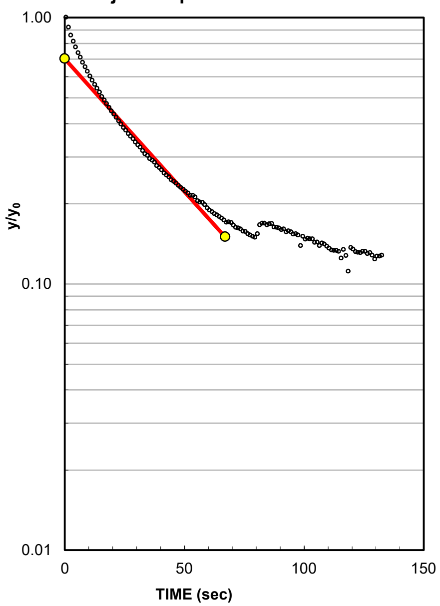
K =	**0.8**	**meter/day**

Observed slug discrepancy: 12%

Eff casing slug discrepancy: 12%

K= 0.79 is less than likely minimum of 0.914 for Fine Sand

Adjust slope of line to estimate K



Bouwer and Rice analysis of slug test, WRR 1976

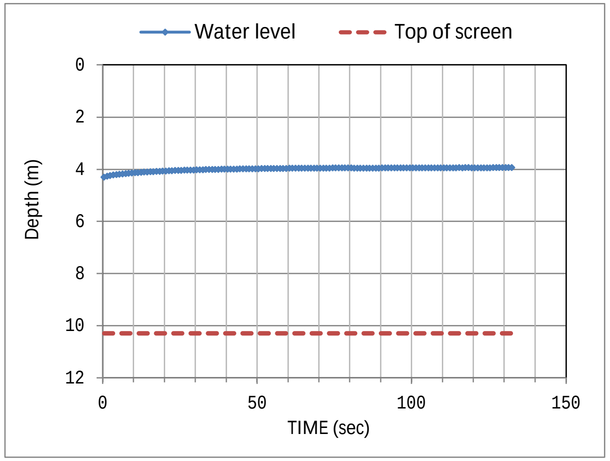
Spreadsheet adapted from one developed by USGS

No. of data points: 133

	Elapsed time Hr:Min:Sec	Water Level Meter	Draw-down Meter
Pre-start	0:00:00.0	3.889	
Final obs:	0:02:13.0	3.935	-0.046

Reduced Dataset

Entry	Elapsed time	Water Level	Drawdown
1	0:00:01.0	4.302	0.413
4	0:00:04.0	4.225	0.336
7	0:00:07.0	4.181	0.292
10	0:00:10.0	4.148	0.259
13	0:00:13.0	4.120	0.231
16	0:00:16.0	4.097	0.208
19	0:00:19.0	4.079	0.190
22	0:00:22.0	4.063	0.174
25	0:00:25.0	4.048	0.159
28	0:00:28.0	4.037	0.148
31	0:00:31.0	4.026	0.137
34	0:00:34.0	4.016	0.127
37	0:00:37.0	4.009	0.120
40	0:00:40.0	4.002	0.113
43	0:00:43.0	3.995	0.106
46	0:00:46.0	3.989	0.100
49	0:00:49.0	3.984	0.095
52	0:00:52.0	3.979	0.090
55	0:00:55.0	3.976	0.087
58	0:00:58.0	3.972	0.083
61	0:01:01.0	3.967	0.078
64	0:01:04.0	3.964	0.075
67	0:01:07.0	3.961	0.072
70	0:01:10.0	3.959	0.070
73	0:01:13.0	3.956	0.067
76	0:01:16.0	3.954	0.065
79	0:01:19.0	3.951	0.062
82	0:01:22.0	3.958	0.069
85	0:01:25.0	3.958	0.069
88	0:01:28.0	3.956	0.067
91	0:01:31.0	3.955	0.066
94	0:01:34.0	3.954	0.065
97	0:01:37.0	3.953	0.064
100	0:01:40.0	3.951	0.062
103	0:01:43.0	3.950	0.061
106	0:01:46.0	3.948	0.059
109	0:01:49.0	3.947	0.058
112	0:01:52.0	3.944	0.055
115	0:01:55.0	3.944	0.055



USEPA EPA/600/R-93/202, 1994

Check that intercept is at 00:00:00	YES
Intercept of straight line on Y/Yo axis	0.70
Observed drawdown (m)	0.4128
Inferred drawdown for formation (m)	0.2890
Expected displacement based on slug volume (m)	0.4666
Vol. water recharged by filter pack (m3)	0.0003
Vol. filter pack that recharged water originated from (m3)	0.0014
Specific yield of filter pack (-)	0.25
Effective casing radius (m)	0.032
Effective casing diameter (m)	0.064

Butler, 1997

Effective casing radius (m)	0.032
Effective casing diameter (m)	0.064

Check significance of varying screen length during test

Was the water level always above top of screen?	Yes
Displacement (yo) as % of initial saturated screen length	-

REMARKS:

Screen 9.5 - 12.5m bgl (10.3 - 13.3m btoc) in mixed sandy clay, clay and clayey sand, with clay beneath

Appendix G

Pump Test Data

Pump Testing Data Capture

Date	5-Dec	**Pump Test Location**	EX10
LBWco Personnel	AB & JC		

Gauging Event Before Test

Well	Easting	Northing	TOC (mAHD)	Ground Level (mAHD)	SWL (mBTOC)	SWL Time
SLMW01-P	272971.881	6163709.803	9.674	8.818	3.51	10:29:00 AM
SLMW01-Q1	272973.019	6163706.174	9.685	8.867	3.499	10:30:00 AM
SLMW02-Q1	272446.646	6163233.766	8.643	7.711	4.362	10:18:00 AM
SLMW03-Q1	272721.032	6163226.168	9.469	8.661	4.973	10:34:00 AM
SLMW04-P	273255.325	6162771.465	8.518	7.688	3.835	9:54:00 AM
SLMW05-P	271804.955	6162843.62	8.086	7.103	5.05	10:13:00 AM
SWLM05-Q1	271806.178	6162845.203	8.138	7.008	5.116	10:12:00 AM
SLMW06-Q1	272522.86	6162784.453	7.27	6.355	3.635	10:06:00 AM
SLMW07-Q1	272105.585	6162180.002	6.51	5.662	3.065	9:39:00 AM
SLMW10-A	272776.768	6163177.594	9.591	8.661	5.097	10:40:00 AM
SLMW10-B	272774.531	6163178.4	9.559	8.681	5.064	10:39:00 AM
SLMW10-C	272772.577	6163179.029	9.588	8.713	5.091	10:38:00 AM
EX10					4.719	10:37:00 AM
SLMW11-B	272799.342	6162987.626	9.294	8.216	5.13	10:23:00 AM
SLMW11-C	272800.36	6162985.507	9.292	8.237	5.132	10:23:00 AM
EX11					4.638	10:22:00 AM
SLMW12-A	272727.468	6162776.055	8.31	7.303	4.445	10:00:00 AM
SLMW12-B	272728.233	6162773.82	8.312	7.313	4.427	10:01:00 AM
SLMW12-C	272729.249	6162771.629	8.272	7.321	4.407	10:02:00 AM
EX12					3.873	9:59:00 AM
SLMW13-A	273247.115	6162805.068	8.643	7.833	3.946	9:52:00 AM
SLMW13-B	273247.281	6162802.55	8.654	7.839	3.947	9:52:00 AM
SLMW13-C	273247.768	6162800.651	8.582	7.767	3.88	9:51:00 AM
EX13					3.759	9:50:00 AM

Gauging Comments	

Pump Testing Data Capture

Date	5/12/2023	**Pump Test Location**	EX10
LBWco Personnel	AB & JC		

Logger Details

Well ID	**SLMW10-A**	**SLMW10-B**	**SLMW10-C**	**EX10**	**Baro**
SWL	5.097	5.064	5.091	4.719	-
SWL Time	10:40:00 AM	10:39:00 AM	10:38:00 AM	10:37:00 AM	-
Depth of well	7.16	10.045	13.065	9.783	-
Logger Serial Number	004-2181662	004-2181664	004-2181665	004-2185069	001-2182293
Logger measurement frequency	1 per hour	1 per hour	1 per hour	1 per hour	1 per hour
Time loggers start	11:45:00 AM	11:45:00 AM	11:45:00 AM	11:45:00 AM	11:45:00 AM
Depth of logger	7.06	9.945	12.965	9.683	-
SWL after logger deployed (mBTOC)	5.095	5.064	5.093	4.718	-
SWL after logger time	11:37:00 AM	11:38:00 AM	11:38:00 AM	11:39:00 AM	-
Date removed from well	6-Dec	6-Dec	6-Dec	reprogramged - 6/12/2023	6-Dec
Time removed from well	8:29	8:29	8:29	8:29	8:29

Date	6/12/2023	**Pump Test Location**	EX10
LBWco Personnel	JC + MF		

Logger Details

Well ID	SLMW10-A	SLMW10-B	SLMW10-C	EX10	Baro
SWL (mTOC)	5.094	5.063	5.089	4.712	-
SWL Time	6/12/2023 8:25	6/12/2023 8:25	6/12/2023 8:25	6/12/2023 8:25	-
Depth of well (mTOC)	7.16	10.045	13.065	9.783	-
Logger Serial Number	004-2181662	004-2181664	004-2181665	004-2185069	001-2182293
Logger measurement frequency	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	Every 10 seconds
Time loggers start	9:30:00 AM	9:30:00 AM	9:30:00 AM	9:30:00 AM	9:30:00 AM
Depth of logger (mTOC)	7.06	9.945	12.965	9.683	0
SWL after logger deployed (mTOC)	5.089	5.055	5.073	4.709	-
SWL after logger time	9:11:00 AM	9:12:00 AM	9:12:00 AM	9:13:00 AM	-
Date removed from well	7/12/2023	7/12/2023	7/12/2023	7/12/2023	7/12/2023
Time removed from well	9:45	9:45	9:45	9:45	9:45

Time pump deployed in well	6/12/2023 9:40	**Water disposal location**	Lake, west of wells
SWL after pump install	4.7 m, 9:48am	**Pump depth (mTOC)**	Top at 8.4 m

Gauging Data During Pump Test

Time	Flow Rate (L/min)	EX10	SLMW10-A	SLMW10-B	SLMW10-C	SLMW03-Q1	Comments
6/12/2023							
9:53	-	-	-	-	-	-	-
10:03	15	5.9	-	-	-	-	-
10:07	12	5.67	-	-	-	-	-
10:09	18	-	-	-	-	-	-
10:10	12.3	-	-	-	-	-	increasing but levelling out
10:12	11	-	-	-	-	-	-
10:12	13	-	-	-	-	-	-
10:13	11.5	-	-	-	-	-	-
10:14	12	-	-	-	-	-	-
10:16	11.8-12	5.65	-	-	-	-	-
10:19	-	-	5.21	-	-	-	MF untangled hose, discharging more water
10:25	11.8	-	-	-	-	-	-
10:28	11.8	-	5.202	5.169	5.127	-	-
10:31	11.8	-	-	-	-	4.97	-
10:32	11.8	-	-	-	-	-	generator started running out of fuel - topped up
10:40	11.8	5.63	-	-	-	-	-
10:52	-	-	-	-	-	-	generator switched off and restarted again
10:56	11.8	5.53	-	-	-	-	-
11:00	11.8	5.53	-	-	-	-	-
11:06	-	-	-	-	-	-	Generator restarted again
11:09	11.8	5.43	-	-	-	-	-
11:15	11.8	5.45	5.23	5.195	5.14	4.96	-
11:31	-	5.48	-	-	-	-	-
12:16	11.8?	5.482	5.253	5.224	5.169	4.965	flow meter error
12:40	-	-	-	-	-	-	Bucket test: 20 L filled in 1 minute 40 seconds
13:20	11.8?	5.500	5.27	5.238	5.179	4.962	-
14:21	-	5.495	5.287	5.249	5.184	4.967	Bucket test: 20 L filled in 1 minute 40 seconds
15:21	?	5.513	5.287	5.254	5.17	4.971	-
16:15	?	5.520	5.295	5.265	5.175	4.97	-
16:17	-	-	-	-	-	-	generator switched off
7/12/2023							
9:40	N/A	4.721	5.106	5.080	5.100	4.975	-
Gauging Comments							

Pump Testing Data Capture

Date	11-Dec	Pump Test Location	EX12
LBWco Personnel	JC		

Gauging Event Before Test

					5/12/2023			11/12/2023		
Well	Easting	Northing	TOC (mAHD)	Ground Level (mAHD)	SWL (mBTOC)	SWL Time	RWL (mAHD)	SWL (mBTOC)	SWL Time	RWL (mAHD)
SLMW01-P	272971.881	6163709.803	9.674	8.818	3.51	10:29:00 AM	6.164	couldn't access		
SLMW01-Q1	272973.019	6163706.174	9.685	8.867	3.499	10:30:00 AM	6.186	couldn't access		
SLMW02-Q1	272446.646	6163233.766	8.643	7.711	4.362	10:18:00 AM	4.281	4.32	11:45:00 AM	4.323
SLMW03-Q1	272721.032	6163226.168	9.469	8.661	4.973	10:34:00 AM	4.496	4.941	11:30:00 AM	4.528
SLMW04-P	273255.325	6162771.465	8.518	7.688	3.835	9:54:00 AM	4.683	3.816	9:45:00 AM	4.702
SLMW05-P	271804.955	6162843.62	8.086	7.103	5.05	10:13:00 AM	3.036	couldn't access		
SWLM05-Q1	271806.178	6162845.203	8.138	7.008	5.116	10:12:00 AM	3.022	couldn't access		
SLMW06-Q1	272522.86	6162784.453	7.27	6.355	3.635	10:06:00 AM	3.635	3.597	10:54:00 AM	3.673
SLMW07-Q1	272105.585	6162180.002	6.51	5.662	3.065	9:39:00 AM	3.445	couldn't access		
SLMW10-A	272776.768	6163177.594	9.591	8.661	5.097	10:40:00 AM	4.494	5.06	11:14:00 AM	4.531
SLMW10-B	272774.531	6163178.4	9.559	8.681	5.064	10:39:00 AM	4.495	5.031	11:14:00 AM	4.528
SLMW10-C	272772.577	6163179.029	9.588	8.713	5.091	10:38:00 AM	4.497	5.055	11:14:00 AM	4.533
EX10	272773.205	6163174.267	9.247	8.727	4.719	10:37:00 AM	4.528	4.675	11:14:00 AM	4.572
SLMW11-B	272799.342	6162987.626	9.294	8.216	5.13	10:23:00 AM	4.164	5.086	11:06:00 AM	4.208
SLMW11-C	272800.36	6162985.507	9.292	8.237	5.132	10:23:00 AM	4.160	5.091	11:05:00 AM	4.201
EX11	272804.03	6162988.261	8.841	8.404	4.638	10:22:00 AM	4.203	4.589	11:07:00 AM	4.252
SLMW12-A	272727.468	6162776.055	8.31	7.303	4.445	10:00:00 AM	3.865	4.41	10:12:00 AM	3.900
SLMW12-B	272728.233	6162773.82	8.312	7.313	4.427	10:01:00 AM	3.885	4.408	10:10:00 AM	3.904
SLMW12-C	272729.249	6162771.629	8.272	7.321	4.407	10:02:00 AM	3.865	4.388	10:08:00 AM	3.884
EX12	272725.868	6162780.099	7.771	7.396	3.873	9:59:00 AM	3.898	3.84	10:13:00 AM	3.931
SLMW13-A	273247.115	6162805.068	8.643	7.833	3.946	9:52:00 AM	4.697	3.919	9:45:00 AM	4.724
SLMW13-B	273247.281	6162802.55	8.654	7.839	3.947	9:52:00 AM	4.707	3.925	9:45:00 AM	4.729
SLMW13-C	273247.768	6162800.651	8.582	7.767	3.88	9:51:00 AM	4.702	3.851	9:45:00 AM	4.731
EX13	273249.119	6162797.004	8.488	7.769	3.759	9:50:00 AM	4.729	3.732	9:45:00 AM	4.756

Gauging Comments	

Pump Testing Data Capture

Date	
LBWco Personnel	

Gauging Event Before Test

	13/12/2023			15/12/2023		
Well	**SWL (mBTOC)**	**SWL Time**	**RWL (mAHD)**	**SWL (mBTOC)**	**SWL Time**	**RWL (mAHD)**
SLMW01-P	couldn't access			couldn't access		
SLMW01-Q1	couldn't access			couldn't access		
SLMW02-Q1	couldn't access			4.292	11:49:00 AM	4.351
SLMW03-Q1	4.922	11:31:00 AM	4.547	4.909	11:41:00 AM	4.560
SLMW04-P	3.797	1:55:00 AM	4.721	3.751	1:00:00 PM	4.767
SLMW05-P	couldn't access			couldn't access		
SWLM05-Q1	couldn't access			couldn't access		
SLMW06-Q1	3.58	11:37:00 AM	3.690	3.567	11:25:00 AM	3.703
SLMW07-Q1	couldn't access			couldn't access		
SLMW10-A	5.023	11:18:00 AM	4.568	5.01	11:35:00 AM	4.581
SLMW10-B	4.997	11:20:00 AM	4.562	4.979	11:35:00 AM	4.580
SLMW10-C	5.023	11:21:00 AM	4.565	5	11:35:00 AM	4.588
EX10	4.647	11:23:00 AM	4.600	4.634	11:34:00 AM	4.613
SLMW11-B	5.055	11:13:00 AM	4.239	5.042	11:30:00 AM	4.252
SLMW11-C	5.054	11:14:00 AM	4.238	5.044	11:31:00 AM	4.248
EX11	4.553	11:15:00 AM	4.288	4.551	11:29:00 AM	4.290
SLMW12-A	4.377	10:28:00 AM	3.933	4.39	12:06:00 PM	3.920
SLMW12-B	4.381	10:27:00 AM	3.931	4.378	12:06:00 PM	3.934
SLMW12-C	4.36	10:26:00 AM	3.912	4.356	12:07:00 PM	3.916
EX12	3.823	10:30:00 AM	3.948	3.82	12:08:00 PM	3.951
SLMW13-A	3.875	11:55:00 AM	4.768	3.868	12:54:00 PM	4.775
SLMW13-B	3.88	11:55:00 AM	4.774	3.87	12:55:00 PM	4.784
SLMW13-C	3.811	11:55:00 AM	4.771	3.802	12:56:00 PM	4.780
EX13	3.688	11:55:00 AM	4.800	3.686	12:58:00 PM	4.802

Gauging Comments

Date	11/12/2023	**Pump Test Location**	EX12
LBWco Personnel	JC		

Logger Details

Well ID	**SLMW12-A**	**SLMW12-B**	**SLMW12-C**	**EX12**	**Baro**
SWL	4.41	4.408	4.388	3.84	-
SWL Time	10:12:00 AM	10:10:00 AM	10:08:00 AM	10:13:00 AM	-
Depth of well	4.99	9	12.39	7.44	-
Logger Serial Number	662	664	665	69	293
Logger measurement frequency	30 min	30 min	30 min	30 min	10 min
Time loggers start	10:40:00 AM	10:40:00 AM	10:40:00 AM	10:40:00 AM	10:40:00 AM
Depth of logger	4.89	8.9	12.29	7.34	-
SWL after logger deployed (mBTOC)	4.383	4.383	4.39	3.85	-
SWL after logger time	10:49:00 AM	10:48:00 AM	10:47:00 AM	10:46:00 AM	-
SWL	4.377	4.381	4.36	3.823	-
SWL Time 13/12/23	10:28:00 AM	10:27:00 AM	10:26:00 AM	10:30:00 AM	-
Date removed from well	15-Dec	15-Dec	15-Dec	15-Dec	15-Dec
Time removed from well	12:30ish	12:30ish	12:30ish	12:30ish	12:30ish

Date	14/12/2023	**Pump Test Location**	EX12
LBWco Personnel	JC + JB		

Logger Details

Well ID	**SLMW12-A**	**SLMW12-B**	**SLMW12-C**	**EX12**	**Baro**
SWL (mTOC)	4.387	4.36	4.358	3.82	-
SWL Time	9:25	9:26	9:27	9:24	-
Depth of well (mTOC)	4.99	9	12.39	7.44	-
Logger Serial Number	662	664	665	69	293
Logger measurement frequency	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	Every 10 seconds
Time loggers start	10:00:00 AM	10:00:00 AM	10:00:00 AM	10:00:00 AM	10:00:00 AM
Depth of logger (mTOC)	4.89	8.9	12.29	7.34	-
SWL after logger deployed (mTOC)	4.387	4.376	4.353	3.82	-
SWL after logger time	9:55:00 AM	9:57:00 AM	9:58:00 AM	9:54:00 AM	-
Date removed from well	15-Dec	15-Dec	15-Dec	15-Dec	15-Dec
Time removed from well	12:30ish	12:30ish	12:30ish	12:30ish	12:30ish

well	RL
EX12	108.5
12-A	52.4
12-B	53.2
12-C	56.3

Time pump deployed in well	10:40ish	**Water disposal location**	approx 20 m away in lake
SWL after pump install	x	**Pump depth (mTOC)**	6.1

Gauging Data During Pump Test

Time	**Flow Rate (L/min)**	**EX12**	**SLMW12-A**	**SLMW12-B**	**SLMW12-C**	**SLMW06**	**EX11**	**SLMW11-B**	**SLMW11-C**	**Comments**
9:15	x	x	x	x	x	3.573	x	x	x	
10:25	x	x	x	x	x	x	4.554	5.049	5.051	
10:43	x	x	x	x	x	x	x	x	x	test restarted, stop again, fittings tightened
10:48	x	x	x	x	x	x	x	x	x	test restarted again, went dry, stopped
10:54	5.2	5.37	x	x	x	x	x	x	x	test restarted
10:59	5.9-6.1	x	x	x	x	x	x	x	x	level dropping
11:00	5.4-5.7	x	x	x	x	x	x	x	x	
11:04	5.2-5.4	5.45	4.428	4.426	4.363	x	x	x	x	
11:12	5.2-5.4	x	x	x	x	x	x	x	x	
11:35	7.2	x	x	x	x	x	x	x	x	
11:46	6.6	6.05	4.484	4.464	4.368	x	x	x	x	
11:58	x	x	x	x	x	3.573	x	x	x	
12:03	7	x	x	x	x	x	4.554	5.049	5.051	bucket test: 7.0 L/min
12:25	x	x	x	x	x	x	x	x	x	started recharging, adjusted flow
12:51	x	5.615	x	x	x	x	x	x	x	
12:58	x	x	x	x	x	x	x	x	x	bucket test: 7.5 l/min
13:05	x	5.574	4.525	4.496	x	x	x	x	x	bucket test: 7.5 l/min
13:23	x	5.574	x	x	x	x	x	x	x	bucket test: a little slower than 7.5 L/min
14:00	x	5.71	x	x	x	3.573	4.554	5.049	5.051	bucket test: a little slower than 7.5 L/min
14:50	x	5.77	5.453	4.51	4.383	x	x	x	x	bucket test: 7.5 l/min
15:50	x	5.78	x	x	x	x	x	x	x	bucket test: 7.5 l/min
4:30-5:00	x	5.775	4.573	4.504	4.387	3.572	4.55	5.05	5.051	SLMW04: 3.755 / EX13: 3.684 / 13-C: 3.801 / 13-B: 3.873 / 13-A: 3.870
17:05	x	5.83	x	x	x	x	x	x	x	bucket test: 7.5 l/min
17:10	x	x	x	x	x	x	x	x	x	generator switched off
	x	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	x	
Gauging Comments										

Pump Testing Data Capture

Date	18-Dec	**Pump Test Location**	EX13		
LBWco Personnel	JC				

Gauging Event Before Test

					5/12/2023		11/12/2023		13/12/2023	
Well	**Easting**	**Northing**	**TOC (mAHD)**	**Ground Level (mAHD)**	**SWL (mBTOC)**	**SWL Time**	**SWL (mBTOC)**	**SWL Time**	**SWL (mBTOC)**	**SWL Time**
SLMW01-P	272971.881	6163709.803	9.674	8.818	3.51	10:29:00 AM	couldn't access		couldn't access	
SLMW01-Q1	272973.019	6163706.174	9.685	8.867	3.499	10:30:00 AM	couldn't access		couldn't access	
SLMW02-Q1	272446.646	6163233.766	8.643	7.711	4.362	10:18:00 AM	4.32	11:45:00 AM	couldn't access	
SLMW03-Q1	272721.032	6163226.168	9.469	8.661	4.973	10:34:00 AM	4.941	11:30:00 AM	4.922	11:31:00 AM
SLMW04-P	273255.325	6162771.465	8.518	7.688	3.835	9:54:00 AM	3.816	9:45:00 AM	3.797	1:55:00 AM
SLMW05-P	271804.955	6162843.62	8.086	7.103	5.05	10:13:00 AM	couldn't access		couldn't access	
SWLM05-Q1	271806.178	6162845.203	8.138	7.008	5.116	10:12:00 AM	couldn't access		couldn't access	
SLMW06-Q1	272522.86	6162784.453	7.27	6.355	3.635	10:06:00 AM	3.597	10:54:00 AM	3.58	11:37:00 AM
SLMW07-Q1	272105.585	6162180.002	6.51	5.662	3.065	9:39:00 AM	couldn't access		couldn't access	
SLMW10-A	272776.768	6163177.594	9.591	8.661	5.097	10:40:00 AM	5.06	11:14:00 AM	5.023	11:18:00 AM
SLMW10-B	272774.531	6163178.4	9.559	8.681	5.064	10:39:00 AM	5.031	11:14:00 AM	4.997	11:20:00 AM
SLMW10-C	272772.577	6163179.029	9.588	8.713	5.091	10:38:00 AM	5.055	11:14:00 AM	5.023	11:21:00 AM
EX10					4.719	10:37:00 AM	4.675	11:14:00 AM	4.647	11:23:00 AM
SLMW11-B	272799.342	6162987.626	9.294	8.216	5.13	10:23:00 AM	5.086	11:06:00 AM	5.055	11:13:00 AM
SLMW11-C	272800.36	6162985.507	9.292	8.237	5.132	10:23:00 AM	5.091	11:05:00 AM	5.054	11:14:00 AM
EX11					4.638	10:22:00 AM	4.589	11:07:00 AM	4.553	11:15:00 AM
SLMW12-A	272727.468	6162776.055	8.31	7.303	4.445	10:00:00 AM	4.41	10:12:00 AM	4.377	10:28:00 AM
SLMW12-B	272728.233	6162773.82	8.312	7.313	4.427	10:01:00 AM	4.408	10:10:00 AM	4.381	10:27:00 AM
SLMW12-C	272729.249	6162771.629	8.272	7.321	4.407	10:02:00 AM	4.388	10:08:00 AM	4.36	10:26:00 AM
EX12					3.873	9:59:00 AM	3.84	10:13:00 AM	3.823	10:30:00 AM
SLMW13-A	273247.115	6162805.068	8.643	7.833	3.946	9:52:00 AM	3.919	9:45:00 AM	3.875	11:55:00 AM
SLMW13-B	273247.281	6162802.55	8.654	7.839	3.947	9:52:00 AM	3.925	9:45:00 AM	3.88	11:55:00 AM
SLMW13-C	273247.768	6162800.651	8.582	7.767	3.88	9:51:00 AM	3.851	9:45:00 AM	3.811	11:55:00 AM
EX13					3.759	9:50:00 AM	3.732	9:45:00 AM	3.688	11:55:00 AM

Gauging Comments

15/12/2023		18/12/2023		19/12/2023	
SWL (mBTOC)	**SWL Time**	**SWL (mBTOC)**	**SWL Time**	**SWL (mBTOC)**	**SWL Time**
couldn't access		couldn't access		couldn't access	
couldn't access		couldn't access		couldn't access	
4.292	11:49:00 AM	4.28	9:03:00 AM	4.289	11:32:00 AM
4.909	11:41:00 AM	4.883	9:19:00 AM	4.876	11:47:00 AM
3.751	1:00:00 PM	3.746	9:30:00 AM	3.573	11:58:00 AM
couldn't access		4.976	9:07:00 AM	4.976	11:27:00 AM
couldn't access		5.04	9:08	5.042	
3.567	11:25:00 AM	3.547	8:56:00 AM	3.558	11:13:00 AM
couldn't access		couldn't access		couldn't access	
5.01	11:35:00 AM	4.984	9:15:00 AM	4.986	11:43:00 AM
4.979	11:35:00 AM	4.948	9:15:00 AM	4.947	11:44:00 AM
5	11:35:00 AM	4.973	9:15:00 AM	4.983	11:45:00 AM
4.634	11:34:00 AM	4.605	9:16:00 AM	4.6	11:42:00 AM
5.042	11:30:00 AM	5.026	9:22:00 AM	5.032	11:37:00 AM
5.044	11:31:00 AM	5.032	9:22:00 AM	5.034	11:37:00 AM
4.551	11:29:00 AM	4.527	9:23:00 AM	4.534	11:36:00 AM
4.39	12:06:00 PM	4.377	9:00:00 AM	4.382	11:20:00 AM
4.378	12:06:00 PM	4.366	9:00:00 AM	4.37	11:22:00 AM
4.356	12:07:00 PM	4.345	9:01:00 AM	4.346	11:21:00 AM
3.82	12:08:00 PM	3.802	9:01:00 AM	3.811	11:17:00 AM
3.868	12:54:00 PM	3.872	9:29:00 AM	3.876	11:59:00 AM
3.87	12:55:00 PM	3.864	9:29:00 AM	3.857	12:00:00 PM
3.802	12:56:00 PM	3.798	9:28:00 AM	3.787	12:01:00 PM
3.686	12:58:00 PM	3.666	9:27:00 AM	3.635	12:01:00 PM

Date	15/12/2023	**Pump Test Location**	EX13
LBWco Personnel	JC		

Logger Details

Well ID	**SLMW13-A**	**SLMW13-B**	**SLMW13-C**	**EX13**	**Baro**
SWL	3.868	3.87	3.802	3.686	-
SWL Time	12:54:00 PM	12:55:00 PM	12:56:00 PM	12:58:00 PM	-
Depth of well	5.305	9.429	13.345	6.742	-
Logger Serial Number	662	664	665	69	293
Logger measurement frequency	1 hour	1 hour	1 hour	1 hour	30 minutes
Time loggers start	1:20:00 PM	1:20:00 PM	1:20:00 PM	1:20:00 PM	1:20:00 PM
Depth of logger	5.205	9.329	13.245	6.642	-
SWL after logger deployed (mBTOC)	-	-	-	-	-
SWL after logger time	-	-	-	-	-
SWL	3.872	3.864	3.798	3.666	-
SWL Time	9:29:00 AM	9:29:00 AM	9:28:00 AM	9:27:00 AM	-
Date removed from well	18-Dec	18-Dec	18-Dec	18-Dec	
Time removed from well	9:45	9:45	9:45	9:45	

Date	18/12/2023	**Pump Test Location**	EX13
LBWco Personnel	JC + KJ		

Logger Details

Well ID	**SLMW12-A**	**SLMW12-B**	**SLMW12-C**	**EX12**	**Baro**
SWL (mTOC)	3.872	3.864	3.798	3.666	-
SWL Time	9:29:00 AM	9:29:00 AM	9:28:00 AM	9:27:00 AM	-
Depth of well (mTOC)	5.305	9.429	13.345	6.742	-
Logger Serial Number	662	664	665	69	293
Logger measurement freque	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	0.005 m change in pressure, reading 10 seconds	Every 10 seconds
Time loggers start	10:00:00 AM	10:00:00 AM	10:00:00 AM	10:00:00 AM	10:00:00 AM
Depth of logger (mTOC)	5.205	9.329	13.245	6.642	-
SWL after logger deployed (r	3.849	3.839	3.78	3.676	-
SWL after logger time	10:06:00 AM	10:07:00 AM	10:07:00 AM	10:08:00 AM	-
Date removed from well	19-Dec	19-Dec	19-Dec	19-Dec	19-Dec
Time removed from well	12:05	12:05	12:05	12:05	12:05

Time pump deployed in well	10:35	**Water disposal location**	15 m north-west into drain, into lake
SWL after pump install	4.655 10:36am	**Pump depth (mTOC)**	5.4 (top)

Gauging Data During Pump Test

Time	Flow Rate (L/min)	EX13	SLMW13-A	SLMW13-B	SLMW13-C	SLMW04-P	Comments
11:08	13.7	4.4	x	x	x	x	Started 11:03
11:10	13.7	4.42	3.888	3.905	3.856	x	
11:13	12.8	x	x	x	x	x	noticed water level rising, flow had slowed
11:15	x	x	x	x	x	x	flow meter error
11:19	x	x	x	x	x	x	water level dropping slowly, slowing flow rate slightly
11:19-11:35	x	x	x	x	x	x	playing with flow rate with mm adjustments
11:30	~13.7	x	3.926	3.962	3.906	x	-
11:36	~13.7	3.565	x	x	x	x	-
11:50	~12	x	x	x	x	x	doing flow test
12:10	x	x	x	x	x	x	Generator stopped working
12:15	x	x	x	x	x	x	Started again, haven't changed settings
12:18	~12	4.3	x	x	x	x	Bucket flow test for flow rate
12:30	x	x	x	x	x	x	water level dropping, haven't touched valve
12:37	~12	4.608	3.951	3.994	3.939	3.766	bucket test: flow rate 12 l/min
13:06	~12	4.4	x	x	x	x	bucket test: flow rate 12 l/min, water rising
13:13	~11.53	x	x	x	x	x	bucket flow test
13:42	x	x	x	x	x	x	
13:45	x	4.31	3.964	4.015	3.948	3.766	bucket test: flow rate dropped to 8.1
13:54	x	x	x	x	x	x	bucket flow test: increased to 10.3 l/min
14:02	x	x	x	x	x	x	flow consistent
14:15	x	x	x	x	x	x	flow rate dropped to 9 l/min, opened valve more
14:38	10.50	x	x	x	x	x	
14:40	8	4.235	x	x	x	x	started increasimg water level, opened valve more, valve hasn't been tightened at all since 11:35
14:47	7	x	x	x	x	x	opened valve slightly
14:50	6	4.2	x	x	x	x	opened valve more
14:55	6	x	3.961	3.896	3.945	x	opened valve more
14:58	10.5	4.27	x	x	x	x	-
15:04	10.5	4.32	x	x	x	x	
15:07	10.5	4.337	x	x	x	x	
15:12	10.5	x	x	x	x	x	tightened valve, water siltier
15:16	10.3	x	x	x	x	x	tightened valve
15:24	10.7	4.618	x	x	x	x	
15:25	x	x	x	x	x	x	tightened valve SLIGHTLY
15:28	10.3	x	x	x	x	x	-
15:35	10.3	4.473	x	x	x	x	becoming less silty
15:43	x	4.485	x	x	x	x	

Date	18/12/2023	**Pump Test Location**	EX13
LBWco Personnel	JC + KJ		

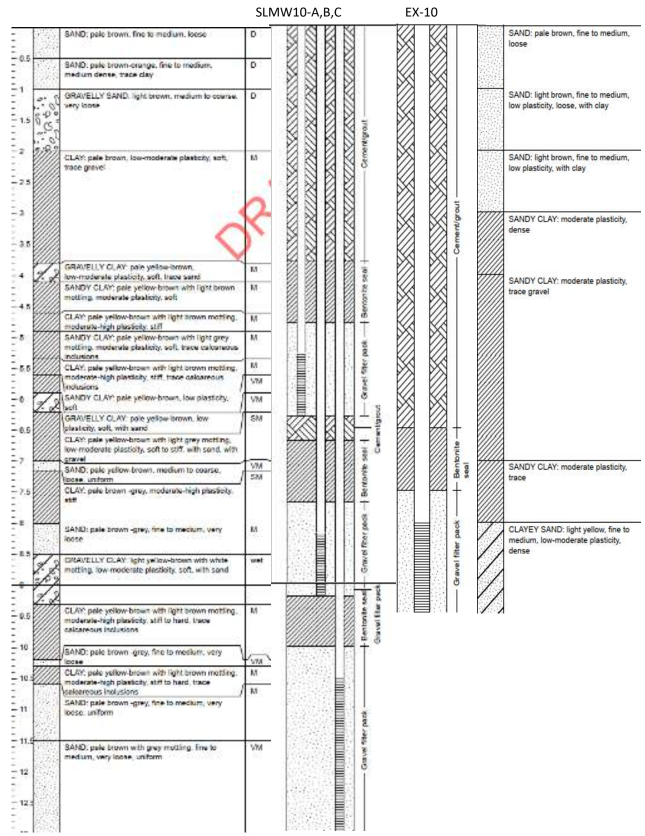
15:45	8.3	x	x	x	x	x	
15:49	7.5	x	x	x	x	x	
15:51	7	x	x	x	x	x	opened valve slightly
15:54	6.6	x	x	x	x	x	opened valve slightly
16:00	6.7	4.18	3.958	3.99	3.95	x	
16:10	x	x	x	x	x	x	
16:11	4	x	x	x	x	x	opened slightly
16:25	4	x	x	x	x	x	
16:50	3.4	3.995	x	x	x	x	
16:55	x	x	x	x	x	x	opened slightly
16:58	5	4.068	x	x	x	x	
17:11:00 PM	x	x	x	x	x	x	generator switched off
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
	x	x	x	x	x	x	
Gauging Comments							

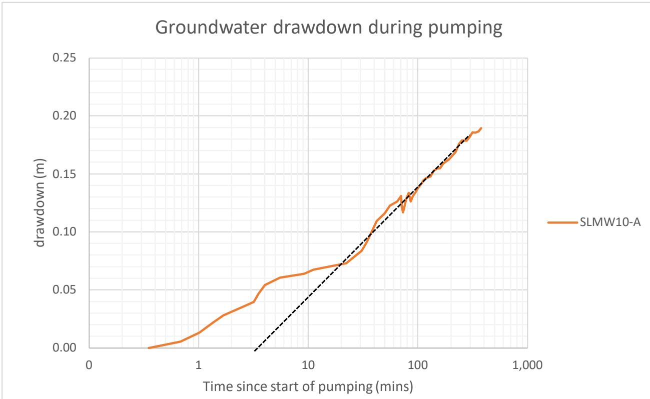
Well details from well register				Calculated distance from EX10 (m)
Bore	**Easting**	**Northing**	**Top of casing (mAHD)**	
SLMW10-A	272777	6163178	9.591	4.87
SLMW10-B	272775	6163178	9.559	4.34
SLMW10-C	272773	6163179	9.588	4.80
EX10	272773	6163174	9.247	0.00

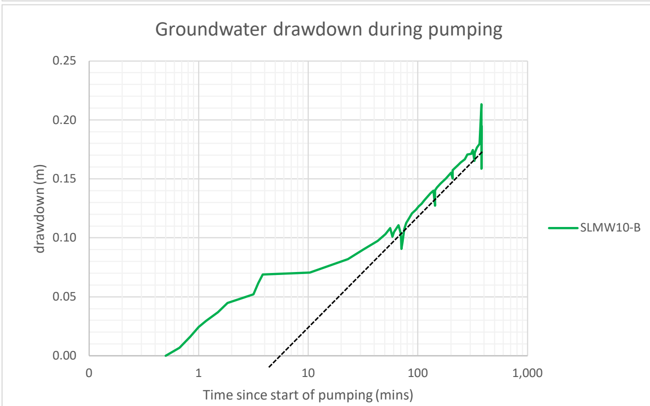
Test information					Screened permeable thickness (m)	Hydraulic conductivity from slug test (m/d)	Assumed aquifer thickness (m)	Estimated transmissivity (m2/d)					
Extraction well	Monitoring well	Pumping rate		Distance (m)				Slug test (B&R)		Confined		Unconfined	
		L/min	m3/d					By unit	Total	Jacob	Theis recovery	Jacob	Theis recovery
EX-10	EX-10	11.9	17.1	0.05	1.3	-	4	-	-	-	31.4	-	31.4
	SLMW10-A	-	-	4.87	0.6	16		9.6	27.0	33.0	36.9	33.0	36.9
	SLMW10-B	-	-	4.34	1.3	7.6		9.9		33.0	34.8	33.0	37.3
	SLMW10-C	-	-	4.80	2.5	3.0		7.5		n/a	n/a	n/a	n/a

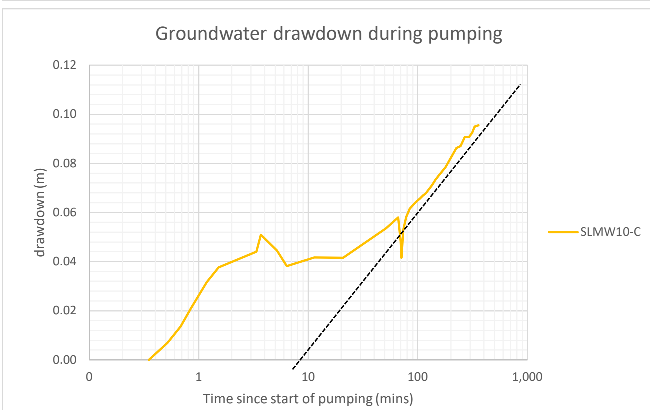
Notes

Response in -A is almost identical to response in -B and they are at about the same distance, therefore treat them as a single hydrogeological unit
Well -C responds quickly so is hydraulically connected
The response in -C is smaller magnitude (about half)
As -C is in a different (but connected) unit, the assumptions of the analysis methods do not apply
Based on the slug testing, -C has similar transmissivity (but lower k and larger thickness)
As some of the water comes from -C, the transmissivity estimated based on responses at A and B are likely over-estimated
The slug test T estimates therefore appear reasonably representative









Jacob's method (Cooper & Jacob, 1946)

Assumes

Aquifer has infinite extent
Aquifer is homoegneous, isotropic and uniform thickness in the area influenced
Prior to pumping, piezometric surface was (nearly) horizontal in the area influenced
Aquifer is pumped at a constant rate
Pumped well penetrates the full thickness of the aquifer
Diameter of pumped well is small (storage in well can be neglected)
Water removed from storage is discharged instantaneously with decline of head
Aquifer is confined
Flow to well is in unsteady state
Values of u (= $r^2S/4kDt$) are small, less than 0.01

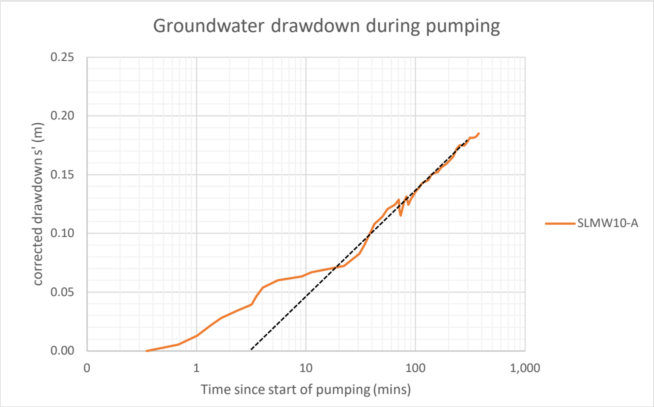
Parameters		units
distance to monitoring well	r	m
coefficient of storage	S	-
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
time since pumping started	t	d
pumping rate	Q	m3/d

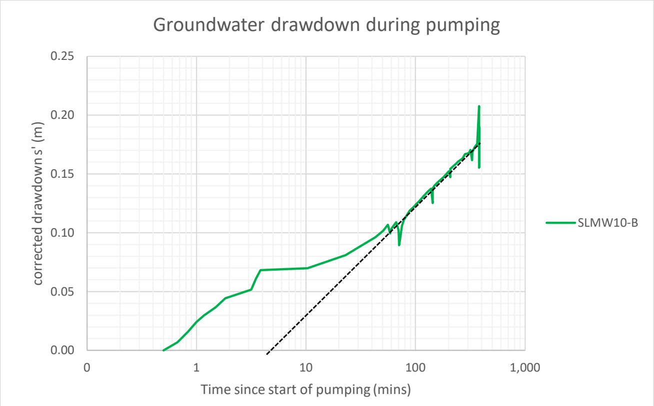
Equation

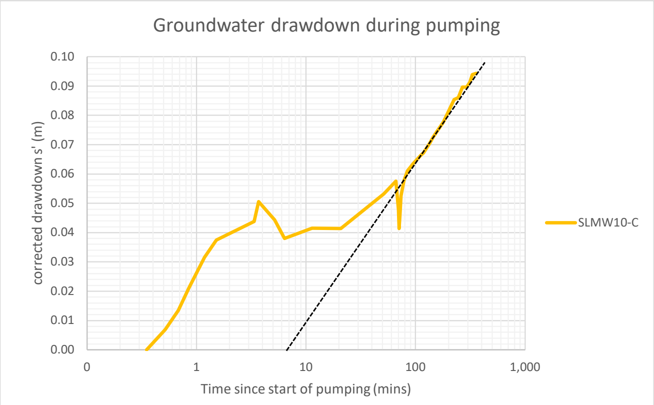
kD = (2.3 Q) / (4 π delta_s)

S = (2.25 kD t_0) / (r^2)

Parameters		units	SLMW10-A	SLMW10-B	SLMW10-C	Comment
distance to monitoring well	r	m	4.87482287	4.34050285	4.803231	From summary sheet
drawdown per log cycle	delta_s	m	0.095	0.095	0.058	Read from semi-log charts to left
time when line crosses zero drawdown axis	t_0	mins	3	4	7	
	t_0	days	0.0021	0.0028	0.0049	
transmissivity	kD	m2/d	33.0	33.0		Calculated from equation
coefficient of storage	S	-	6.5 E-03	1.1 E-02		Calculated from equation
value of u for t = 0.25 days	u	-	4.7 E-03	6.3 E-03		Calculated to check that u is less than 0.01
					Not appropriate	







Jacob's method (Cooper & Jacob, 1946)

Assumes

Same as Jacob's method for confined aquifers with drawdown s replaced by $s - s^2/2D$

Parameters		**units**
distance to monitoring well	r	m
coefficient of storage	S	-
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
time since pumping started	t	d
pumping rate	Q	m3/d

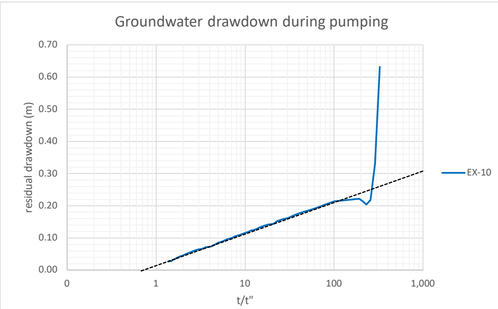
Equation

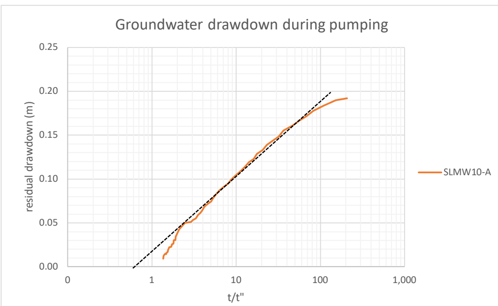
$kD = (2.3\ Q) / (4\ \pi\ \text{delta\_s})$

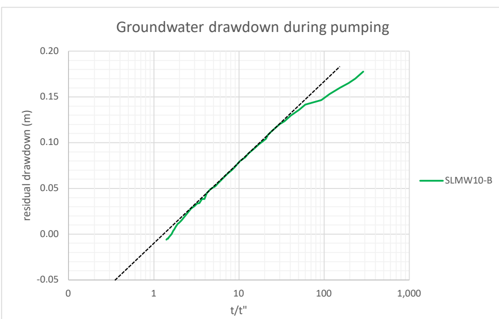
$S = (2.25\ kD\ t_0) / (r^2)$

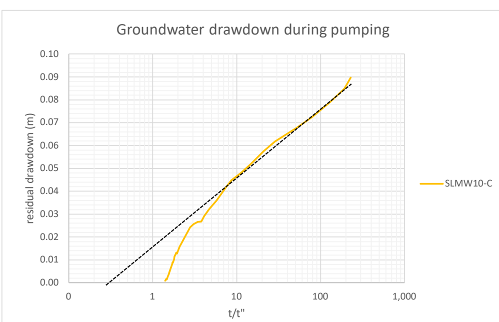
Parameters		**units**	**SLMW10-A**	**SLMW10-B**	**SLMW10-C**	**Comment**
distance to monitoring well	r	m	4.87482287	4.34050285	4.803231	From summary sheet
drawdown per log cycle	delta_s	m	0.095	0.095	0.054	Read from semi-log charts to left
time when line crosses zero drawdown axis	t_0	mins	3	4	6.5	
	t_0	days	0.0021	0.0028	0.0045	
transmissivity	kD	m2/d	33.0	33.0		Calculated from equation
coefficient of storage	S	-	6.5 E-03	1.1 E-02		Calculated from equation
value of u for t = 0.25 days	u	-	4.7 E-03	6.3 E-03		Calculated to check that u is less than 0.01
					Not appropriate	

Charts for confined aquifer

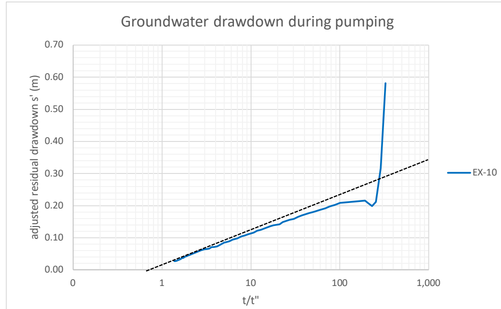


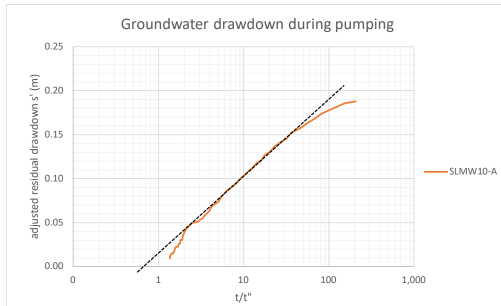


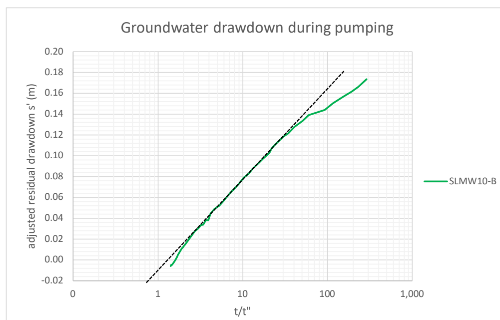


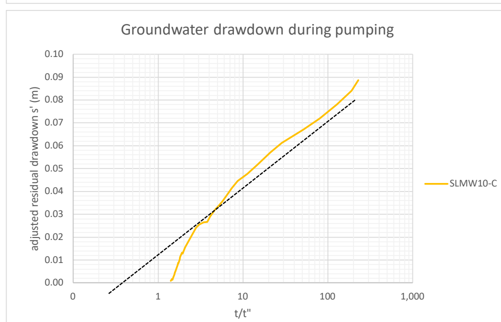


Charts for unconfined aquifer









Theis's recovery method (Theis, 1935)

Assumes

Same assumptions as Jocob method

Confined aquifer assessed based on residual drawdown, s

Unconfined aquifer assessed based on adjusted residual drawdown, $s' = s - s^2/2D$

Parameters		units
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
pumping rate	Q	m3/d

Equation

$kD = (2.3\ Q) / (4\ \pi\ \text{delta\_s})$

Confined aquifer

	Parameters	units	EX-10	10-A	10-B	10-C	Comment
drawdown per log cycle	delta_s	m	0.1	0.085	0.09	0.029	Read from semi-log charts to left
transmissivity	kD	m2/d	31.4	36.9	34.8		Calculated from equation
						N/A	

Unconfined aquifer

	Parameters	units	EX-10	10-A	10-B	10-C	Comment
drawdown per log cycle	delta_s	m	0.1	0.085	0.084	0.03	Read from semi-log charts to left
transmissivity	kD	m2/d	31.4	36.9	37.3		Calculated from equation
						N/A	

Well details from well register				Calculated distance from EX12 (m)
Bore	Easting	Northing	Top of casing (mAHD)	
SLMW12-A	272727	6162776	8.31	4.35
SLMW12-B	272728	6162774	8.312	6.71
SLMW12-C	272729	6162772	8.272	9.12
EX-12	272726	6162780	7.771	0.00

Test information					Screened permeable thickness (m)	Hydraulic conductivity from slug test (m/d)	Assumed aquifer thickness (m)	Estimated transmissivity (m2/d)					
Extraction well	Monitoring well	Pumping rate		Distance (m)				Slug test (B&R)		Confined		Unconfined	
		L/min	m3/d					By unit	Total	Jacob	Theis recovery	Jacob	Theis recovery
EX-12	EX-12	7.5	10.8	0.05	0.8	-	4	-	-	-	19.8	-	19.8
	SLMW12-A	-	-	4.35	1.2	0.7		0.84	7.4	18.0	20.8	19.8	22.0
	SLMW12-B	-	-	6.71	0.8	7.5		6.0		21.5	28.2	23.5	30.9
	SLMW12-C	-	-	9.12	0.8	0.7		0.52		n/a	n/a	n/a	n/a

Notes

Response in -A is similar to response in -B, but a bit larger. A is closer. Treat them as a single hydrogeological unit

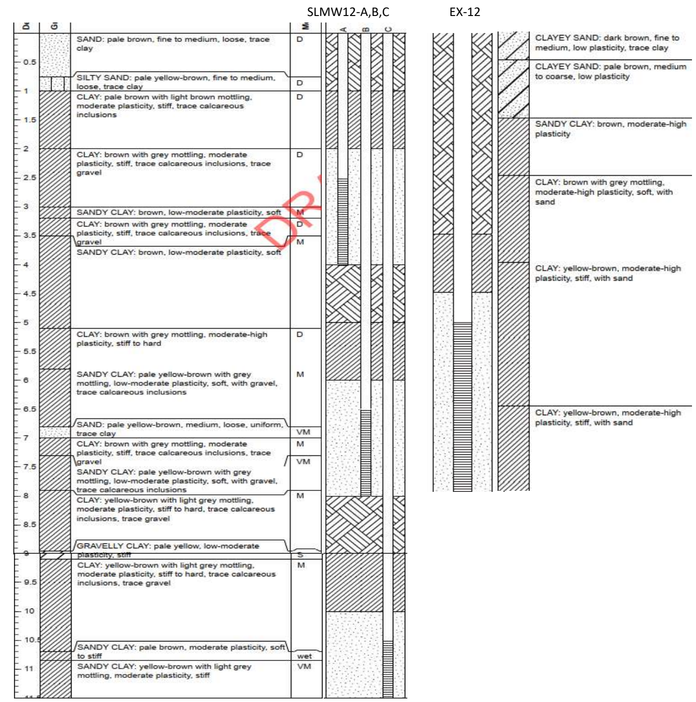
Well -C responds quickly so is hydraulically connected

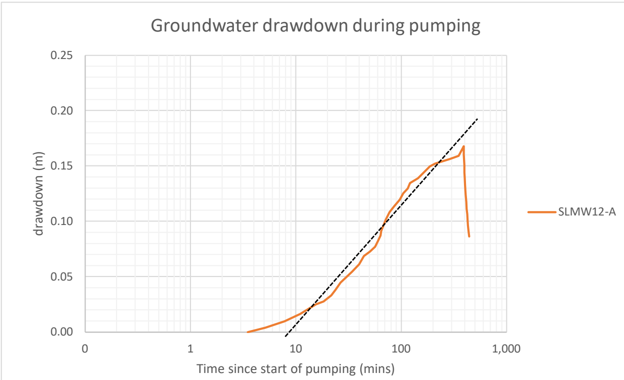
The response in -C is smaller magnitude (about 20%) but it is also further away

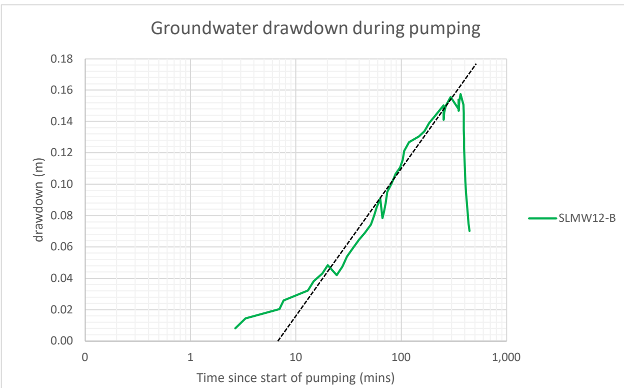
As -C is in a different (but connected) unit, the assumptions of the analysis methods do not apply

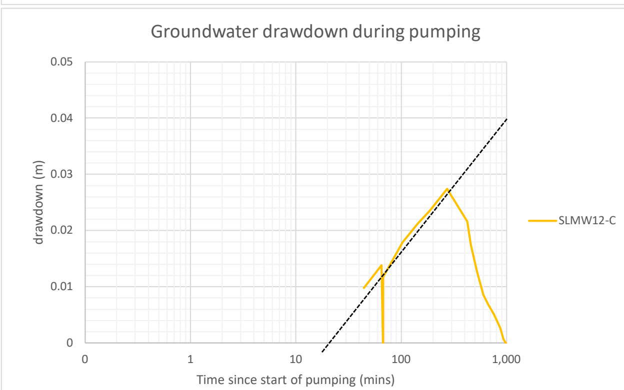
Based on the slug testing, -C has lower transmissivity

As some of the water comes from -C, the transmissivity may be a bit lower than calculated based on responses in A and B









Jacob's method (Cooper & Jacob, 1946)

Assumes

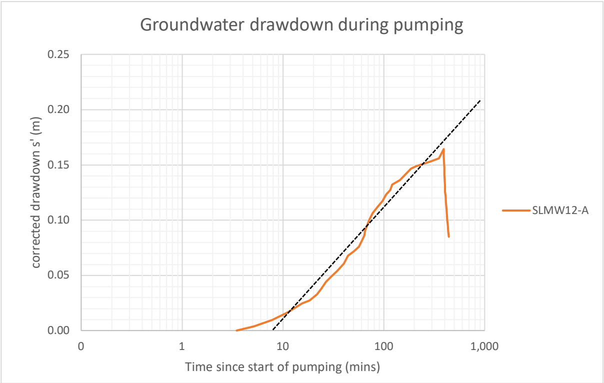
Aquifer has infinite extent
Aquifer is homoegneous, isotropic and uniform thickness in the area influenced
Prior to pumping, piezometric surface was (nearly) horizontal in the area influenced
Aquifer is pumped at a constant rate
Pumped well penetrates the full thickness of the aquifer
Diameter of pumped well is small (storage in well can be neglected)
Water removed from storage is discharged instantaneously with decline of head
Aquifer is confined
Flow to well is in unsteady state
Values of u (= $r^2S/4kDt$) are small, less than 0.01

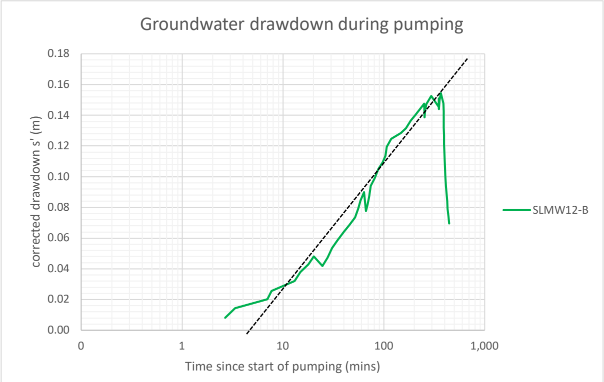
Parameters		units
distance to monitoring well	r	m
coefficient of storage	S	-
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
time since pumping started	t	d
pumping rate	Q	m3/d

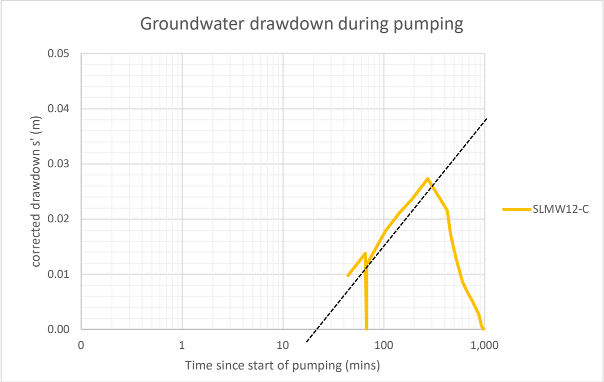
Equation

kD = (2.3 Q) / (4 π delta_s)
S = (2.25 kD t_0) / (r^2)

Parameters		units	SLMW12-A	SLMW12-B	SLMW12-C	Comment
distance to monitoring well	r	m	4.34901552	6.70962488	9.11987177	From summary sheet
drawdown per log cycle	delta_s	m	0.11	0.092	0.024	Read from semi-log charts to left
time when line crosses zero drawdown axis	t_0	mins	8	7	17	
	t_0	days	0.0056	0.0049	0.0118	
transmissivity	kD	m2/d	18.0	21.5		Calculated from equation
coefficient of storage	S	-	1.2 E-02	5.2 E-03		Calculated from equation
value of u for t = 0.25 days	u	-	1.3 E-02	1.1 E-02		Calculated to check that u is less than 0.01
					Not appropriate	







Jacob's method (Cooper & Jacob, 1946)

Assumes

Same as Jacob's method for confined aquifers with drawdown s replaced by $s - s^2/2D$

Parameters		**units**
distance to monitoring well	r	m
coefficient of storage	S	-
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
time since pumping started	t	d
pumping rate	Q	m3/d

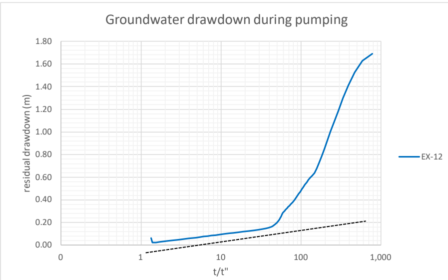
Equation

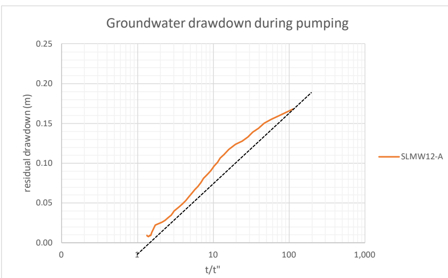
kD = (2.3 Q) / (4 π delta_s)

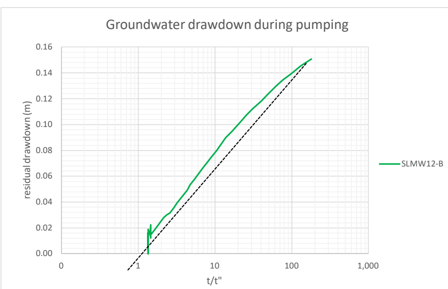
S = (2.25 kD t_0) / (r^2)

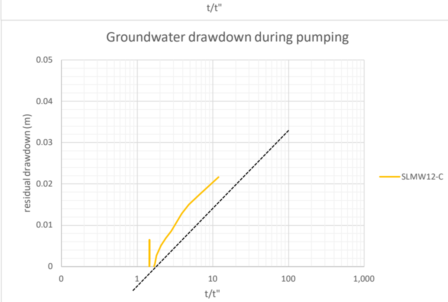
Parameters		**units**	**SLMW12-A**	**SLMW12-B**	**SLMW12-C**	**Comment**
distance to monitoring well	r	m	4.34901552	6.70962488	9.11987177	From summary sheet
drawdown per log cycle	delta_s	m	0.1	0.084	0.054	Read from semi-log charts to left
time when line crosses zero drawdown axis	t_0	mins	8	4	6.5	
	t_0	days	0.0056	0.0028	0.0045	
transmissivity	kD	m2/d	19.8	23.5		Calculated from equation
coefficient of storage	S	-	1.3 E-02	3.3 E-03		Calculated from equation
value of u for t = 0.25 days	u	-	1.3 E-02	6.3 E-03		Calculated to check that u is less than 0.01
					Not appropriate	

Charts for confined aquifer

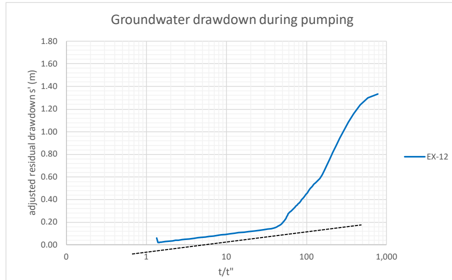


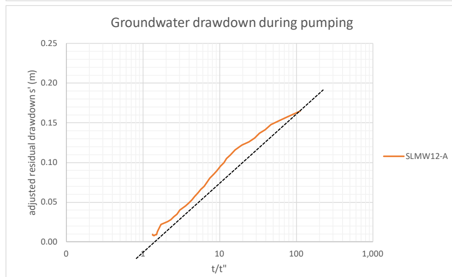


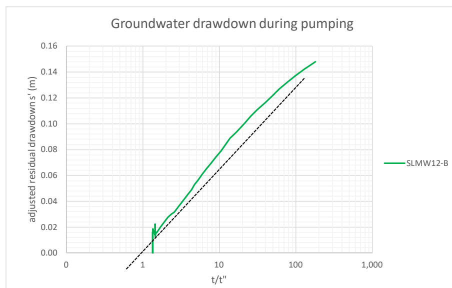


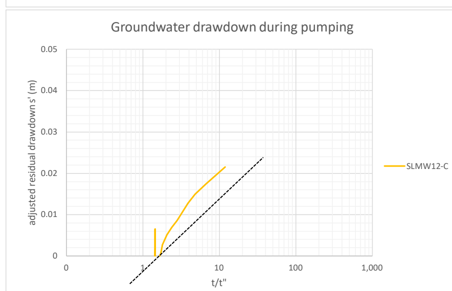


Charts for unconfined aquifer









Theis's recovery method (Theis, 1935)

Assumes

Same assumptions as Jocob method
Confined aquifer assessed based on residual drawdown, s
Unconfined aquifer assessed based on adjusted residual drawdown, $s' = s - s^2/2D$

Parameters		units
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
pumping rate	Q	m3/d

Equation

$kD = (2.3\ Q) / (4\ \pi\ \text{delta\_s})$

Confined aquifer

Parameters		units	EX-12	SLMW12-A	SLMW12-B	SLMW12-C	Comment
drawdown per log cycle	delta_s	m	0.1	0.095	0.07	0.029	Read from semi-log charts to left
transmissivity	kD	m2/d	19.8	20.8	28.2		Calculated from equation
						N/A	

Unconfined aquifer

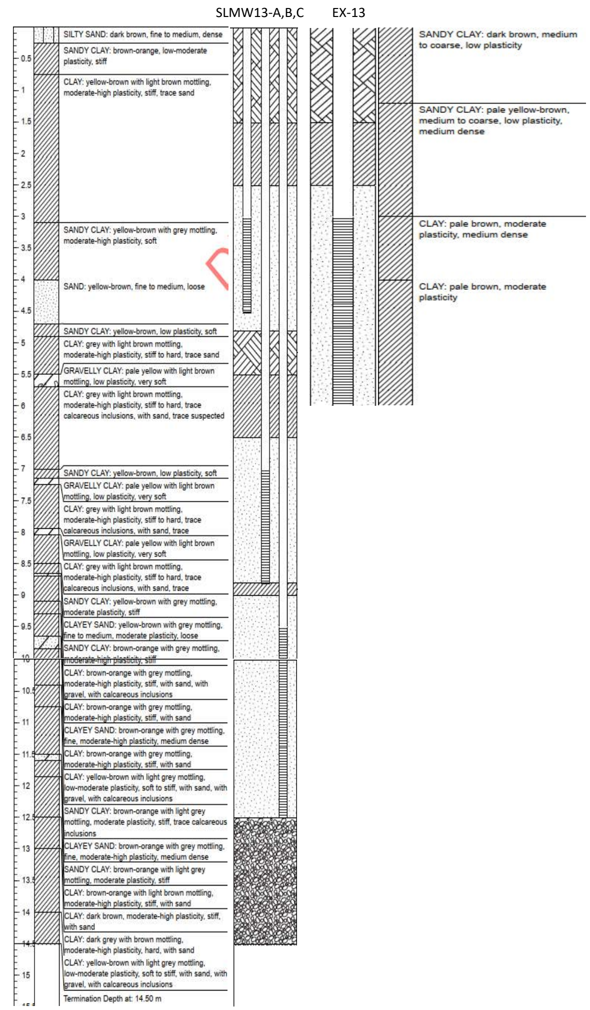
Parameters		units	EX-12	SLMW12-A	SLMW12-B	SLMW12-C	Comment
drawdown per log cycle	delta_s	m	0.1	0.09	0.064	0.03	Read from semi-log charts to left
transmissivity	kD	m2/d	19.8	22.0	30.9		Calculated from equation
						N/A	

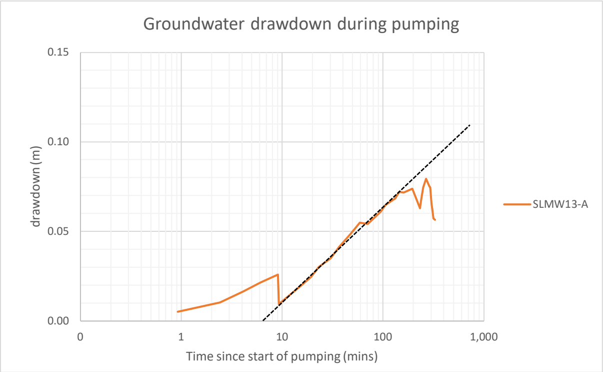
Well details from well register				Calculated distance from Ext. well (m)
Bore	Easting	Northing	Top of casing (mAHD)	
SLMW13-A	273247	6162805	8.643	8.31
SLMW13-B	273247	6162803	8.654	5.84
SLMW13-C	273248	6162801	8.582	3.89
EX-13	273249	6162797	8.488	0.00

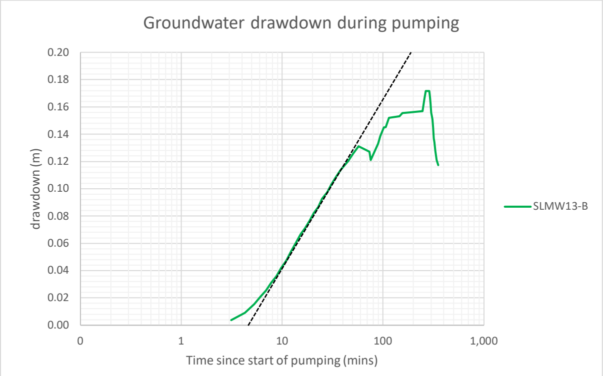
Test information					Screened permeable thickness (m)	Hydraulic conductivity from slug test (m/d)	Assumed aquifer thickness (m)	Estimated transmissivity (m2/d)					
		Pumping rate						Slug test (B&R)		Confined		Unconfined	
Extraction well	Monitoring well	L/min	m3/d	Distance (m)				By unit	Total	Jacob	Theis recovery	Jacob	Theis recovery
EX-13	EX-13	10.0	14.4	0.05	1.3	-	8	-	-	-	35.1	-	35.1
	SLMW13-A	-	-	8.31	1.6	11		17.6	20.0	47.9	49.7	49.7	52.7
	SLMW13-B	-	-	5.84	0.3	1.2		0.4		N/A	N/A	N/A	N/A
	SLMW13-C	-	-	3.89	3	0.9		2.55		N/A	N/A	N/A	N/A

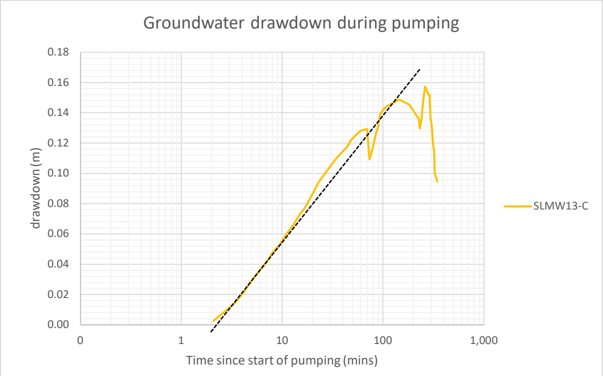
Notes

Response in -B is almost identical to response in -C, therefore treat them as a single hydrogeological unit
All wells respond quickly so are hydraulically connected
The response in -A is smaller magnitude (about half) but it is further from the pumped well
Due to variability of the pumping rate, the recovery test information is likely to give the best estimates of transmissivity
Only -A is screened in the same layer as the pumped well, so the interpretation method applies only to -A









Jacob's method (Cooper & Jacob, 1946)

Assumes

Aquifer has infinite extent
Aquifer is homoegneous, isotropic and uniform thickness in the area influenced
Prior to pumping, piezometric surface was (nearly) horizontal in the area influenced
Aquifer is pumped at a constant rate
Pumped well penetrates the full thickness of the aquifer
Diameter of pumped well is small (storage in well can be neglected)
Water removed from storage is discharged instantaneously with decline of head
Aquifer is confined
Flow to well is in unsteady state
Values of u (= $r^2S/4kDt$) are small, less than 0.01

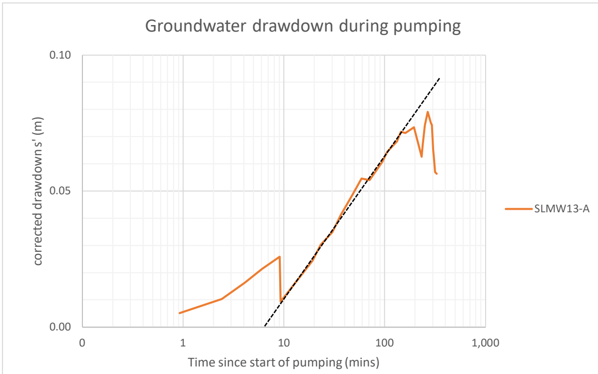
Parameters		**units**
distance to monitoring well	r	m
coefficient of storage	S	-
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
time since pumping started	t	d
pumping rate	Q	m3/d

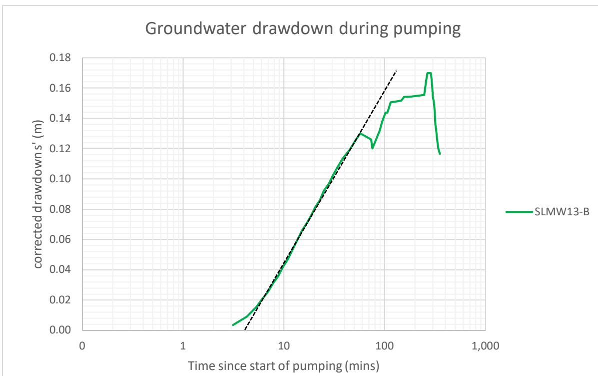
Equation

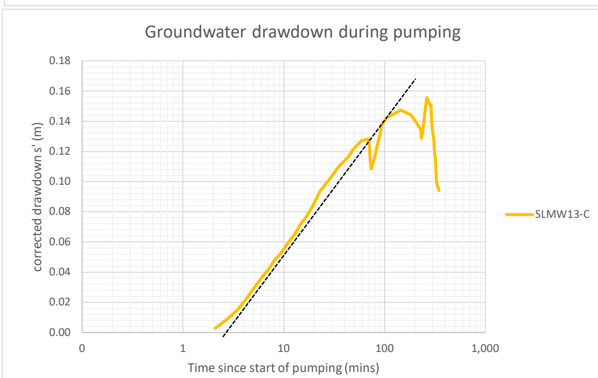
kD = (2.3 Q) / (4 π delta_s)

S = (2.25 kD t_0) / (r^2)

Parameters		**units**	**SLMW13-A**	**SLMW13-B**	**SLMW13-C**	**Comment**
distance to monitoring well	r	m	8.31	5.84	3.89	From summary sheet
drawdown per log cycle	delta_s	m	0.055	0.126	0.083	Read from semi-log charts to left
time when line crosses zero drawdown axis	t_0	mins	6	5	2	
	t_0	days	0.0042	0.0035	0.0014	
transmissivity	kD	m2/d	47.9	N/A	N/A	Calculated from equation
coefficient of storage	S	-	6.5 E-03	N/A	N/A	Calculated from equation
value of u for t = 0.25 days	u	-	9.4 E-03	N/A	N/A	Calculated to check that u is less than 0.01







Jacob's method (Cooper & Jacob, 1946)

Assumes

Same as Jacob's method for confined aquifers with drawdown s replaced by $s - s^2/2D$

Parameters		**units**
distance to monitoring well	r	m
coefficient of storage	S	-
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
time since pumping started	t	d
pumping rate	Q	m3/d

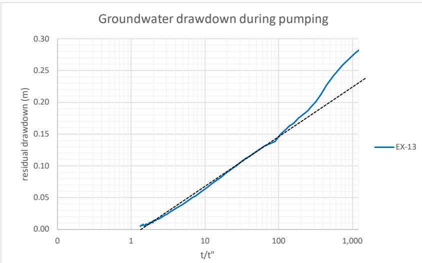
Equation

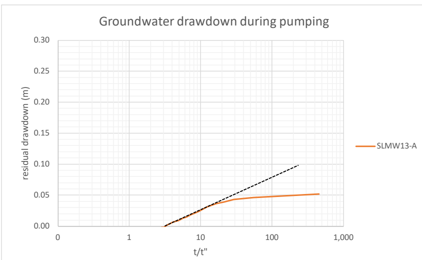
kD = (2.3 Q) / (4 π delta_s)

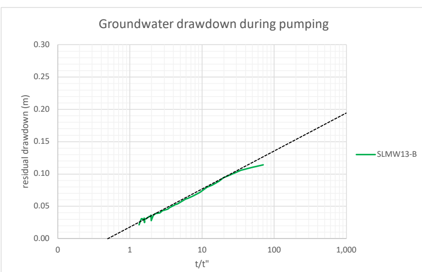
S = (2.25 kD t_0) / (r^2)

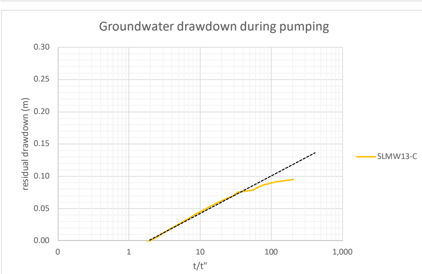
	Parameters	**units**	**SLMW13-A**	**SLMW13-B**	**SLMW13-C**	**Comment**
distance to monitoring well	r	m	8.30927867	5.84263297	3.88919143	From summary sheet
drawdown per log cycle	delta_s	m	0.053	0.115	0.09	Read from semi-log charts to left
time when line crosses zero drawdown axis	t_0	mins	7	4	2.2	
	t_0	days	0.0049	0.0028	0.0015	
transmissivity	kD	m2/d	49.7	N/A	N/A	Calculated from equation
coefficient of storage	S	-	7.9 E-03	N/A	N/A	Calculated from equation
value of u for t = 0.25 days	u	-	1.1 E-02	N/A	N/A	Calculated to check that u is less than 0.01

Charts for confined aquifer

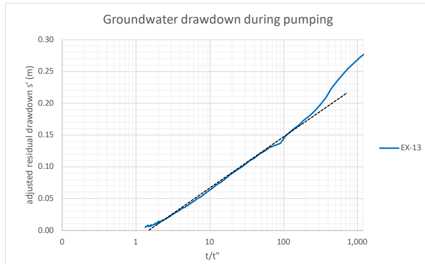


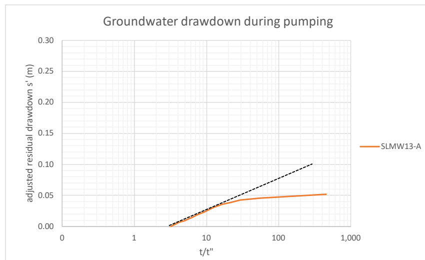


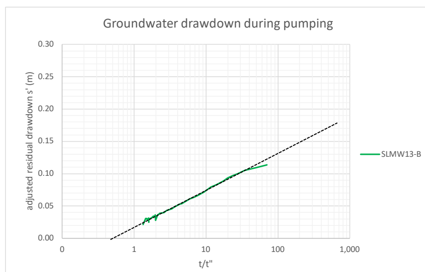


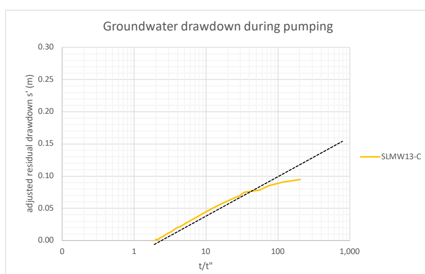


Charts for unconfined aquifer









Theis's recovery method (Theis, 1935)

Assumes

Same assumptions as Jocob method

Confined aquifer assessed based on residual drawdown, s

Unconfined aquifer assessed based on adjusted residual drawdown, $s' = s - s^2/2D$

Parameters		units
hydraulic conductivity	k	m/d
thickness of aquifer	D	m
pumping rate	Q	m3/d

Equation

kD = (2.3 Q) / (4 π delta_s)

Confined aquifer

Parameters		units	EX-13	13-A	13-B	13-C	Comment
drawdown per log cycle	delta_s	m	0.075	0.053	0.058	0.059	Read from semi-log charts to left
transmissivity	kD	m2/d	35.1	49.7	N/A	N/A	Calculated from equation

Unconfined aquifer

Parameters		units	EX-13	13-A	13-B	13-C	Comment
drawdown per log cycle	delta_s	m	0.075	0.05	0.057	0.06	Read from semi-log charts to left
transmissivity	kD	m2/d	35.1	52.7	N/A	N/A	Calculated from equation

Appendix H

Dewatering Modelling Report

hydrogeology CONSULTING LTD

GROUNDWATER DEWATERING MODEL, RIVERLEA SALTWATER LAKE 1

REPORT STATUS: FINAL

REPORT PREPARED FOR:

LBW co Pty Ltd
184 MAGILL RD
NORWOOD
SA 5067
AUSTRALIA

Date issued: 30 September 2024

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1. Introduction

1.1. Objective

This report has been prepared by Hydrogeology Consulting Ltd, commissioned by LBWco. It relates to the Riverlea Development north of Adelaide, South Australia. Three Saltwater Lakes are planned as part of the development. The work presented here relates to Saltwater Lake 1 (SWL1).

The objective of this work is to estimate the rate and timescale of dewatering that will be needed to lower the groundwater table temporarily to facilitate the construction of SWL1, which will be developed progressively using six 'bays' (stages), and to estimate by how much the dewatering may draw down the groundwater level in the surrounding area.

This report relates only to matters relating to groundwater level and groundwater flow. It does not consider groundwater quality, geotechnical issues or engineering design. This report and the modelling it presents have been prepared with reference to the following guideline documents:

- Murray-Darling Basin Commission (MDBC), *Groundwater flow modelling guideline*, Aquaterra Consulting Pty Ltd, November 2000.

- National Water Commission (NWC), *Australian groundwater modelling guidelines*, Sinclair Knight Merz and National Centre for Groundwater Research and Training, Waterlines Report Series No. 82, June 2012.

1.2. Scope of Work

The following scope of work was conducted:

- Collation of relevant hydrogeological information.
- Development of conceptual hydrogeological model.
- Development of computer groundwater model (steady-state), calibrated against available groundwater level information.
- Transient model simulations to assess potential dewatering requirements to allow SWL1 to be constructed.
- Assessment of the sensitivity of steady-state and transient modelling results to changes in input parameters and assumptions.
- Preparation of this report.

2. Background Information

2.1. Previous Reports

The reports listed in *Table 1* were reviewed during this work.

Table 1. List of previous reports

Date	Company	Report title
Oct 2008	REM	Aquifer Storage and Recovery Potential for Buckland Park
Dec 2008	REM (a business of SKM)	Buckland Park EIS Groundwater Investigations
March 2009	SKM	Further Groundwater Monitoring, Buckland Park Proposal
May 2011	AGT	Buckland Parks Drain Model

In addition, Hydrogeology Consulting Ltd worked with LBWco in planning and interpretating groundwater investigations conducted by LBWco at Riverlea between October and December 2023. That work is reported separately by LBWco. The investigations included:

- Installation of groundwater monitoring wells
- Borehole permeability ('slug') testing
- Installation of four test wells for groundwater extraction
- Test pumping of three of the groundwater extraction wells.

2.2. Saltwater Lake Design

The planned locations of the three saltwater lakes are shown in yellow in *Figure 1,* which also shows the locations of some of the groundwater monitoring wells installed by LBWco and others. The red outline indicates the boundary of Precinct 2 of the Riverlea development.

Figure 1. Locations of SWL1 to SWL3

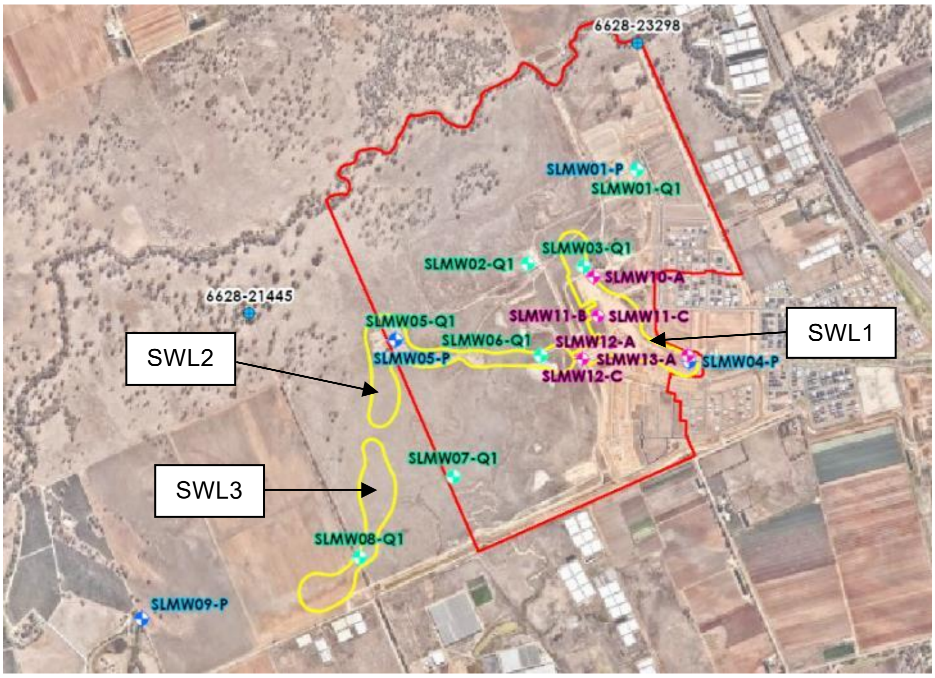
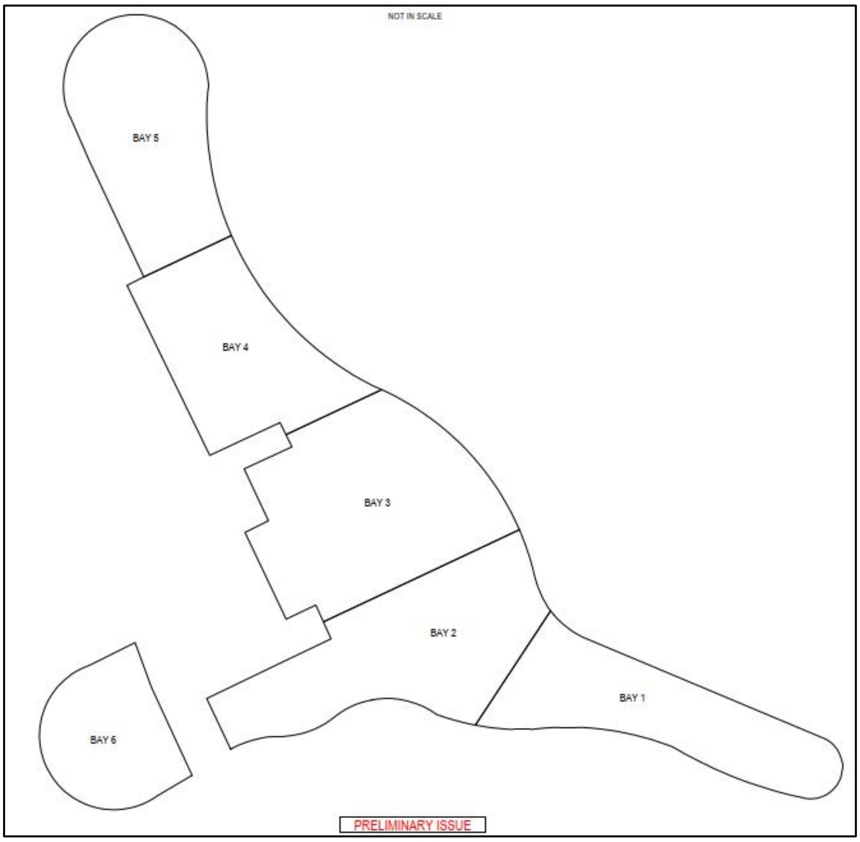


Figure 2 shows the planned layout of SWL1, which will be constructed as six bays with a total area of approximately 170,000 m^2. Bays 1 to 5 will be separated by temporary coffer dams to facilitate construction.

Figure 2. Planned layout of SWL 1



Source: Geotest Pty Ltd 'Construction Methodology SLW1', undated

A preliminary and simplified summary of the potential stages of excavation and liner construction for the first four bays of SWL1 is as follows. Similar stages of work will continue until construction of Bays 5 and 6 has also been completed.

- Remove overburden from Bay 1
- Commence dewatering Bay 1, pumping to location of partially excavated SWL2
- Remove overburden from Bay 2
- Commence dewatering Bay 2, pumping to location of SWL2
- Cut Bay 1 to invert level and prepare subgrade, commence liner construction (subject to final design)
- Cut Bay 2 to invert level and prepare subgrade
- Remove overburden from Bay 3
- Continue liner construction from Bay 1 into Bay 2 (subject to final design)
- Install coffer dam between Bays 1 and 2
- Start dewatering Bay 3, pumping into Bay 1
- Stop dewatering Bay 1
- Cut Bay 3 to invert level and prepare subgrade
- Remove overburden from Bay 4
- Continue liner construction from Bay 2 into Bay 3 (subject to final design)
- Install coffer dam between Bays 2 and 3
- Start dewatering Bay 4, pumping into Bay 2
- Stop dewatering Bay 2

The original ground surface at SWL1 was at an elevation of approximately 8 mAHD. This has already been excavated down to a level of 5.5 m AHD, which is about 1 m above the groundwater table. It is understood that the bottom of the lake (invert level) will be at 1.5 mAHD, with dewatering required to be to 0.5 mAHD to facilitate the civil construction works.

2.3. Geology

The ground surface is relatively flat in the vicinity of the site, with a gentle slope down towards the coast about 3 km west of SWL1.

The near surface stratigraphy of the area is comprised of Quaternary sediments of the Pooraka Formation, with the St Kilda and Glanville Formations towards the coast. The Pooraka Formation is described as mottled clay and silt inter-bedded with sand, gravel and thin sandstone layers. The St Kilda formation is characterised by estuarine muds, sands, peats and shelly beds and often contains permeable sand lenses.

These Quaternary sediments overlie the older sediments of the Hindmarsh Clay, which is described as a layered sequence of mottled red-brown sandy clay with sand and gravel lenses.

The soils and sediments encountered by LBWco during installation of monitoring wells around the site are consistent with the above descriptions, with a range of clay, silt, sand and gravel that varies both laterally and vertically. In general, the borehole logs for the deeper monitoring wells around SWL 1 (monitoring wells SLMW10 to SLMW13) indicate increased dominance of clay or sandy clay with depth, although SLMW10 encountered sand from 10.6 m to its base at 13 m below ground level.

The REM (2008) assessment indicated that there is a relatively consistent clay layer at around 20 metres depth across the area.

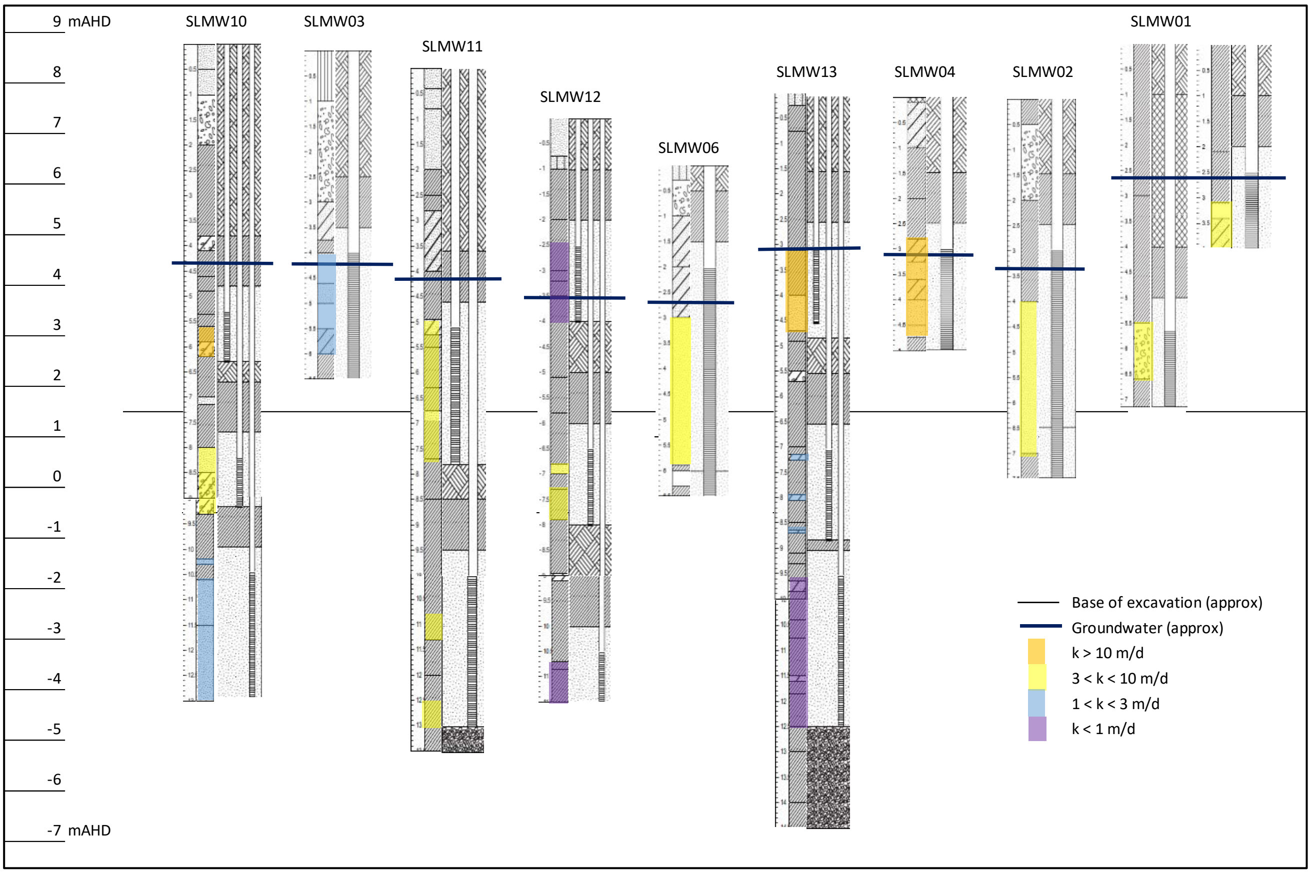
2.4. Hydrogeology

The REM (Oct 2008) report indicates that four Quaternary aquifers (Q1 to Q4) are generally present in the Northern Adelaide Plains region. The top three (Q1 to Q3) have thicknesses ranging from 3 to 15 m, and can be quite discontinuous with lateral extents often less than 2 km. The Hindmarch Clay unit encloses these aquifers. Clay generally underlies the Q3 aquifer and forms a confining bed above the Q4 aquifer, which is a sandy, confined aquifer within the Carisbrooke Sand, with an average thickness of about 20 m. The Q4 near Buckland Park (and Riverlea) is interpreted directly to overlie the top Tertiary aquifer (T1), although the Q4 itself thins out towards the coast.

The results of groundwater pressure monitoring, borehole permeability ('slug') testing and groundwater test pumping conducted by LBWco in late 2023 indicate that although each bore intersects a different vertical sequence of more-permeable materials (sand and gravel) and less-permeable materials (silts and clays), the investigated units appear to be hydraulically connected. They are therefore interpreted to represent a single 'aquifer', even though there is significant heterogeneity and local discontinuity, both laterally and vertically. This shallow 'aquifer' is interpreted to represent a combination of the top Quaternary aquifer (Q1) as well as locally perched units within the Pooraka, St Kilda and Hindmarsh Clay Formations. This is consistent with the interpretation by AGT referenced in REM/SKM (2008) that pumping test results for two sites close to Buckland Park showed 'perched' zones to be connected to the Q1 aquifer, while the Q1 aquifer and the underlying Q2 aquifer had almost no hydraulic connection.

Figure 3 below shows the borehole logs for LBWco monitoring wells that are located close to SWL1 with their elevations aligned to AHD. It shows the approximate groundwater level in blue. The horizons that are interpreted from the slug tests to be relatively more permeable are highlighted in orange (most permeable), yellow, blue and purple. The horizons that are not highlighted with a colour are more clay-rich and are interpreted to be less permeable, with hydraulic conductivity below approximately 0.1 m/d.

Figure 3. Borehole logs around SWL1



Based on the borehole logs and slug testing results as summarised in Figure 3, the geological sequence appears to be generally more permeable towards the top, as evidenced by the higher proportions of orange and yellow shading, and generally less permeable with increased depth.

The best data for assessing the transmissivity of the shallow aquifer overall are the results from the three pumping tests conducted on wells EX10, EX12 and EX13, which are all located close to SWL1. The transmissivity estimates from the pumping tests and for the slug tests in the nearby multi-level monitoring wells are summarised in *Table 2*.

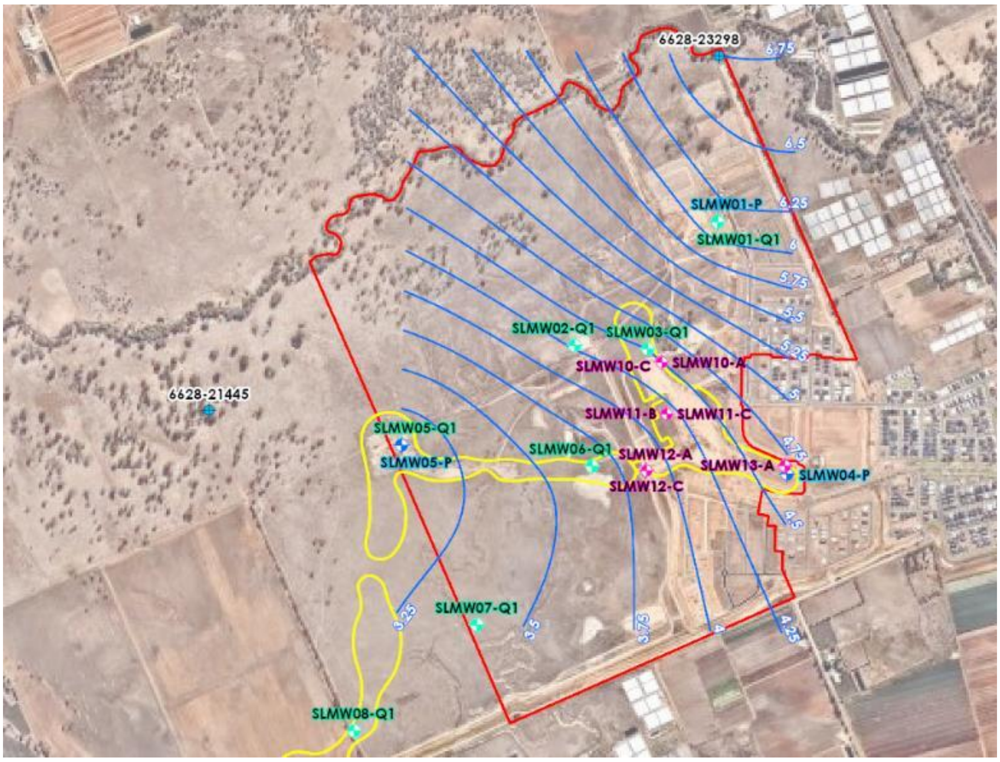
The transmissivity estimates for each location derived using various methods produce similar results, with averages of 34 m^2/d at EX10, 22 m^2/d at EX12 and 45 m^2/d at EX13. The overall geometric mean transmissivity estimate is 33 m^2/d. The transmissivity estimates are up to a factor of 3 higher than those obtained from the slug tests conducted in the same monitoring wells. The estimates from the pumping tests are likely to be more representative of the formation, as they investigate a much larger volume of the formation, whereas slug tests only influence a relatively small radius of aquifer material around each test well.

Table 2. Summary of transmissivity estimates

Test well	Monitored well	Screen interval	Slug test transmissivity (m2/d)		Estimated transmissivity from test pumping (m2/d)				
					Assuming confined conditions		Assuming unconfined conditions		Average from test pumping
		m BGL	By unit	Total	Jacob	Theis recovery	Jacob	Theis recovery	
EX-10	EX-10	8 - 9.5	-	-	-	31	-	31	34
	SLMW10-A	5.3 - 6.3	9.6	27	33	37	33	37	
	SLMW10-B	8.2 - 9.2	9.9		33	35	33	37	
	SLMW10-C	10 - 13	7.5		-	-	-	-	
EX-12	EX-12	5 - 8	-	-	-	20	-	20	22
	SLMW12-A	2.5 - 4	0.84	7	18	21	20	22	
	SLMW12-B	6.5 - 8	6.0		21	28	24	31	
	SLMW12-C	10.5 - 13	0.52		-	-	-	-	
EX-13	EX-13	3 - 6	-	-	-	35	-	35	45
	SLMW13-A	3 - 4.5	17.6	21	48	50	50	53	
	SLMW13-B	7 - 8.8	0.4		-	-	-	-	
	SLMW13-C	9.5 - 12.5	2.55		-	-	-	-	
								Geometric mean transmissivity (m2/d)	**33**

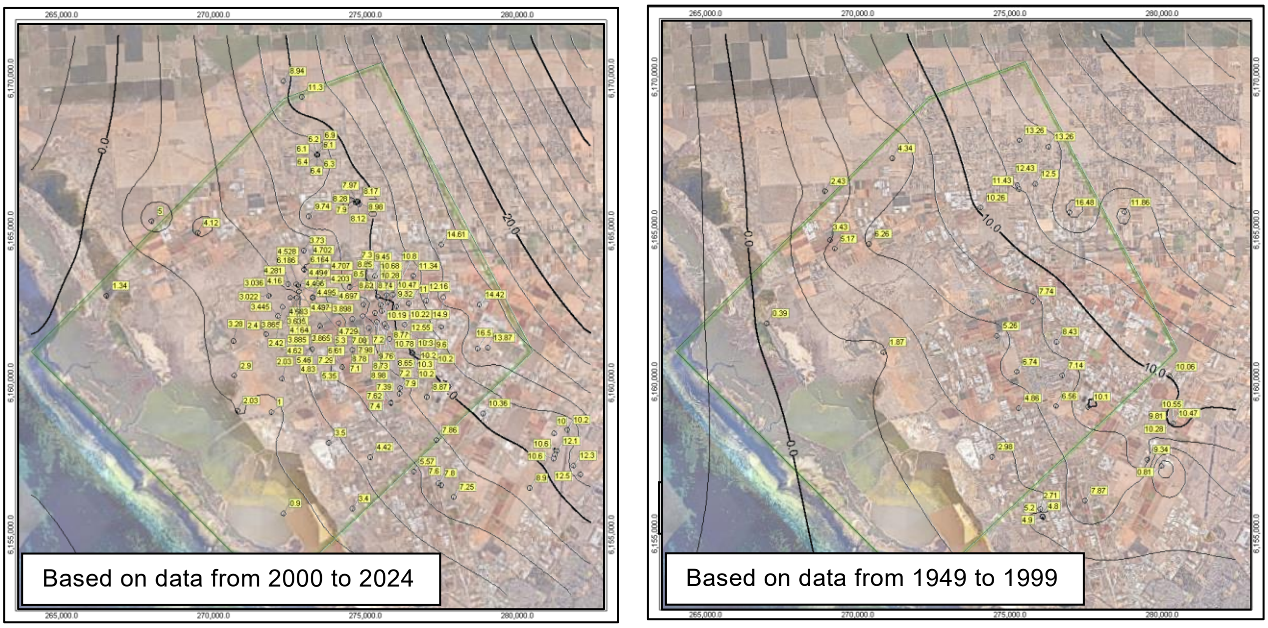
The groundwater elevation beneath SWL1 in October 2023 was in the approximate range 4 to 5 mAHD, with an inferred flow direction southwest towards the coast, as indicated in *Figure 4*. This is consistent with what was reported by REM (2008). The hydraulic gradient at SWL1 in October 2023 was about 0.0025 (1 in 400) and was lower further downgradient.

Figure 4. Groundwater elevation contours for Riverlea



Groundwater level contours for a wider area around Riverlea have been interpolated based on groundwater elevation data obtained from www.waterconnect.sa.gov.au in September 2024. Review of the data indicates that although the dates of individual measurements vary, the dataset produces groundwater level contours that show a consistent overall picture of flow towards the coast, with a gradient that is steeper inland and flatter towards the coast. The lefthand image in *Figure 5* shows contours based on data collected since the year 2000, the righthand image shows contours based on measurements recorded between 1949 and 1999. Whilst there are differences between the two, the differences are considered to be due more to the different locations and spread of data points than to the timing of the dates of the measurements.

Figure 5. Interpolated average regional groundwater elevation contours



Time-series water level data are available for several wells and have been used to plot hydrographs (*Figure 6*) of groundwater level against time. The Figure also shows the monthly rainfall record for the Edinburgh weather station (source: www.bom.gov.au). The locations of the hydrograph wells are shown on *Figure 7*. Overall, the hydrographs indicate that short-term and seasonal fluctuations are generally less than 1 m. Some wells show a slow, longer-term trend of increasing groundwater levels, particularly well 6628-2515 where the groundwater level has risen by approximately 4.2 m in the last 24 years (less than 0.2 m/year). This well is about 6 km southeast (upgradient) of the planned location of SWL1. Such trends could be associated with changing abstraction patterns or changes in land use, irrigation or drainage. However, in the context of potential pumping for a relatively short period (a number of months) to facilitate lake construction, the potential background water level changes are expected to be small.

Figure 6. Groundwater level hydrographs

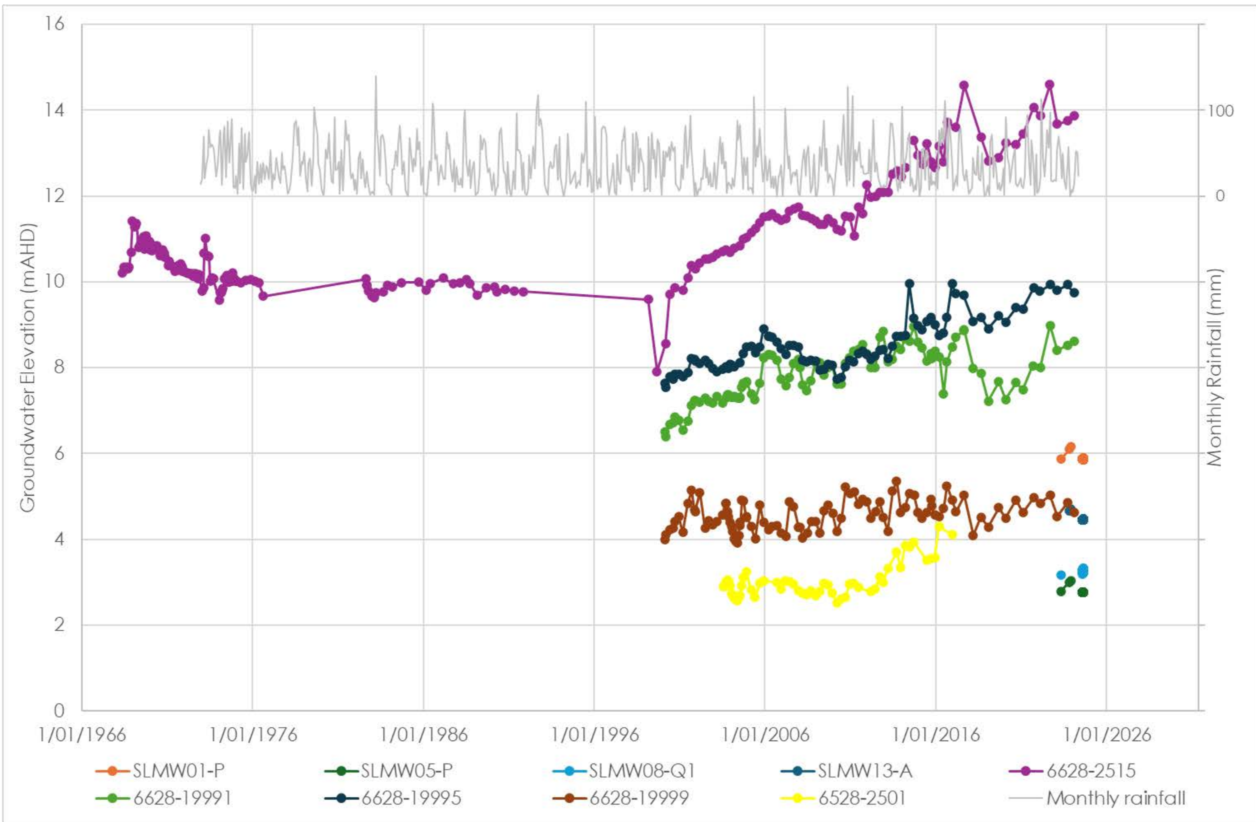
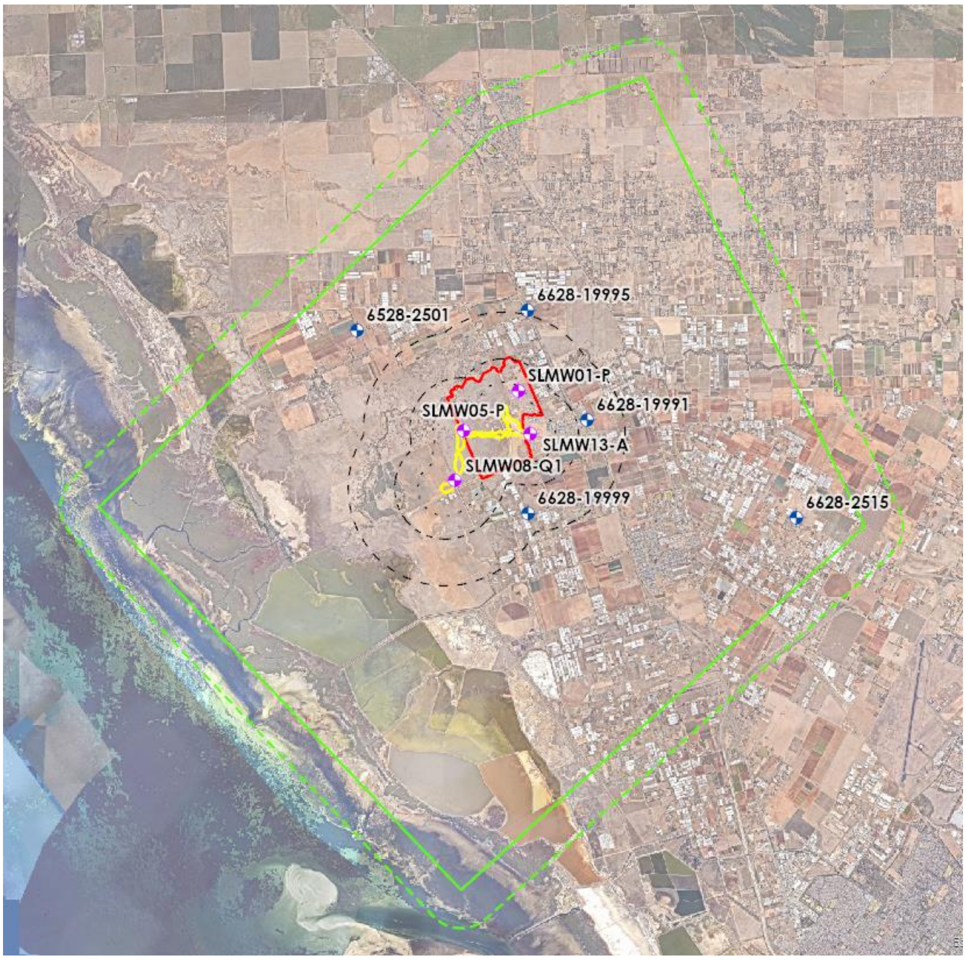


Figure 7. Locations of wells used for hydrographs



2.5. Conceptual Hydrogeological Model

In order to develop a method of estimating the amount of groundwater pumping that will be needed to draw the groundwater level beneath SWL1 down to the required level, it is first necessary to have a conceptual understanding of groundwater conditions beneath SWL1 and its surrounding area. The conceptual understanding is described below.

Based on the results of the groundwater investigations it is considered that from an overview perspective, groundwater within the investigated depth range behaves as a single, hydraulically connected aquifer, even though it has considerable local variability both laterally and vertically. The variability is interpreted to be the result of deposition in an alluvial environment in which channels meandered over time, depositing granular materials (sands and gravels). Between the channels were floodplain areas in which fine-grained sediments (silts and clays) were laid down.

In general, the permeability of the formation is interpreted to decrease with depth. From the results of the LBWco groundwater investigations the effective base of the shallow (Q1 and perched) aquifer may be at or below -5 mAHD. Other aquifers (Q2 and below) are also present at depth but based on the presence of the Hindmarsh Clay and a regional understanding of geological conditions, deeper aquifers are assumed to be hydraulically separate from the shallow aquifer, and so are not relevant to this assessment. The same assumption was made by REM/SKM in their 2008 groundwater model of the area.

The general groundwater flow direction beneath SWL1 is inferred to be southwest towards the coast. Flow is driven by recharge upgradient to the east and northeast, including recharge from ephemeral creeks including the Gawler River. It is also influenced by discharge to low-lying creeks. Some of this discharge will be within creek bed gravels, some may emerge as surface water discharge, and some water will be lost by evaporation from low-lying ground and salt pans to the west and southwest, and by evapotranspiration from deep-rooted vegetation.

There will be variations in groundwater levels and flows over time, in response to seasonal fluctuations and variability in rates of precipitation, groundwater recharge and evapotranspiration. However, for the purposes of modelling the relatively short timescale required for construction dewatering, and as future climate events cannot be predicted, it is assumed that regional groundwater levels (away from the influence of dewatering) will be steady over time.

3. Groundwater Baseline Model

3.1. Model Selection

The MDBC (2000) modelling guideline discusses three classifications of groundwater model:

- Basic - a simple model suitable for preliminary assessment (rough calculations), not requiring substantial resources to develop, but not suitable for complex conditions or detailed resource assessment.
- Impact Assessment model - a moderate complexity model, requiring more data and a better understanding of the groundwater system dynamics, and suitable for predicting the impacts of proposed developments or management policies.
- Aquifer Simulator - a high complexity model, suitable for predicting responses to arbitrary changes in hydrological conditions, and for developing sustainable resource management policies for aquifer systems under stress.

The guideline recommends adopting a level of complexity that is high enough to meet modelling objectives, but low enough to allow conservatism where needed, recognizing uncertainty where data or understanding are lacking. Given that the objectives for Riverlea are to simulate dewatering rates and to estimate the drawdown of groundwater levels in the local area, the appropriate level of complexity is that of an Impact Assessment model.

Similarly, the 2012 Australian groundwater modelling guidelines describe a 3-level classification system relating to model confidence (Class 1, Class 2 or Class 3 in order of increasing confidence), with the level of confidence depending on the available data, model calibration, the consistency between calibration and predictive analysis, and the level of stresses applied in predictive models. Class 1 models have relatively low confidence associated with any predictions and are best-suited for managing low-value resources (i.e. few groundwater users with few or low-value groundwater-dependent ecosystems) or for assessing impacts of low-risk developments. Class 2 and 3 models are suitable for assessing higher risk developments in higher-value aquifers. According to the guidelines, it is not expected that any individual model will have all the defining characteristics of Class 1, 2 or 3 models, but that a model can fall into different classes for various characteristics and criteria.

The 2012 guidelines indicate that the target confidence level for an example mine-dewatering model would be Class 1-2. It would not be Class 3 due to a lack of useful time-series data that could be used for calibration. The same is true for the Riverlea model, for which the target confidence level is also Class 1-2, based on the following factors:

- Groundwater head observations and bore logs are available but may not provide adequate coverage throughout the model domain (Class 2).
- Calibration is only possible for steady state conditions, not transient (Class 1)
- The aquifer value might be considered medium (not high) due to the groundwater salinity being typically over 5,000 mg/L total dissolved solids in the vicinity of SWL1 (Class 2).
- Model is being used to provide estimates of dewatering requirements for excavations and the associated impacts (Class 2).

The modelling software used for this assessment is Anaqsim, analytical element software for simulating groundwater flow. Anaqsim is a product of Yellow Sub Hydro and was developed by Dr Charlie Fitts in the USA. It is coded in C#. Anaqsim is used and trusted by industry and governments globally (https://anaqsim.com).

Anaqsim is discussed at length in the 2nd and 3rd editions of Charles Fitts' textbook 'Groundwater Science' published by Elsevier. Anaqsim is used in the text to teach the topic of groundwater modelling. The 3rd edition was published in 2024 with new links for professors and students to Anaqsim modelling files. It is understood that the book is being used for instruction at a number of universities in USA, Canada, Australia, and the UK. In Australia it is understood to have been used by mining companies and water resource companies (for example, in a submission[1] by Rio Tinto to the EPA in Western Australia).

The analytic element method (AEM) superposes analytic solutions to yield a composite solution consisting of equations for head and discharge as functions of location and time. The AEM is described in detail in books by Strack (1989)[2] and Haitjema (1995)[3]. A shorter summary of the method may be found in Fitts (2023)[4]. The AEM is fundamentally different than numerical methods like finite elements and finite differences, where the domain is broken into small blocks or elements and simple head distributions (e.g. linear) are assumed within these blocks or elements. In the AEM, boundaries of the domain are discretized, but the domain itself is not.

Anaqsim uses a variation of the AEM that divides the modelled region into subdomains, each with its own definition of aquifer parameters and its own separate AEM model. The model for a given subdomain includes contributions from elements inside and on the external boundary of the subdomain. Each subdomain model is written in terms of two-dimensional functions, but three-dimensional flow may be simulated using multiple levels in a model. In multi-level models, the resistance to vertical flow is accounted for in the vertical leakage between levels.

This subdomain approach allows for a high degree of flexibility with respect to a model's heterogeneity, anisotropy, and layering. For example, it is possible for a subdomain that is anisotropic to be adjacent to another subdomain that is isotropic or anisotropic with a different direction and ratio. The subdomain approach allows mixed layering schemes. For example, an area with multiple levels (subdomains stacked vertically and leaking vertically to each other) can abut an area with subdomains in just a single level. This allows the model to focus layering and computational effort in the area of interest, with a simpler single-level model for distant areas.

Another key aspect of Anaqsim is that it allows complete transient simulation capabilities by using finite difference time steps. The transient term in the flow equations is handled in essentially the same manner as it is in finite difference programs like MODFLOW.

3.2. Checks of Anaqsim

The Anaqsim website details the following 19 checks of Anaqsim against either empirical relations or other software:

1. Uniform flow in a confined aquifer
2. Uniform flow in a confined aquifer with uniform recharge
3. Uniform flow in a confined aquifer with uniform leakage from below
4. Uniform flow in an unconfined aquifer with uniform recharge
5. Uniform flow in a confined interface aquifer with uniform recharge

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[1] https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/A8_2 Hydrogeological Assessment Western Range (Rio Tinto 2018c).pdf
[2] Strack, O. (1989), Groundwater Mechanics, Prentice Hall, Engle- wood Cliffs, NJ.
[3] Haitjema, H. (1995), Analytic Element Modeling of Groundwater Flow, Academic Press, San Diego.
[4] Fitts, C. R. (2023), Groundwater Science 3rd edition, Academic Press, San Diego.

6. Uniform flow in an unconfined interface aquifer with uniform recharge
7. Uniform flow in an unconfined aquifer with uniform recharge and two levels
8. Uniform flow in a two-level confined aquifer system with circular opening connecting the two levels
9. Transient simulation of the Theis (1935) solution
10. Transient simulation of the Hantush (1967) analytic solution for mounding under a rectangular recharge area
11. Comparison of complex multi-level Anaqsim model and equivalent MODFLOW 2005 model
12. Check of Anaqsim drain line boundary
13. Check of Anaqsim leaky barrier line boundary
14. Uniform flow in a confined/unconfined aquifer with uniform recharge
15. Uniform flow in a two-layer confined/unconfined aquifer with uniform recharge
16. Head-dependent normal flux (3rd type) boundary
17. Check of vertical leakage over polygon tool
18. Multi-layer pumping test comparison with MLU
19. 3D pathline tracing comparison with MODFLOW

The checks that are the most relevant to modelling of dewatering at Riverlea are Checks 9, 11 and 18:

- Check 9 (transient simulation of the Theis solution) simulates transient extraction along a line through the well and indicates good approximation of the governing equation by the model.
- Check 11 (comparison of complex multi-level Anaqsim model and equivalent MODFLOW model) has confined and unconfined domains under transient and steady flow, with spatially-variable area sinks for simulating vertical leakage and storage changes. It includes anisotropy, wells, constant head line boundaries, normal flux line boundaries, and inter-domain line boundaries. This check demonstrates that Anaqsim and MODFLOW produce similar results for a complex model that implements most of Anaqsim's capabilities. The comparisons are similar for both steady state and transient simulations.
- Check 18 (multi-layer pumping test) is a model of a pumping test in a thick, stratified aquifer, adapted to give a direct comparison between Anaqsim and MLU, which is an analytic multi-level model that uses Laplace transforms and analytic elements (LT-AEM) to get exact distributions of vertical leakage and storage fluxes, without finite time steps. The models have 9 layers that are all confined and isotropic in the plane of the layering, but with lower vertical hydraulic conductivity. The pumping well spans three of the levels. The model-simulated drawdowns in the pumping well and in the three observation wells are essentially identical.

Checks of Anaqsim have also been conducted by McLane Environmental.[5] Charles McLane has authored some peer reviewed papers on the AEM method, as referenced on his blog.[6]

In addition, Stephen Kraemer of the USEPA has published in the journal Groundwater a case study involving the use of Anaqsim and its comparison to MODFLOW.[7,8] The case study was for the Los Angeles basin. It demonstrated the use of analytic element groundwater modelling for testing stress dependent boundaries during site pump-treat-inject design.

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5 McLane Environmental independently sells 'FlexAEM', which is a tutorial package for Anaqsim
6 flexAEM Blog: So…How Does AnAqSim Compare to MODFLOW?
7 https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=358906&Lab=CEMM
8 https://ngwa.onlinelibrary.wiley.com/doi/10.1111/gwat.13322

The results of these checks and reviews give confidence that Anaqsim is an appropriate model to use for simulation of groundwater flow and pumping at Riverlea, given the objectives of the modelling and the limited amount of hydrogeological data available on the groundwater system, which has considerable 3-dimensional complexity on a small scale but appears to behave in a relatively uniform way on a large scale.

3.3. Approach to Modelling

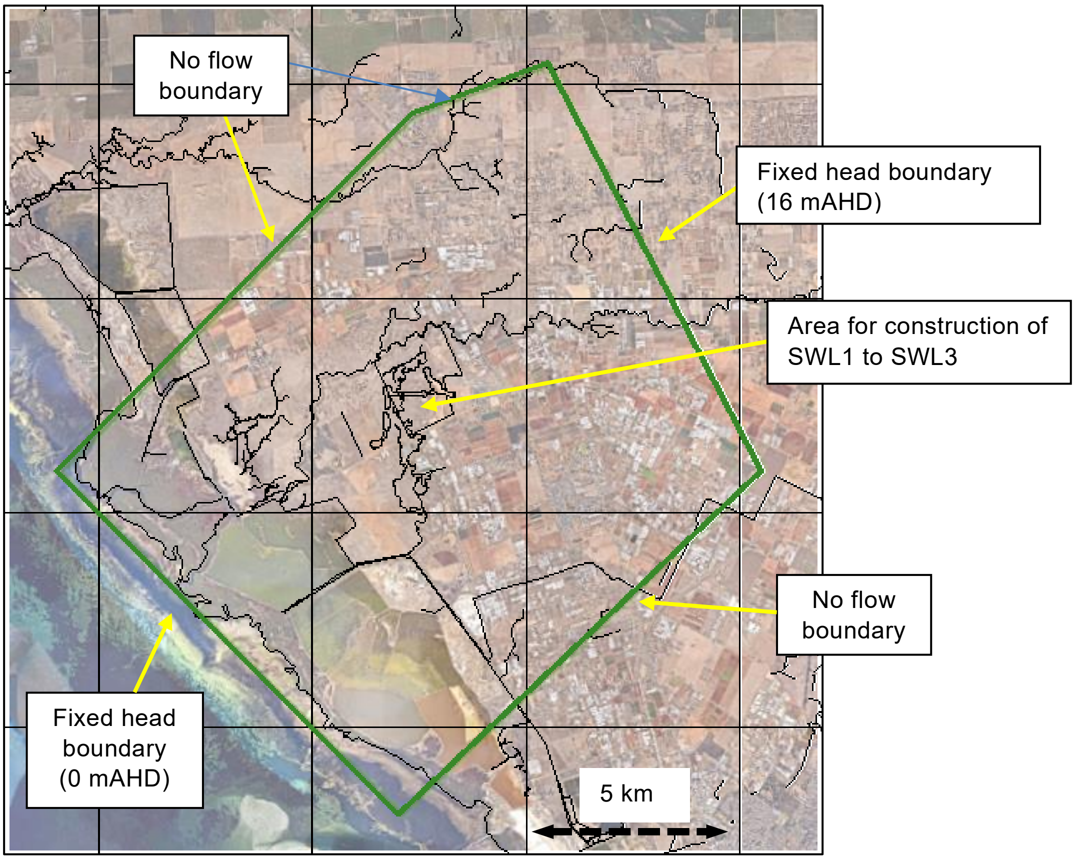
First, a baseline model was developed to provide a reasonable steady-state approximation of average groundwater levels in the area, with model boundaries sufficiently distant from the site that they do not significantly influence modelling outcomes. The baseline model incorporates river elements for the Gawler River and Thompson's Creek and involves 3,152 equations that it solves iteratively.

The baseline model was then used to assess the response of the aquifer to various potential dewatering scenarios to achieve the groundwater lowering required for construction of Bay 1 of SWL1 (Section 0). The most promising approach was then taken forward to simulate the dewatering needed for construction of the full sequence of bays (Section 0). The sensitivity of the model to various input parameters and assumptions was assessed both at the steady-state calibration stage and for the transient simulations.

3.4. Model Domain, Layering and Boundary Conditions

The lateral extent of the model is similar to that used by REM/SKM in their 2008 model and by AGT in their 2011 model. It is oriented approximately NE-SW in line with the inferred general groundwater gradient, and measures approximately 13.2 km by 11.3 km, as shown by the green boundary in *Figure 8.* This extent of domain was designed to be large enough that the effects of modelled dewatering for the saltwater lakes would not be significant at the model boundaries.

Figure 8. Groundwater model domain and external boundaries



As in the previous models developed by REM/SKM and AGT, the southeast and northwest boundaries of the model area were set as 'no flow' boundaries on the basis that they are approximately parallel to the inferred groundwater flow direction, meaning that groundwater moves parallel to the boundaries and does not cross them.

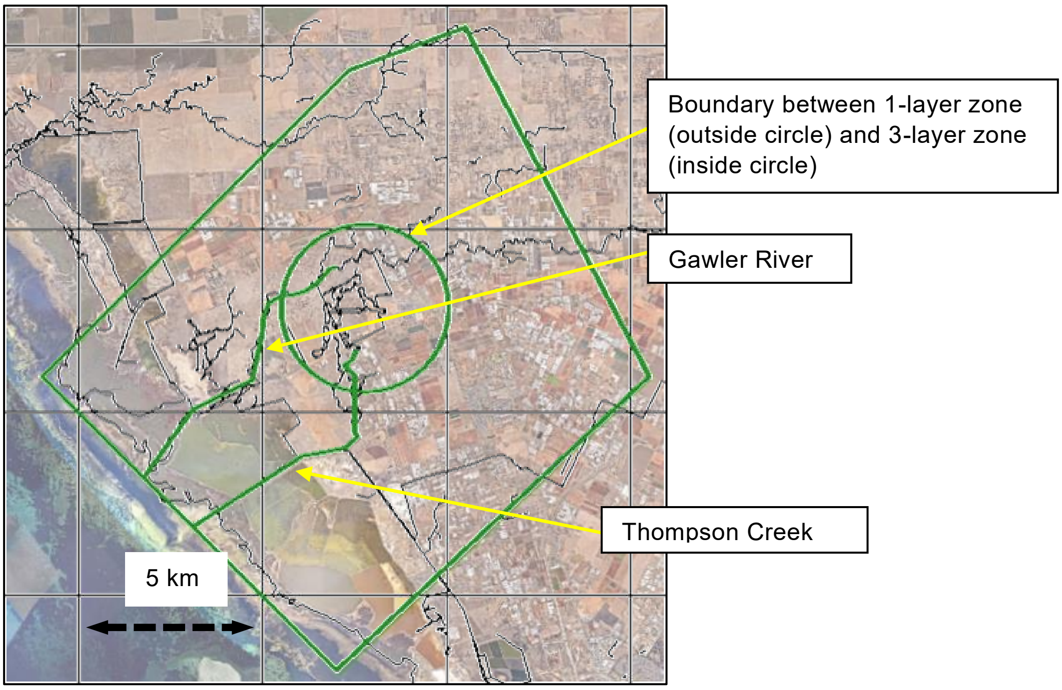
The southwest boundary of the model was defined as a fixed head boundary at zero mAHD close to the coast, and the northeast boundary was set at a fixed head of 16 mAHD. Care was taken throughout the modelling process to check the simulated boundary flows and to make sure that the simulation of dewatering at Riverlea did not induce a higher inflow through the fixed head boundary (if it had, this would have indicated that the boundary was too close to the pumping area and that the model domain should be expanded).

The top of the model was set at 20 mAHD, thus allowing the aquifer to be unconfined across the domain. The base of the model was set at -6 mAHD based on review of the site investigation findings close to SWL1, as shown in Figure 3. This means the saturated thickness of the central part of the model is approximately 11 m (from +5 mAHD to -6 mAHD). This is smaller than the 20 m that was adopted in the previous models but is based on the more recent site investigation data. The sensitivity of modelling results to this assumption is assessed in *Section 4.7*.

Across the more distant parts of the domain, away from the proposed lakes, the model was set up as a single layer. This simplifies the model and is consistent with the findings of the site assessment, which suggest that the shallow formation acts as a single, hydraulically-connected aquifer unit even though it is laterally and vertically heterogenous. It is also appropriate in the absence of site-specific data with which to define aquifer properties across most of the area.

In and around the area where the saltwater lakes will be constructed the model has three layers. This allows the layers to be set with different hydraulic properties and it allows vertical flows between layers to be assessed, as well as lateral flows within layers. At the internal model boundary between the inner three-layer zone and the outer single layer zone, the groundwater pressures in each layer are vertically uniform, which maintains continuity of groundwater flows across the internal boundary. The boundary of the 3-layer zone is a circle with a diameter of approximately 4.5 km as indicated in *Figure 9*.

Figure 9. Groundwater model internal boundaries



Layer 1 in the central part of the model was set vertically from 5 m AHD to -1 mAHD. The bottom elevation of this layer was selected based on review of the hydraulic conductivity (k) values estimated from slug tests in the multi-level wells SLMW10 to SLMW13 installed around SWL1. The k estimates were attributed to the relevant 1 m vertical interval, after factoring where needed to take into account the thickness of the zone investigated (in some cases this is the screened thickness, in others it is the thickness of a specific permeable layer within the screen). The resulting k estimates for the vertical intervals were then averaged between the four wells as shown in *Table 3* and these were plotted in a vertical profile as shown in *Figure 10*. The vertical profile suggests that *k* is generally higher in the shallower zone (above -1 mAHD) than below, so -1 mAHD was adopted as the base for Layer 1. The bottom elevation of Layer 1 is therefore 1.5 m below the +0.5 mAHD dewatering elevation needed for construction of SWL1.

Layer 2 was set from -1 mAHD to -2 mAHD, as a thin layer to allow potential vertical flows to be simulated below the required dewatering level. Layer 3 was set from -2 mAHD to the base of the model at -6 mAHD.

Table 3. Averaged vertical profile of slug test hydraulic conductivity estimates (m/d)

Elevation (mAHD)	Estimated average k (m/d) from slug testing						Implied transmissivity (m2/d)
	EX10	EX11	EX12	EX13	Average	Vertical average	
4 to 5 m	0.5	0.5	0.5	6.6	2.03	2.6	15.4
3 to 4 m	0.5	1.11	0.5	11	3.28		
2 to 3 m	9.6	3.7	0.5	0.5	3.58		
1 to 2 m	0.5	3.7	0.5	0.5	1.30		
0 to 1 m	5.32	1.48	0.5	0.5	1.95		
-1 to 0 m	4.56	0.5	7.5	0.5	3.27		
-2 to -1 m	0.5	0.5	0.5	0.5	0.50	1.3	6.5
-3 to -2 m	3	0.5	0.5	0.85	1.21		
-4 to -3 m	3	3.15	0.5	0.85	1.88		
-5 to -4 m	3	3.15	0.65	0.85	1.91		
-6 to -5 m	3	0.5	0.5	0.5	1.13		
						Total	**21.9**

Figure 10. Average vertical profile of hydraulic conductivity from slug tests

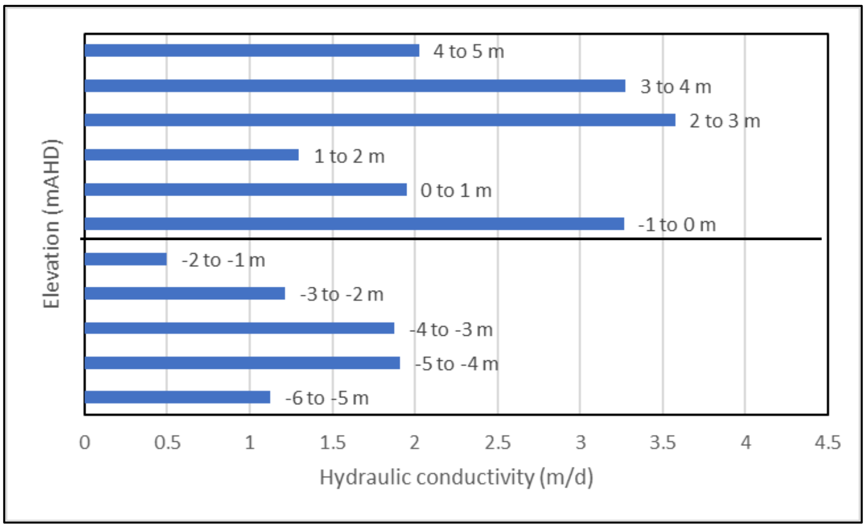


Figure 9 also shows shows the locations of the internal model boundaries for the Gawler River and Thompson Creek. During model calibration it was found to be necessary to include these to allow discharge from the model and therefore bring down the groundwater levels and gradient in the western part of the mdel. Without them (or a zone of higher hydraulic conductivity which could

potentially have the same overall effect), it would not have been possible to obtain an acceptable match of groundwater levels in the vicinity of the saltwater lakes while also giving a reasonable representation of groundwater levels both at the coast and at the upgradient boundary of the model. The creeks are represented in the model as series of line segments with prescribed heads applied at their downstream (zero mAHD) and upstream ends (4.5 mAHD[9] for the Gawler River, 3.5 mAHD for Thompson Creek).

3.5. Hydraulic Conductivity

Based on the pumping tests conducted in wells EX10, EX12 and EX13 in December 2023, the overall geometric mean transmissivity estimate is 33 m^2/d. For the modelled aquifer thickness of approximately 11 m at SWL1, this implies an average hydraulic conductivity of 3 m/d. However, based on the vertical profile of *k* estimates from slug testing, as discussed above, *k* in the shallow zone down to -1 mAHD appears to be approximately double *k* in the deeper zone. Given that the transmissivity estimates from pumping tests are likely to give the most representative information and that slug tests often underestimate *k* due to their limited zone of influence, the transmissivity and *k* estimates derived from the slug tests (Table 3) have been factored up so that the overall aquifer transmissivity is 33 m^2/d. To do this the vertically averaged *k* estimates for the two zones were increased from 2.6 m/d and 1.3 m/d to 4 m/d and 2 m/d respectively, maintaining their ratio to each other. The *k* value of 4 m/d was then applied to Layer 1 and the *k* value of 2 m/d was applied to Layers 2 and 3. In the far-field of the model, where there is only a single layer, its *k* value was set to 3 m/d to maintain the same transmissivity of 33 m^2/d (based on 11 m saturated thickness).

The starting point for model calibration in the absence of other site data, was to set *k* to be uniform across the single-layer portion of the model domain, away from Riverlea. However, this did not provide an acceptable match against observed groundwater levels (see Section 3.9), so some variability of *k* was incorporated into the model during the calibration process. During this process the aim was to keep the model as simple as possible, while retaining sufficient complexity to represent the system adequately and to reproduce groundwater behaviour. This approach follows the MDBC (2000) and Australian Groundwater Modelling guidance.

The results of model simulations during the calibration process were assessed by visual comparison of modelled groundwater level contours against those interpolated from recorded measurements obtained since the year 2000 (*Figure 5*), and by seeing how the modelled heads at specific monitoring well locations compared with recorded data. The root mean squared error (RMSE) was used to assess goodness of fit between observed and modelled heads.

The resulting final modelled distribution of *k* is indicated in *Figure 11*. The hydraulic conductivity values in the vicinity of the proposed lakes were kept at those derived from the field pumping tests. To simulate the steeper gradient towards the east it was necessary to decrease the hydraulic conductivity compared to both the Riverlea area and the coastal zone, where the gradient is flatter. The zone with the lowest *k* values in the north was needed to decrease inflows from the upgradient boundary, thereby allowing modelled groundwater levels northwest of the SWL area to be lower than they otherwise would have been.

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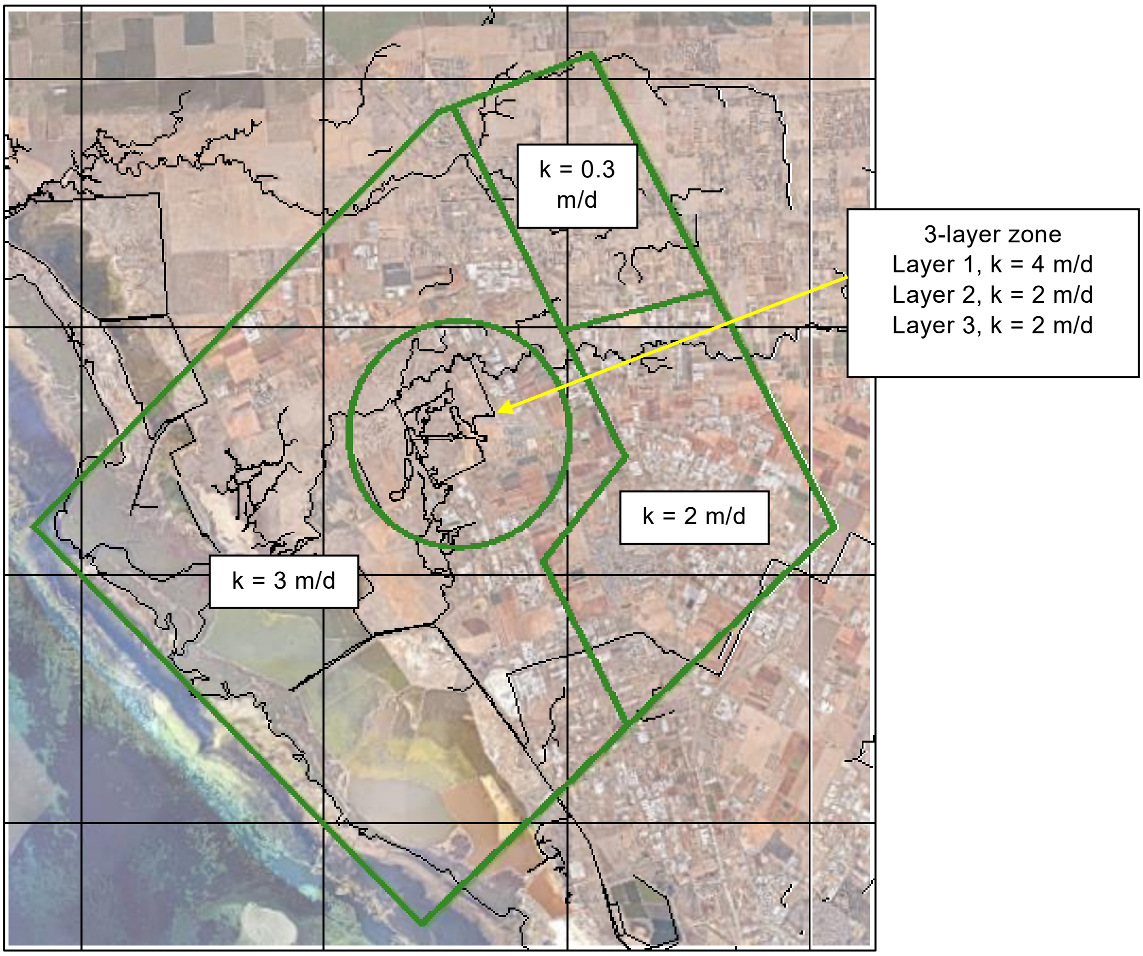
[9] The elevation used in the model is 0.9 m below the approximate general river bed elevation at the upgradient location. It is inferred that coarse permeable materials beneath the river may provide a preferential permeable pathway for groundwater to discharge from the main aquifer and be conveyed towards the coast.

It should be noted that the modelled distribution of hydraulic conductivity values represents a non-unique solution to the question of which distribution to use. The aim in this was to achieve an acceptable calibration against the recorded groundwater levels, remembering that the more important aim of the model is to simulate the pumping needed to achieve the required drawdown.

Figure 11. Modelled hydraulic conductivity distribution



3.6. Porosity and Storage Coefficients

Porosity and storage parameters were set uniformly across the model as follows:

- Porosity: 30%
- Specific yield (for unconfined conditions in Layer 1): 20%
- Confined zone storativity: 0.001

These parameters are not used in the steady-state model calibration but are used in the transient model simulations.

3.7. Vertical Inflows and Outflows

The baseline model does not simulate vertical inflows or outflows to the model, such as recharge, evapotranspiration, groundwater abstraction (other than for dewatering), or vertical flows between the base of the model and underlying strata. This approach is considered appropriate in the context of the objective of the modelling, which is to simulate relatively short-term effects of pumping, and is conservative in relation to simulating the influence of dewatering pumping on groundwater levels in the surrounding area.

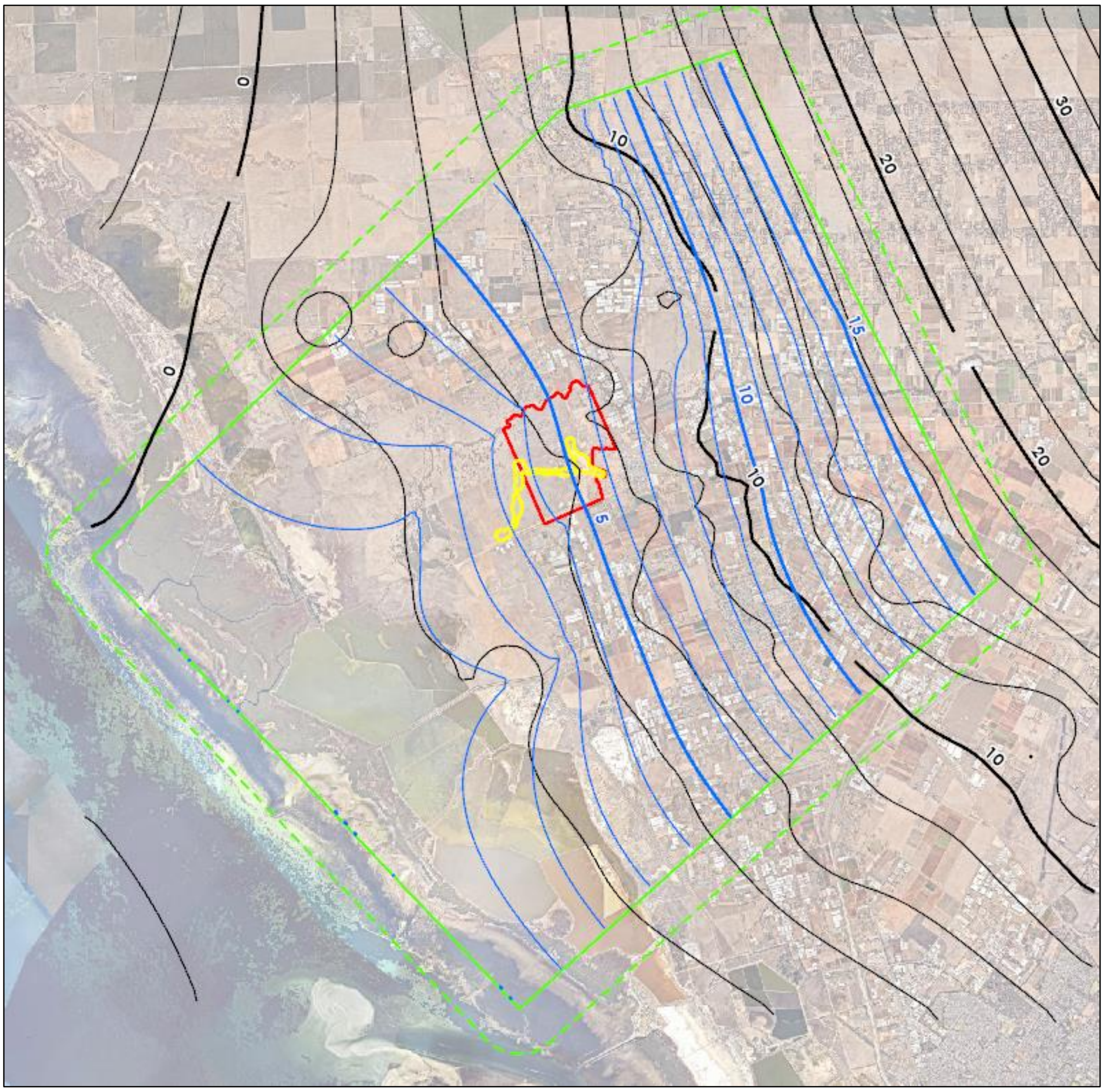
3.8. Steady-State Model

Anaqsim checked the following factors after the end of each iterative calculation to assess model convergence:

- Prescribed head conditions: deviations of modelled values are no more than 0.001 m
- Prescribed flow conditions: deviations of discharge per length are no more than 0.001 m^3/d

The simulated groundwater levels from the calibrated steady-state (average over time) model (blue contour lines) are shown in *Figure 12*, together with the interpolated contours for the period 2000 – 2024 (black contour lines) from *Figure 5*, which are based on recorded monitoring data.

Figure 12. Modelled and observed groundwater level contours (mAHD)



The differences between modelled and recorded groundwater levels at 106 wells within the model domain were checked during model calibration. *Figure 13* shows how the modelled and recorded groundwater levels compare and *Figure 14* is a map showing the differences for a selection of wells spread across the model domain. The average difference between modelled and observed water levels is 0.013 m and the root mean square error (RMSE) is 0.998 m.

Figure 13. Plot of modelled vs observed groundwater levels at 106 wells

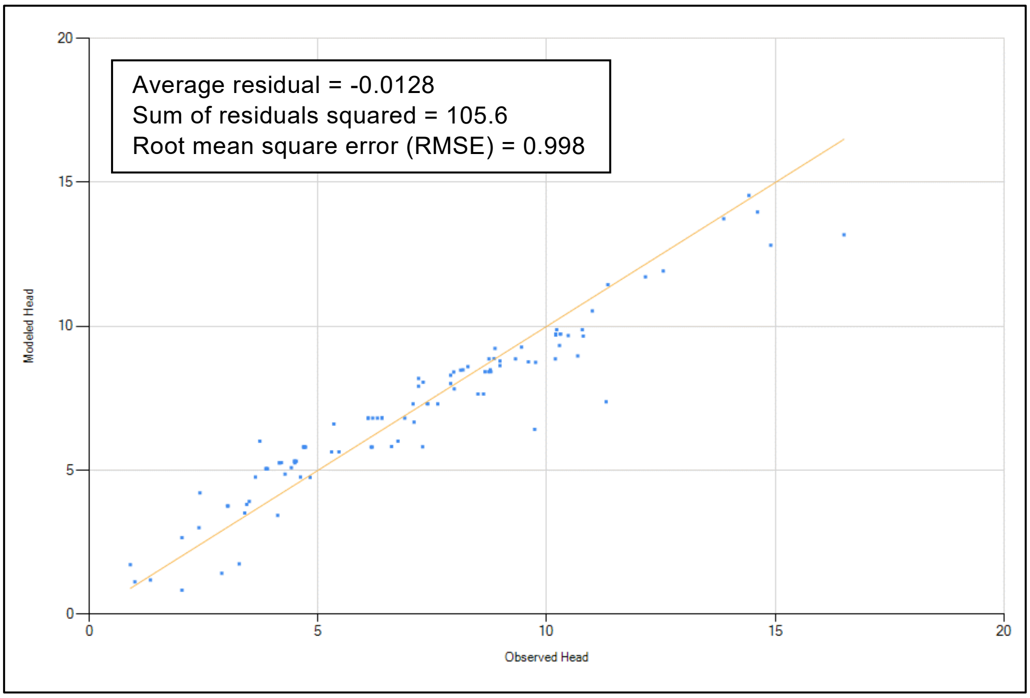
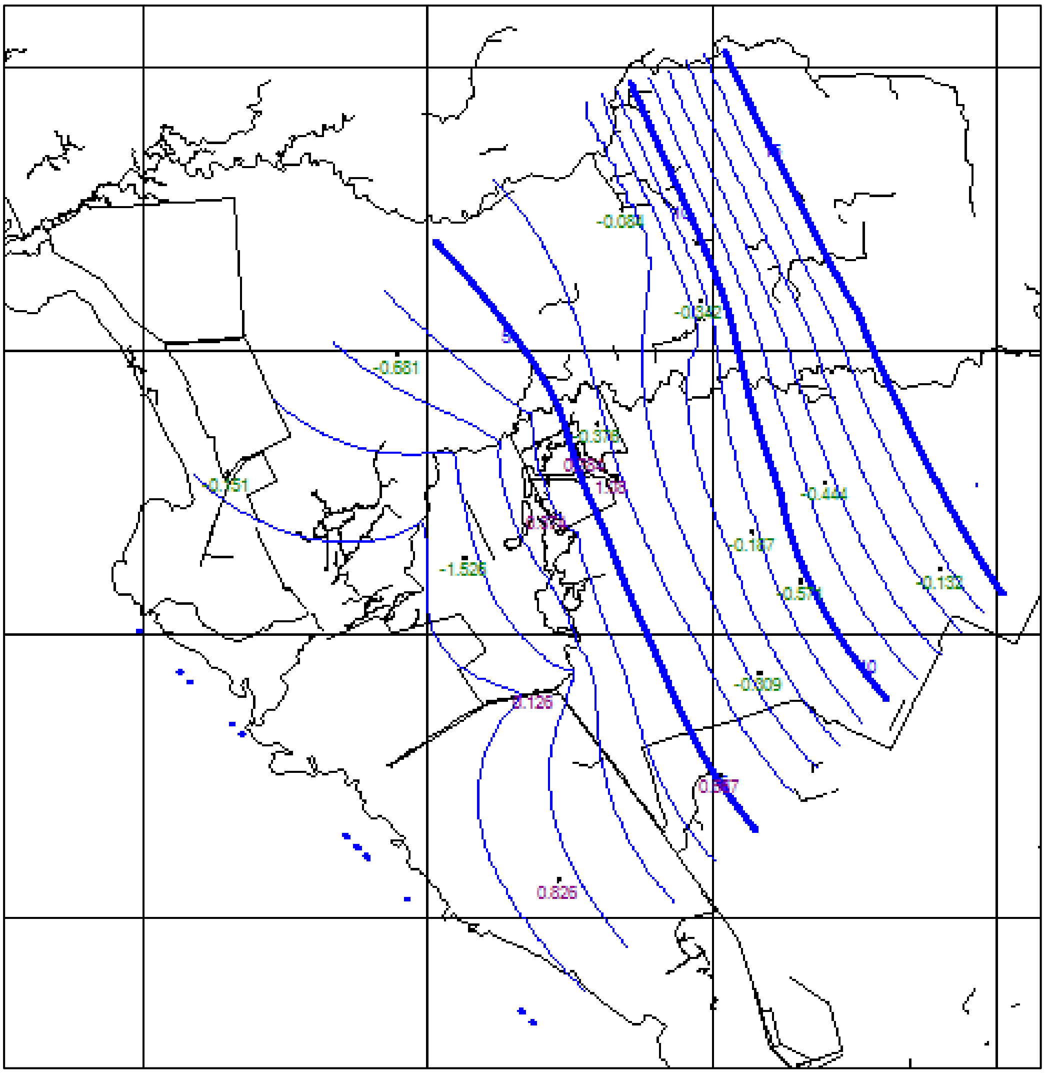


Figure 14. Differences between modelled and recorded groundwater levels



The water balance for the calibrated baseline model is shown in *Table 4*.

Table 4. Baseline steady-state model water balance

Flow location	Flow rate (m^3/d)	
	Inflow to model	Outflow from model
Inflow from northeast (upgradient)	522.9	-
Southwest (coast) flow to fixed head	-	91.3
Flow to or associated with Gawler River	-	215.7
Flow to or associated with Thompson Creek	-	215.8
Discharge across NW (no flow) boundary	<0.1	-
Discharge across SE (no flow) boundary	<0.1	-
TOTAL	522.9	522.8

3.9. Baseline Model Sensitivity

This section assesses the sensitivity of the baseline steady-state model to changes in some key assumptions and parameter values. *Table 5* lists the simulations conducted for sensitivity testing and comments on the effects of each one. *Table 6* provides a summary water balance for the baseline model and for the steady-state sensitivity test runs, and *Figure 15* shows groundwater level contours across the model domain.

Table 5. Summary of model sensitivity testing for steady-state simulations

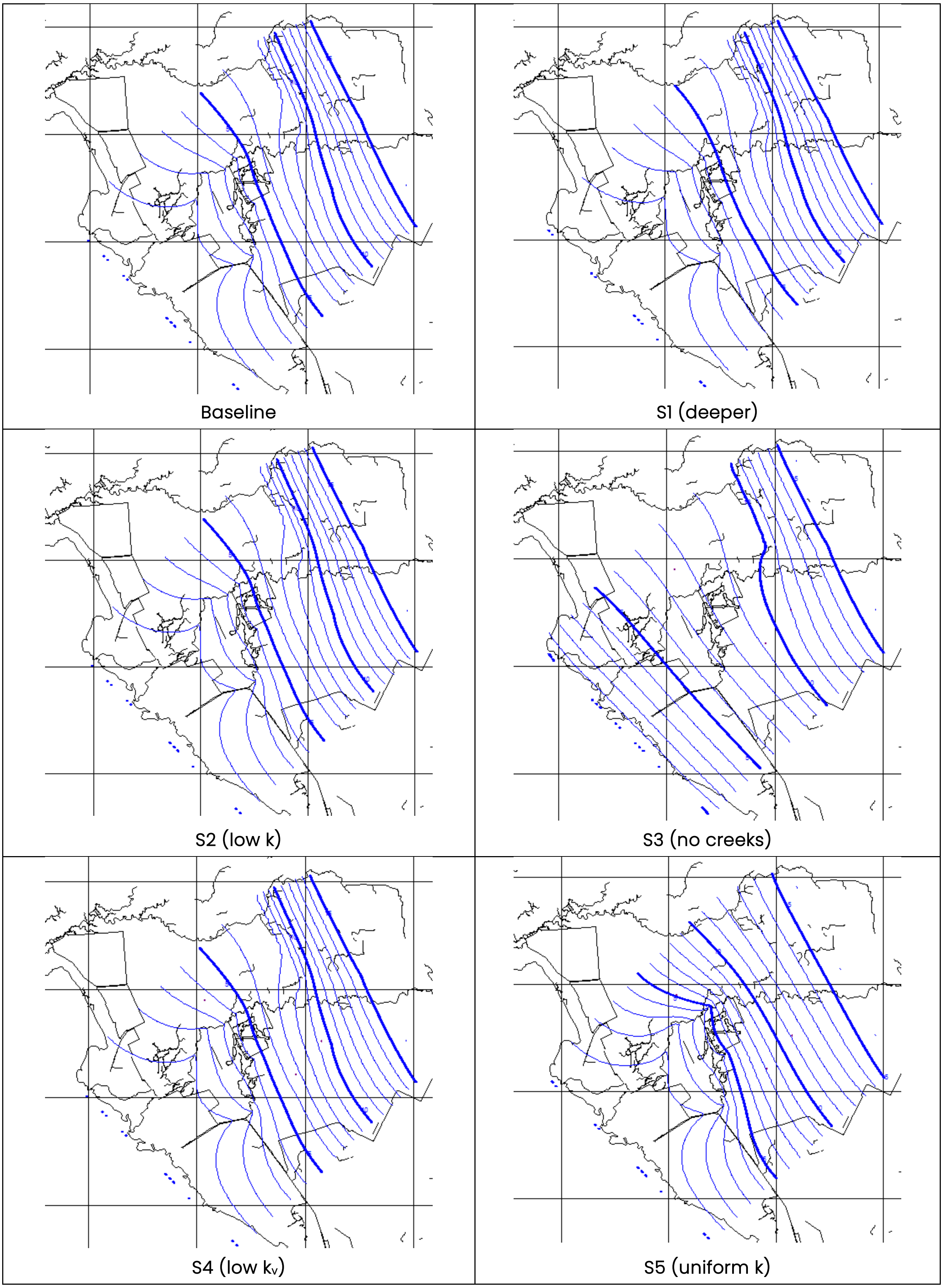
Run	Outline and comment
S1 (deeper)	As baseline but with base of model changed from -6 mAHD to -15m AHD. This gives an approximate 20 m saturated thickness, which is what was adopted previously by REM/SKM and AGT in their modelling. The increased saturated thickness in the model increases the aquifer transmissivity, from the baseline typical value of 33 m^2/d in the vicinity of SWL1 up to 50 to 60 m^2/d. The simulated groundwater level contours are almost unchanged because they are controlled by the fixed head boundaries of the model (*Figure 15*). The simulated steady-state inflows and outflows are proportionately higher (*Table 6)* due to the higher transmissivity. For the same reasons, a simulation based on a thinner aquifer would have smaller inflows and outflows but would not change the steady-state groundwater levels.
S2 (low k)	As baseline but with all hydraulic conductivity values halved. The reduced hydraulic conductivity halves the aquifer transmissivity. The simulated groundwater level contours are almost unchanged because they are controlled by the fixed head boundaries of the model. The simulated steady-state inflows and outflows are halved due to the lower transmissivity. Similarly, a simulation based on higher hydraulic conductivities would have larger inflows and outflows but would not change the steady-state groundwater levels.
S3 (no creeks)	As baseline but without including the Gawler River and Thompson's Creek. The simulated groundwater levels are higher in most of the domain because the water has to flow all the way to the coast to discharge from the aquifer. The groundwater levels simulated in the central part of the model domain are too high (around 8.5 mAHD at SWL1). Because of the higher groundwater levels in the central part of the model, the NE boundary inflow is lower due to the smaller gradient.

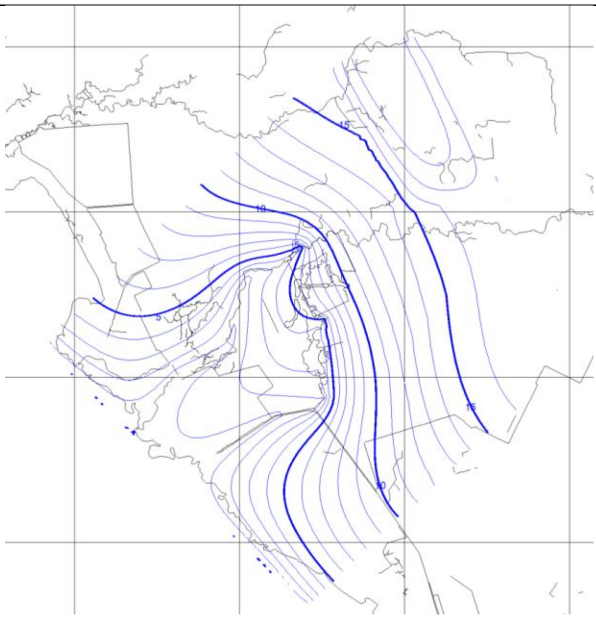
Run	Outline and comment
	Similarly, an intermediate change involving raising the modelled elevations of the creek beds would decrease the modelled creek flows and decrease the influence the creeks have on groundwater levels. Lowering the modelled elevations of the creek beds would increase their flows and their influence on groundwater levels.
S4 (lower vertical k)	As baseline but with vertical hydraulic conductivity reduced by a factor of 10. Because this is a steady-state simulation and the model boundaries are controlled by fixed heads and no-flow conditions, the simulated groundwater level contours are unchanged, as are the model inflows and outflows (which are horizontal).
S5 (uniform k in single layer zone)	As baseline but with the *k* value set to be uniform (3 m/d) across the entire domain. This was the starting point for the calibration process. The simulated groundwater levels near SWL1 are too high (around 7 mAHD) as are the groundwater levels across much of the domain, as can be seen in *Figure 16*. The average difference between modelled and observed water levels in this simulation was 1.7 m and the RMSE was 2.33 m.
S6 (recharge)	As baseline but with groundwater recharge applied uniformly at a rate of 2.7 x 10^{-5} m/d (10 mm/year), which is equivalent to approximately 2% of annual rainfall. The actual effective recharge rate is not known and may be very small due to the climate, the clayey soil and the interception and evapotranspiration of infiltrating water by vegetation. The resulting simulated groundwater levels near SWL1 are too high (around 9 mAHD) as are the groundwater levels across much of the domain (*Figure 16*). Due to the high groundwater levels the model has a net outflow of water across the northeast fixed head boundary. The average difference between modelled and observed water levels in this simulation was 4.7 m and the RMSE was 5.1 m. The results of this simulation therefore suggest that either the aquifer transmissivity must be quite a lot higher (which would not be consistent with the results of the pumping tests conducted on site and would also not be consistent with the observed geology, which is generally clayey) or the net rate of recharge to the shallow aquifer must be much smaller, for example due to low permeability soils and high evapotranspiration. Another factor that could cause net recharge to be low is if there is vertical leakage down from the base of the aquifer into deeper zones.

Table 6. Model water balance summary for steady-state sensitivity tests

Scenario	Inflows (m^3/d)		Outflows (m^3/d)				Flow balance (inflows – outflows) (m^3/d)
	from up-gradient	recharge	SW (coast)	Gawler River	Thompson Creek	leakage to deeper aquifers	
Baseline	522.9	-	91.3	215.7	215.8	-	<0.1
S1 (deeper)	813.5	-	184.7	329.9	298.7	-	<0.2
S2 (lower k)	261.4	-	45.7	107.8	107.8	-	<0.1
S3 (no creeks)	411.1	-	412.1	-	-	-	1.0
S4 (low k_v)	522.9	-	91.3	215.7	215.8	-	<0.1
S5 (uniform k)	905.2	-	116.0	442.0	350.3	-	3.1
S6 (recharge)	-315	3,991	710	1,593	1,391	-	18

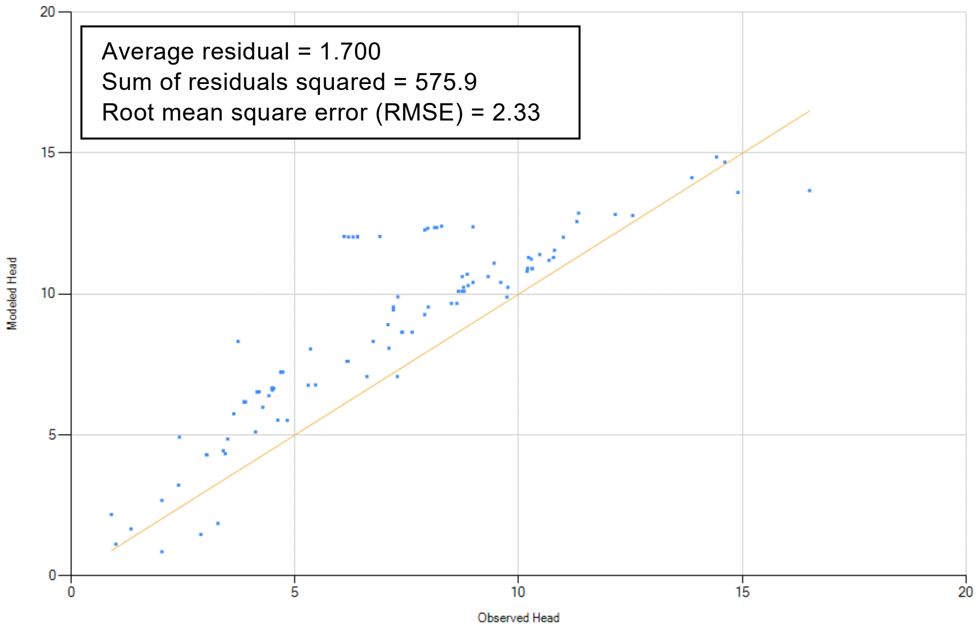
Figure 15. Steady-state groundwater levels (1 m intervals) for sensitivity test runs





S6 (with recharge)

Figure 16. Plot of modelled vs observed groundwater levels for simulation S5 (uniform k)



The results of the steady-state sensitivity testing are consistent with expectations based on how the model domain has been set up. The simulated groundwater contours are controlled primarily by the prescribed heads at the NE and SW boundaries of the model and along the Gawler River and Thompson's Creek. Modelled flows depend not only on the groundwater elevations and gradient but also on the transmissivity (hydraulic conductivity multiplied by saturated thickness). Because of the importance of transmissivity in determining flows, the model has been constructed so that the main area of interest near SWL1 uses the best available estimate of aquifer transmissivity, as obtained from the test pumping. Model sensitivity under transient conditions including pumping is discussed further in *Section 4.7*.

4. Groundwater Dewatering Model (SWL1, Bay 1)

4.1. Model Scenarios

Several model scenarios were run using the baseline model to assess and compare the potential effects of different dewatering configurations, using either wells or wellpoints (which could be installed either as lines of closely-spaced vertical wellpoints or as long horizontal wellpoints). The potential effects of re-infiltration of pumped groundwater after storage at the location of SWL2 was also assessed. The scenarios presented in this report are outlined in *Table 7*.

For all the initial dewatering simulations the model was set to run 20 timesteps covering a period of 30 days, with a timestep multiplier of 1.2 between each timestep and the next. The modelled steady-state groundwater levels were used as the initial heads for the transient simulations.

Table 7. Summary of model scenarios for dewatering Bay 1

Scenario	Outline
A	Dewatering using 9 wells around Bay 1
B	Dewatering using wellpoints (either closely spaced vertical or horizontal wellpoints) located outside the north, east and south sides of Bay 1. Extraction to a fixed head of zero mAHD.
C	Similar to Scenario B but with additional wellpoint lines extending across Bay 1
D	As Scenario C but including re-infiltration at 80% of the average pumping rate, at the location of SWL2.

4.2. Dewatering using Extraction Wells

One potential way to achieve the required dewatering could be to use extraction wells. Because they need to contain pumps and to be pumped before and during construction, the wells would need to be positioned outside the planned excavation area. Various model simulations were therefore run to explore the potential number and spacing of wells that may be needed around SWL1 Bay 1, and to assess the potential required pumping rates.

An example simulation (Scenario A) involved nine extraction wells (each of 0.15 m diameter) positioned around the edges of Bay 1 as indicated in green on *Figure 17*, which also shows the simulated groundwater level contours around Bay 1 at 0.2 m intervals after 30 days of pumping. The nine wells were each set to draw the groundwater level from model Layer 3 down to a fixed head of -2.5 mAHD. The simulated average initial pumping rate was approximately 80 m^3/d per well (combined rate 720 m^3/d), which decreased to 67 m^3/d per well by the end of 30 days (combined rate 600 m^3/d).

The modelled drawdown in groundwater level after 30 days is shown in *Figure 18* and the changes in groundwater level over time along the two purple section lines of *Figure 17* are shown in *Figure 19*. The results show gradually increasing drawdown of groundwater levels. However, after 30 days the groundwater level beneath the middle part of Bay 1 (along the section line) is still around 4 mAHD. Drawdown to the required level of 0.5 mAHD would therefore take considerably longer and may not be practically achievable with this number of wells. Because the model used fixed heads at the wells, planning simply to increase the pumping rates would likely not be achievable, as pumping rates would be limited by the transmissivity of the surrounding formation.

Figure 17. Simulated groundwater levels after 30 days, Scenario A

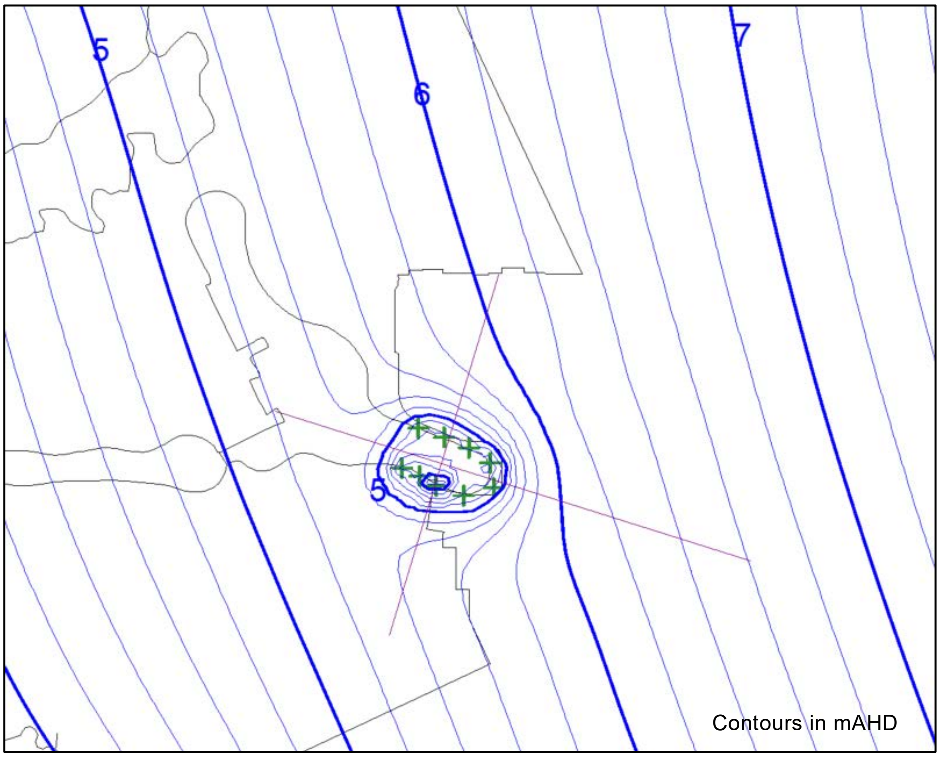


Figure 18. Simulated drawdown after 30 days, Scenario A

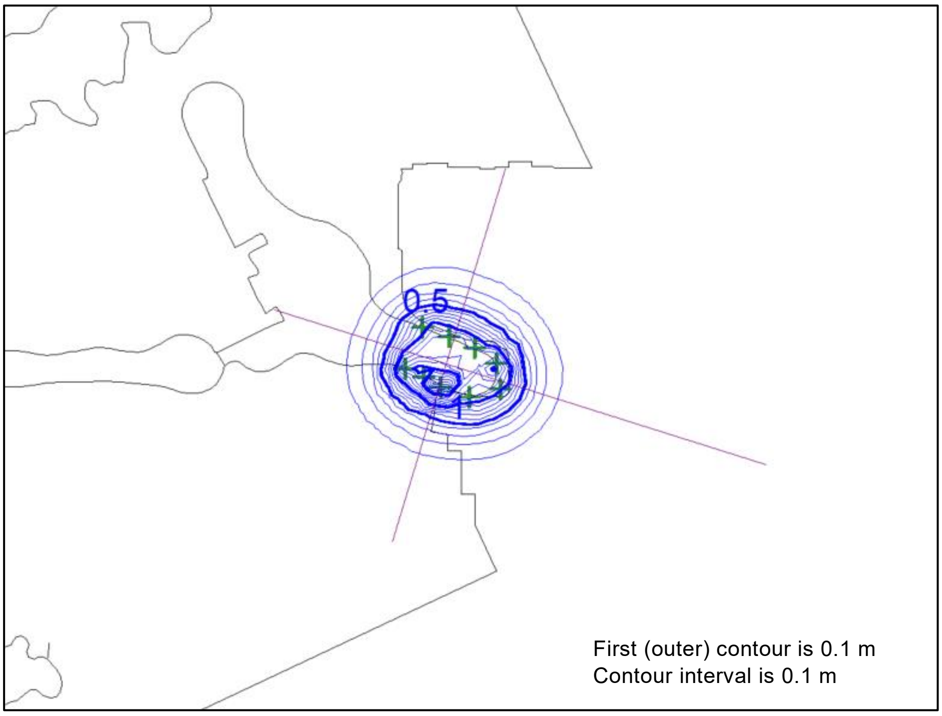
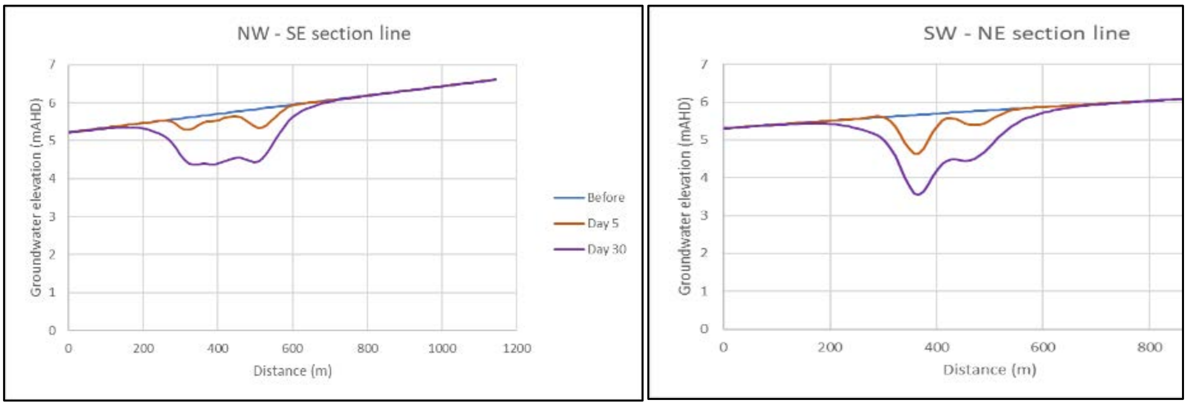


Figure 19. Cross sections of groundwater levels at different times, Scenario A



These results therefore suggest that to achieve the required drawdown using wells would require a much larger number of wells. Also, given the width of SWL1, wells around the edges may not be able to achieve sufficient drawdown in the central part due to the potential for upward flow (depending on the permeability profile and hydraulic connectivity of permeable layers).

Based on the above and on the results of other similar model simulations, it was concluded that dewatering using wells that are relatively widely spaced may not be practicable and that dewatering using wellpoints should be investigated as a potentially better approach.

4.3. Dewatering using Wellpoints outside Bay the Lake Footprint

Dewatering using wellpoints can be a practicable and cost-effective approach at sites where the ground conditions and hydrogeology are suitable. This can include sites with layered soils of variable permeability, such as Riverlea. Wellpoints can either be vertical, in which case they typically need to be closely spaced (e.g. 1 to 2 m spacing in clean sand or 1.5 to 3 m spacing in silty sand), or horizontal, in which case they can be installed either by trenching or by directional drilling. Water can be extracted from multiple wellpoints connected by a header pipe to a specialist vacuum pump mounted on the ground surface or in a sump. The maximum drawdown of groundwater level below the pump can be 5 to 6 m in sandy gravels and fine sands but less (e.g. 4 m) in silty sands. For larger depths, two or more stages of dewatering are required. The depth of dewatering required at Riverlea SWL1 is approximately 4 m, therefore a single stage of wellpoints may be able to achieve the required dewatering.

An advantage of wellpoints compared to dewatering using a small number of deeper extraction wells is that wellpoints spread the extraction more widely, rather than requiring water to flow further towards a small number of extraction points. Wellpoints also intersect much more of the natural geology and so can deal better with variable ground conditions.

Various model simulations were run to explore the potential configuration of wellpoints that may be needed around Bay 1 and to assess potential extraction rates. In each case the wellpoints were simulated as horizontal linear features, rather than as large numbers of point extractions. This simplification makes the modelling practicable and is appropriate given that the intention of the wellpoints would be to create approximately constant drawdown along each line of wellpoints, whether the wellpoints are vertical or horizontal.

A separate engineering assessment is recommended to check the feasibility and practicability of dewatering the site using wellpoints, taking into account geotechnical and engineering considerations as well as cost and the availability of appropriate equipment and contractors.

Initial simulations were based on having wellpoints only around the edges of the excavation. *Figure 20* shows simulated groundwater level contours at 0.5 m intervals at 30 days after the start of pumping from wellpoints positioned around the north, east and south sides of Bay 1 (Scenario B). No wellpoints were positioned along the western side of Bay 1 because this area will need to be excavated for Bay 2. The modelled wellpoint lines are shown in green on the Figure. The wellpoints were set to extract water down to zero mAHD. The overall pumping rate in this simulation started at approximately 10,000 m^3/d then decreased to 3,000 m^3/d after 1 week and by 30 days was around 1,400 m^3/d. In reality, because the water level cannot be instantaneously drawn down within the wellpoints themselves, the overall extraction rate would likely be lower than simulated at the start and may decrease more gradually as dewatering proceeds.

The modelled drawdown in groundwater level after 30 days is shown in *Figure 21*. Groundwater levels towards the centre of Bay 1 are simulated to drop to approximately 1.5 mAHD after 30 days of pumping, as shown in *Figure 22* for the cross-section lines shown in purple on Figure 20. Due to its distance from the wellpoint lines, the slowest drawdown occurs in the centre of the bay.

Figure 20. Groundwater levels after 30 days, Scenario B

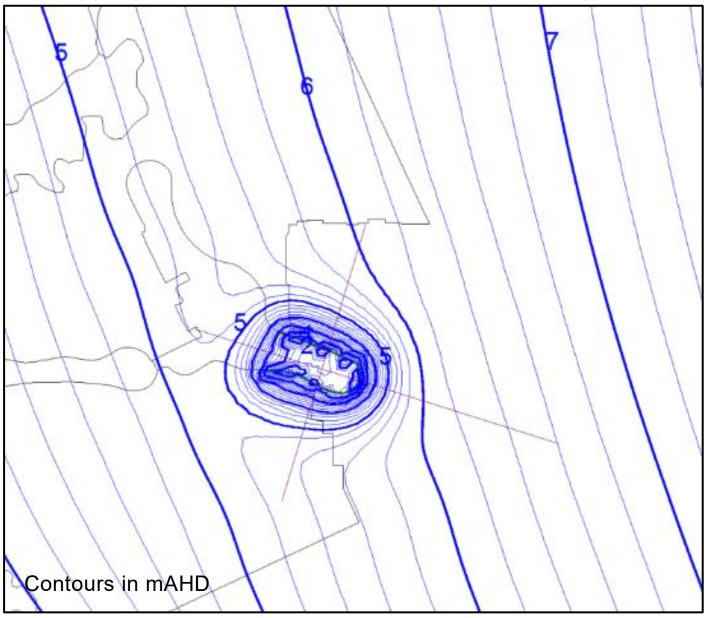


Figure 21. Simulated drawdown after 30 days, Scenario B

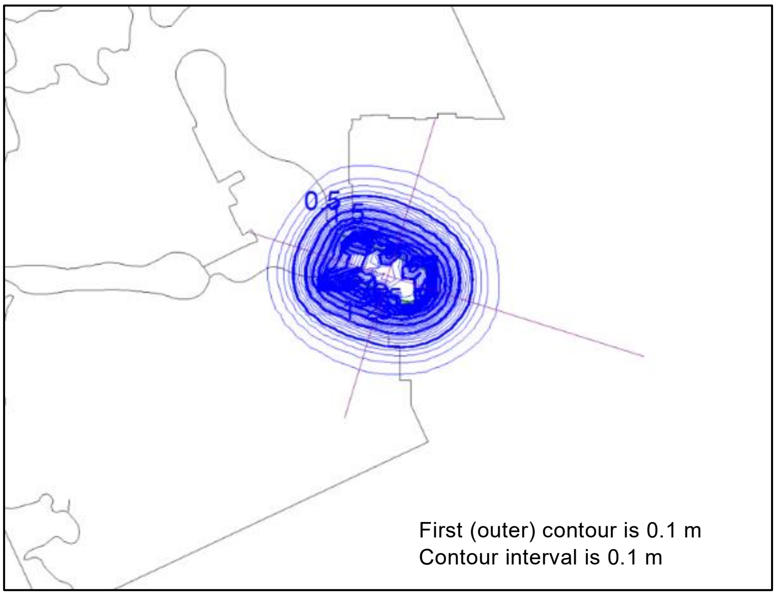
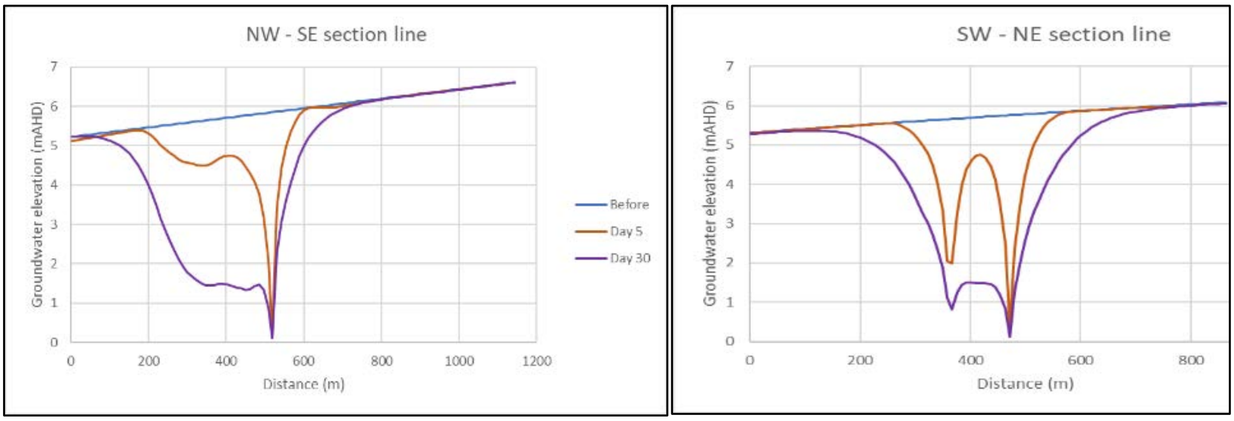


Figure 22. Cross sections of groundwater levels at different times, Scenario B



4.4. Dewatering using Wellpoints around and beneath the Lake Footprint

Based on the above, additional model simulations were undertaken to assess the benefit of installing additional wellpoints within the footprint of Bay 1. If this approach is taken, it is assumed that the wellpoints and associated pipework would remain in place beneath the basal liner of SWL1 and that the extraction pumps would be located outside the footprint of Bay 1. This would allow dewatering to continue while the lining system is constructed and while the coffer dam is installed between Bays 1 and 2. Depending on engineering and other factors, it may also be possible for the wellpoints and associated connections to remain in place in the longer term beneath the lake, which may be helpful if they are needed again for contingency pumping for some reason.

Because further excavation, and potentially liner construction, will need to take place near to and above any wellpoints that are installed within the footprint of Bay 1, it is provisionally considered that horizontal wellpoints may be best in this area, even if closely spaced vertical wellpoints are used around the edges of the excavation area. The length of Bay 1 (approximately 280 m from northwest to southeast) is likely too long for a central line of wellpoints along its entire length to be pumped using a single pump. The conceptual design adopted for model simulations therefore involves a combination of wellpoints positioned outside the edges of Bay 1 together with shorter wellpoints lines crossing the width of Bay 1. These wellpoint lines are assumed to extract only from beneath the central area of the bay, where the bed of the lake will be flat, and not from beneath the sloped edges of the lake. This will help simplify the installation. It is assumed the pumps would be located outside the lake footprint and that buried pipes would be installed to connect the pumps to the wellpoint lines. It is recommended that an engineering assessment is undertaken to make sure the wellpoints and connecting pipes are designed and protected in a way that allows all the lake construction works to proceed as planned without reducing the operability of the wellpoints.

The configuration illustrated in *Figure* 23 (Scenario C) was able to approximately simulate the required drawdown in groundwater levels after 30 days of pumping. This configuration includes wellpoint lines along the north, east and south edges of Bay 1 together with four wellpoint lines crossing the bay at intervals of around 70-80 m. The modelled wellpoint lines are shown in orange on the Figure. The wellpoints were assumed to extract only from Layer 1 of the model (i.e. down to -1 mAHD) with the groundwater level in the wellpoints set to zero mAHD.

Figure 23. Bay 1 wellpoint configuration including within bay (Scenario C)

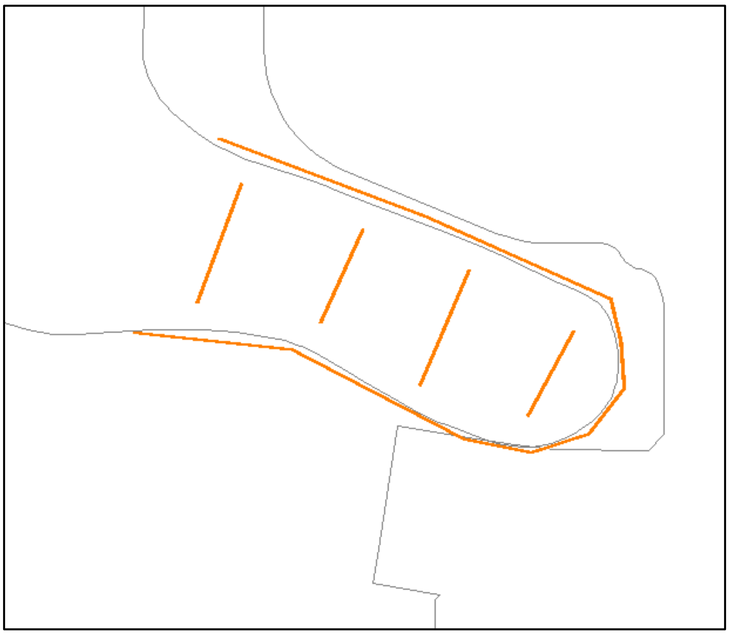


Figure 24 shows the simulated groundwater levels in Layer 1 after 30 days, while *Figure* 25 shows the drawdown at 30 days and *Figure 26* show the changes in groundwater level along the two cross-section lines shown on *Figure* 24. The overall pumping rate in this simulation started at over 15,000 m^3/d then decreased to around 3,200 m^3/d after 1 week and by 30 days was around 1,300 m^3/d. The simulated total volume pumped during the 30 days was close to 91,000 m^3.

Figure 24. Groundwater levels after 30 days, Scenario C

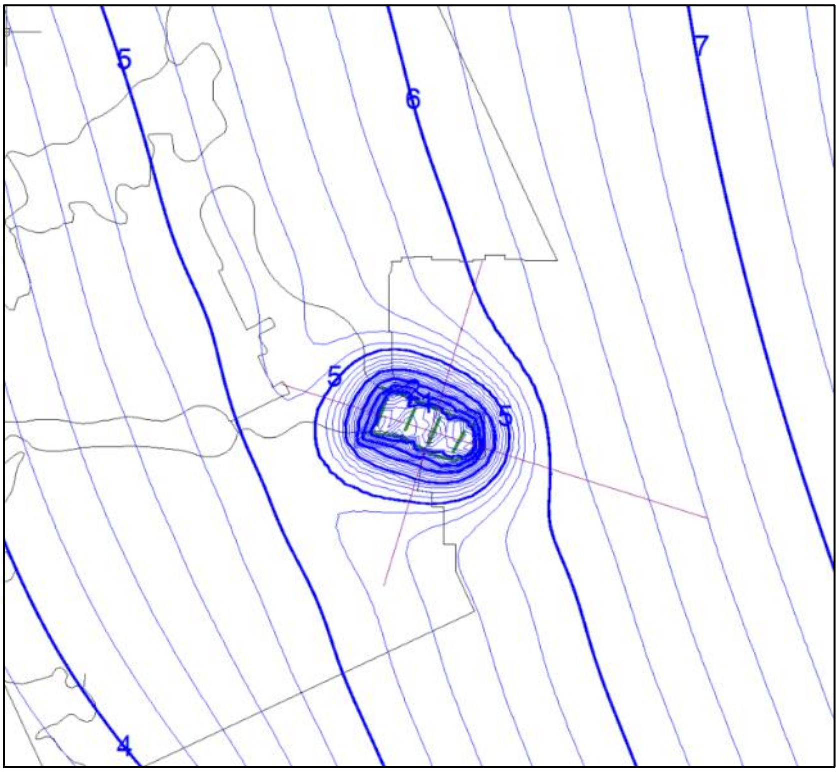


Figure 25. Simulated drawdown after 30 days, Scenario C

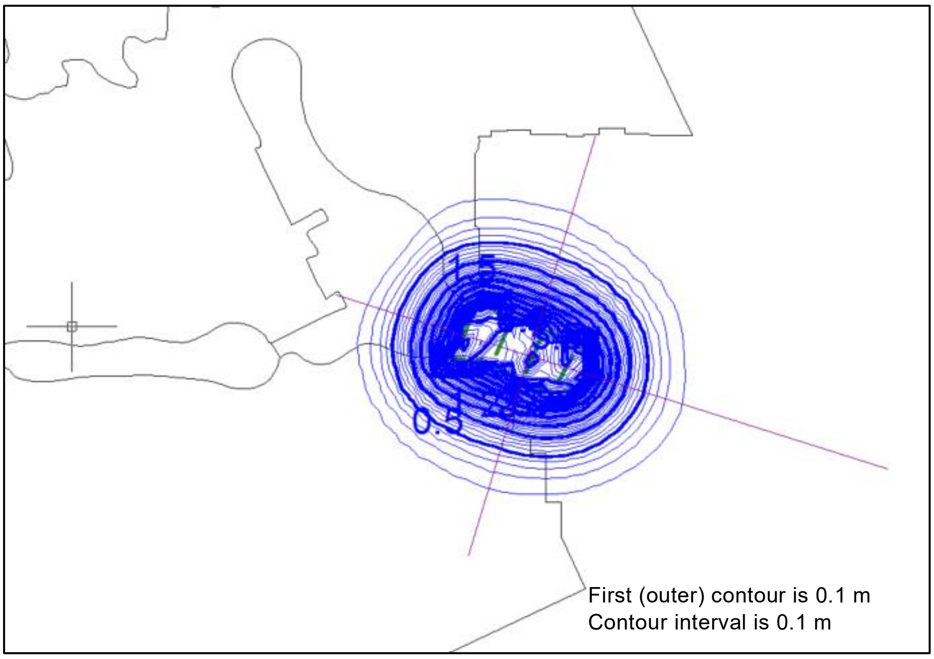
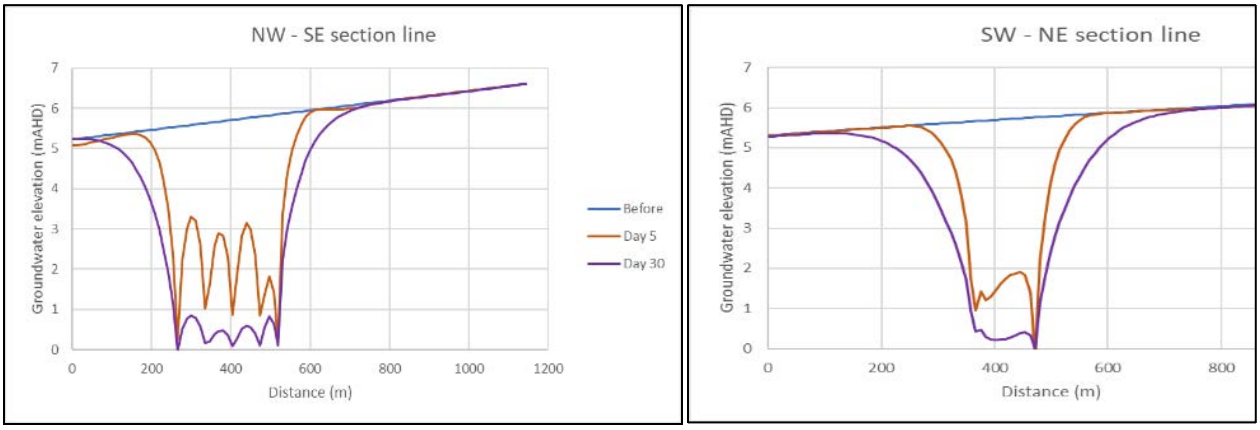


Figure 26. Cross sections of groundwater levels at different times, Scenario C



4.5. Model Water Balance

Table 8 provides a summary water balance for the baseline model (steady state) and for scenarios A, B and C, each after 30 days. The data in the table illustrate:

- For the steady state baseline, the inflows match the outflows (as expected for steady state).
- The inflows and outflows from the model boundaries are the same for the three transient simulations as they are for the steady state baseline model. This gives confidence that the model boundaries are not too close to SWL 1.
- The simulated outflows to the river and the creek are unchanged by the dewatering (note that these simulated outflows should be considered to include water lost by evaporation from low-lying ground in the vicinity of the creeks and by evapotranspiration, as well as water that discharges towards the coast via the creek lines (whether as surface water or as groundwater within granular deposits within the creek bed).
- The water removed by the wells and wellpoints is being derived entirely from local dewatering in the vicinity of SWL1 (i.e. it is water that has come out of storage).

Table 8. Model water balance summary after 30 days pumping

Scenario	Inflow from NE (m^3/d)	Outflows (m^3/d)					Change in storage (m^3/d)
		Coast	Gawler River	Thompson Creek	Wells	Wellpoints	
Baseline (steady state)	523	91	216	216	0	0	0
A (30 days)	523	91	216	216	599	0	-599
B (30 days)	523	91	216	216	0	1374	-1374
C (30 days)	523	91	216	216	0	1279	-1279

4.6. Addition of Infiltration from Storage of Pumped Water

As noted in Section 2.2, water pumped for dewatering purposes during construction of Bay 1 will be transferred to the location of SWL2 for storage. Some of the water may be used for dust suppression. Some of the stored water will infiltrate back into the shallow groundwater. It is therefore important to assess whether the re-infiltration might create a groundwater mound that adversely affects the dewatering.

A model simulation (Scenario D) was therefore run based on Scenario C, but including re-infiltration at SWL2 at a rate of 2,420 m^3/d, which is 80% of the average pumping rate of approximately 3,000 m^3/d determined from Scenario C. The re-infiltration in the model is applied uniformly along the centreline of the footprint of SWL2 (see *Figure 2*). Groundwater contours at 0.2 m intervals after 30 days are shown in *Figure 27* and the change in groundwater levels over time for the NW-SE cross-section through Bay 1 is shown in *Figure 28*.

Figure 27. Groundwater levels after 30 days, Scenario D

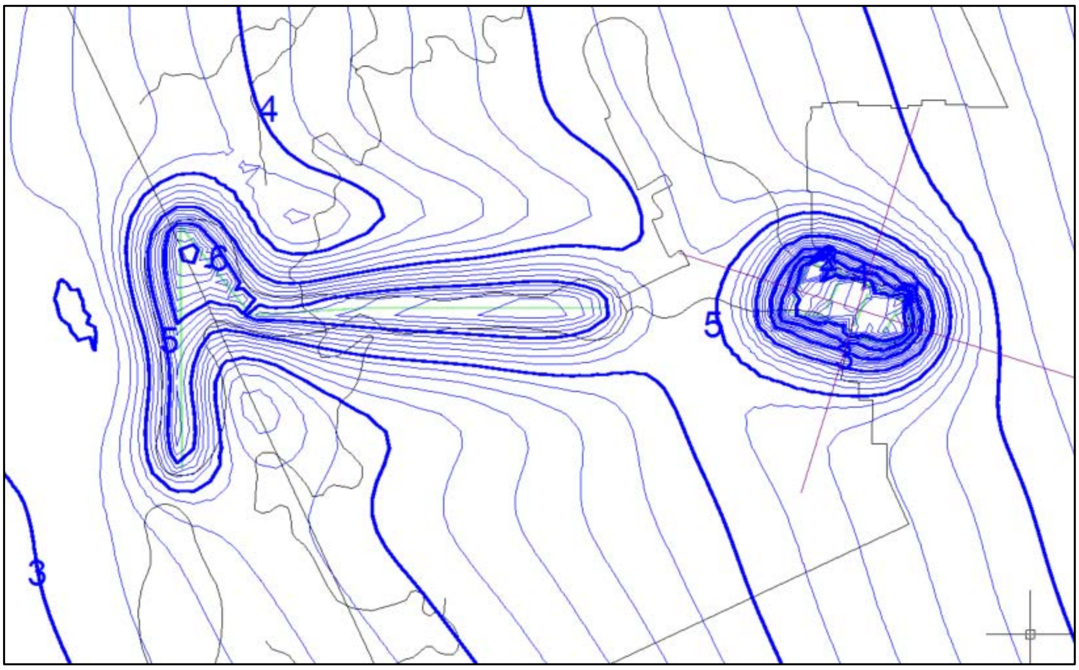
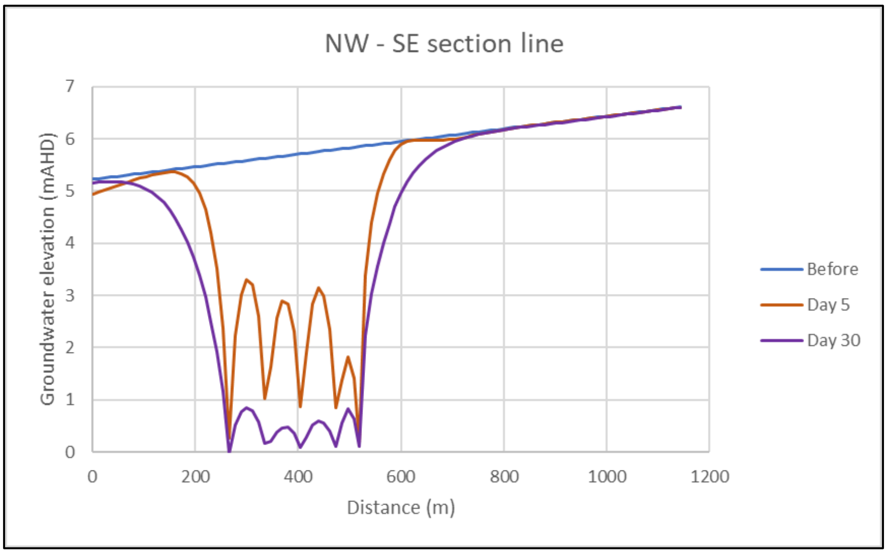


Figure 28. NW-SE cross section of groundwater levels at different times, Scenario D



As in Scenario C, the simulated total volume pumped during the 30 days was close to 91,000 m^3. The total had not increased due to the re-infiltration, indicating that it was occurring far enough from Bay 1 not to influence conditions there over the 30-day timescale. However, if dewatering of the western part of Bay 2 is to be undertaken at the same time as storage of pumped water in the footprint of SWL2, it may be advisable to create a temporary coffer dam within the SWL2 footprint in order to keep the stored water further away in the western part of the SWL2 footprint, so that it is not too close to the zone being dewatered.

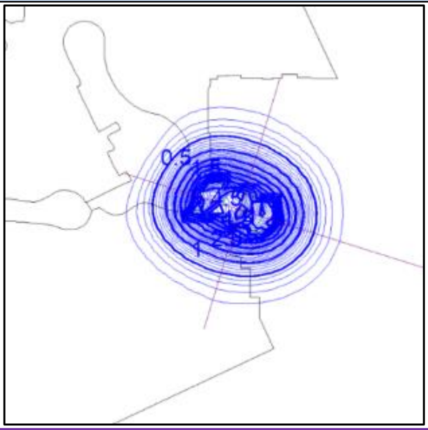
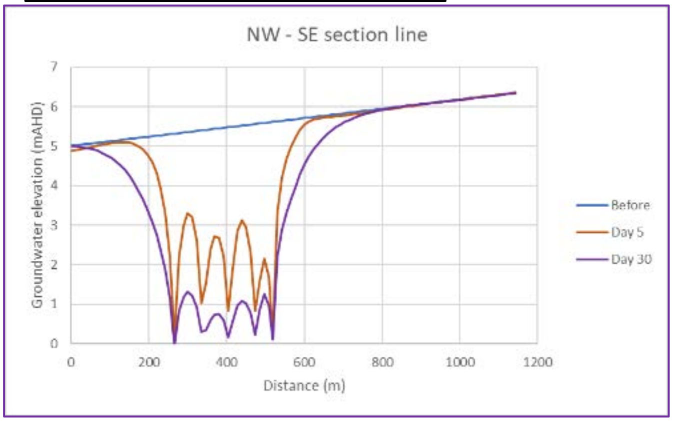
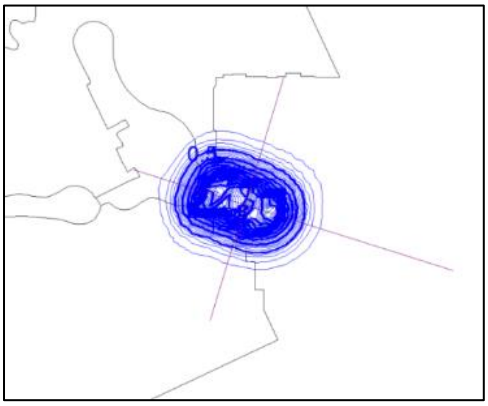
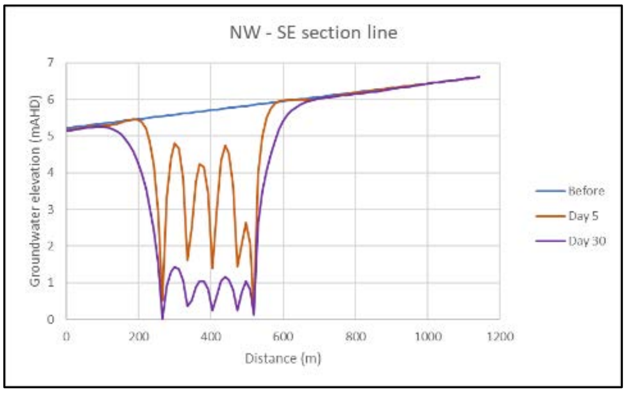
4.7. Transient Model Sensitivity

This section assesses the sensitivity of the transient model to changes in key assumptions and parameter values that are relevant to transient simulations. This builds from the steady-state sensitivity testing in *Section 3.9.*

Table 9 lists the transient simulations conducted for sensitivity testing and comments on the effects of each one. The effects of the transient sensitivity tests were considered by reference to Scenario C and for a modelled time of 30 days after the start of dewatering. *Table 10* provides a summary water balance for the Scenario C and for the transient sensitivity test runs.

Table 9. Summary of model sensitivity testing for transient simulations

Run	Outline and comment
T1	As Scenario C but with base of model changed from -6 mAHD to -15m AHD. This gives an approximate 20 m saturated thickness at the location of SWL1, which is what was adopted previously by REM/SKM and AGT in their modelling. This tests the same change as in steady-state sensitivity run S1. Drawdown contours at 0.1 m intervals for this run are provided below for comparison with *Figure 25* for Scenario C. Also below is the groundwater level plot vs time for the NW-SE section line, for comparison to the left part of *Figure 26*. As in Scenario C, the required drawdown is close to being met after 30 days, although the simulated pumping rate is approximately 25% higher due to the increased transmissivity. As in Scenario C, the pumped water is drawn entirely from storage (not from the model boundaries).

Run	Outline and comment
	 
T2	As Scenario C but with but with all hydraulic conductivity values halved, thus halving the aquifer transmissivity. This tests the same change that was tested using steady-state sensitivity run S2. Graphical output for this run is provided below. As in Scenario C, the required drawdown is close to being met after 30 days. The pumping rate is 26% lower due to the lower transmissivity and as in Scenario C, the pumped water is drawn almost entirely from storage. Because of the lower transmissivity, the radius of influence of pumping is lower for any given drawdown or time. This results in steeper hydraulic gradients near the pumping locations. Conversely, if the transmissivity is higher than modelled, this would result in higher pumping rates for any given drawdown and a wider zone of influence.  
T3	As Scenario C but with vertical hydraulic conductivity reduced by a factor of 10. This tests the same change that was tested using steady-state sensitivity run S4. As with the steady-state test, this does not change the overall inflows and outflows to the model domain, however it reduced slightly the pumping rate required for dewatering.

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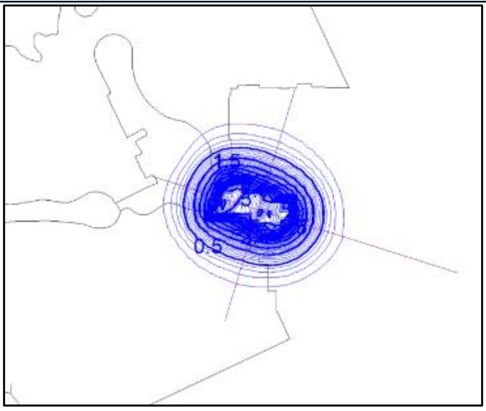
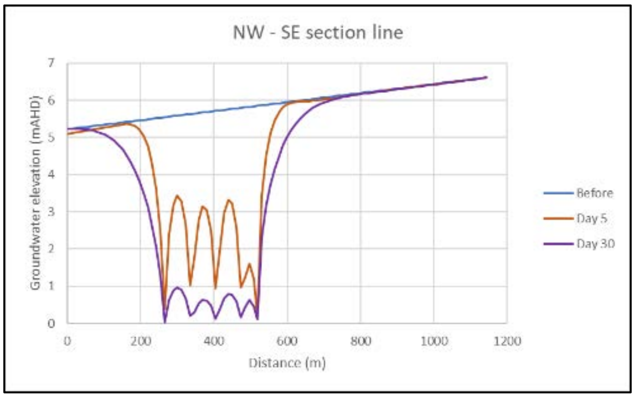
<tr><th>Run</th><th>Outline and comment</th></tr>
<tr><td></td><td>



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<tr><td>T4</td><td>
As Scenario C but with porosity increased from 30% to 35% and specific yield increased from 20% to 25%. Graphical output for this run is provided below.

The results are similar to those for Scenario C, although with pumping rates approximately 11% higher due to the higher specific yield. Similarly, if the specific yield is lower than modelled, the pumping rate required for the same drawdown would be smaller.

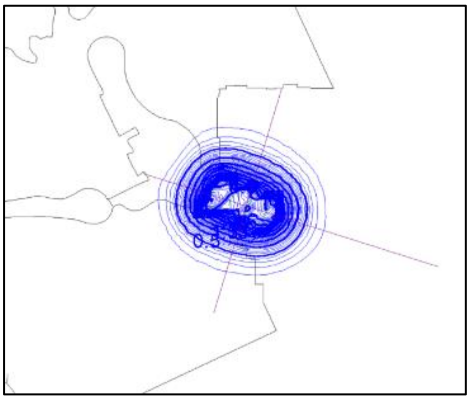
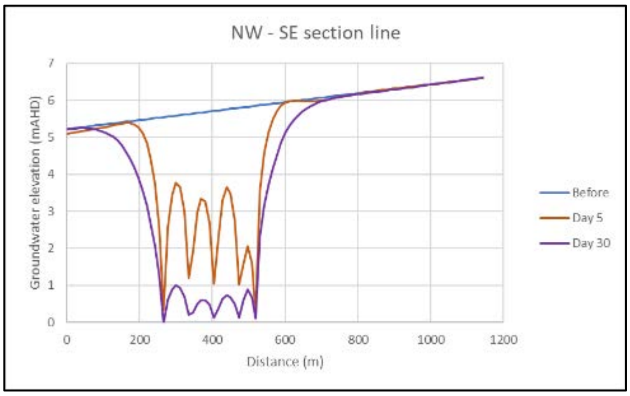

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Table 10. Model water balance summary after 30 days pumping for transient sensitivity tests

Scenario	Inflow from NE (m^3/d)	Outflow rates (m^3/d)				Change in storage (m^3/d)
		Coast	Gawler River	Thompson Creek	Wellpoints	
C	523	91	216	216	1279	-1279
T1 (deeper)	814	185	330	299	1601	-1601
T2 (low k)	261	46	108	108	945	-946
T3 (low k_v)	523	91	216	216	1243	-1243
T4 (higher S_y)	523	91	216	216	1432	-1432

Overall, the sensitivity testing indicates that transmissivity (combination of hydraulic conductivity and saturated thickness) is the most important parameter affecting the pumping rate for dewatering and the extent of influence of dewatering on the surrounding area. In the absence of site data across the modelled area, the baseline model incorporates a simplified geology and permeability distribution that has an overall transmissivity at SWL1 equivalent to the average transmissivity interpreted form the pumping tests. The adopted approach is conservative in that it assumes hydraulic conductivity is the same vertically as horizontally. In reality, the average vertical hydraulic conductivity within the formation is likely to be much lower than the horizontal conductivity, meaning that dewatering may be more rapid and involve lower flow rates and smaller lateral influence than the model results suggest.

Heterogeneity in hydraulic conductivity and transmissivity may mean that dewatering will be easier and more rapid in some parts of the site than in others. Similarly, preferential flowpaths such as individual sand or gravel horizons may provide locally high flow rates that are balanced on a larger scale by lower flows from less permeable zones.

The model simulations do not take account of seasonal variability or of potential short-term fluctuations in groundwater level and dewatering flows that may occur during or following large storm events.

5. Groundwater Dewatering Model (SWL1, Bays 1 to 6)

5.1. Approach

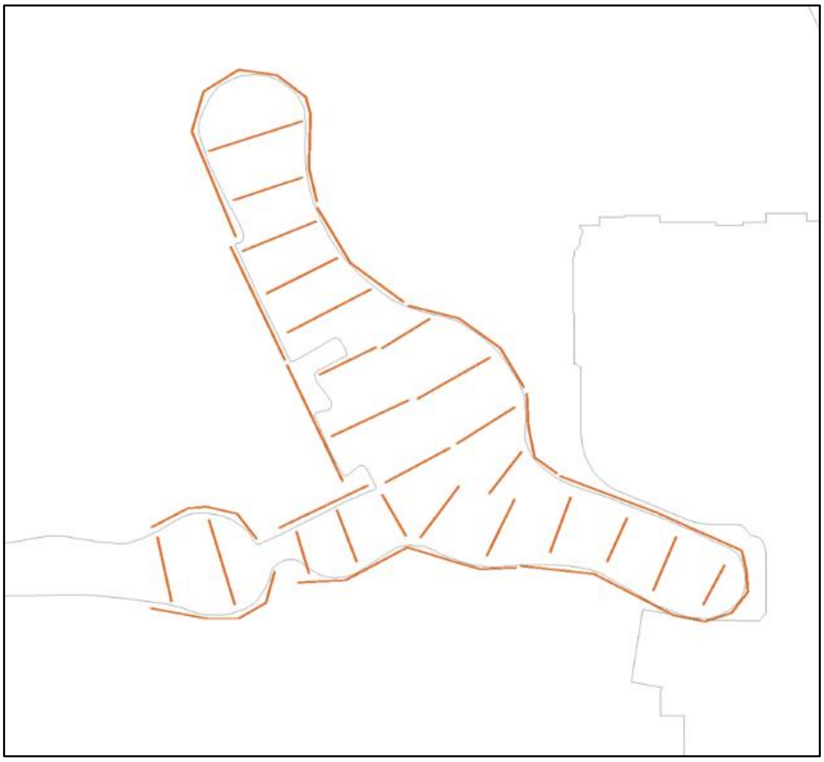
This section presents a model simulation of the dewatering required for construction of all six bays of SWL1, based on a preliminary construction timescale of 147 days as presented in *Table 11*, plus modelling of a further 750 days to simulate recovery of groundwater levels after cessation of pumping. The modelled steady-state groundwater levels were used as the initial heads for the transient simulation.

Table 11. Preliminary dewatering schedule for SWL1

Bay	Day number to start dewatering	Day number to stop dewatering
1	0	65
2	10	84
3	21	109
4	51	123
5	81	139
6	101	147

The approach to dewatering is assumed to be based on wellpoint lines (whether horizontal or vertical) installed both around the edges of the lake footprint and at intervals crossing beneath the floor of the lake, in the same way as discussed in the previous Section. The modelled layout of wellpoint lines is shown by the orange lines in *Figure 29*. The wellpoints are set in the model to draw the groundwater level down to zero mAHD.

Figure 29. Preliminary wellpoint configuration for SWL1



5.2. Results

The overall pumping rate in this simulation started at approximately 17,000 m^3/d across the first day and had additional peaks when pumping started for each new bay, but for most of the dewatering period was below 5,000 m^3/d as shown in *Figure 30*. The total pumping volume for the 147 days of dewatering was simulated to be approximately 436,000 m^3.

For comparison, the volume of water contained within 30% porosity across the lake area of 170,000 m^2 is approximately 51,000 m^3 per vertical metre. Dewatering of approximately 4.5 m thickness would therefore involve removal of a water volume of approximately 230,000 m^3, which is approximately 53% of the simulated volume pumped. The other 47% is from lowering of groundwater levels within the zone of influence of the pumping. The simulated boundary inflow and outflows and groundwater discharge associated with the creeks in this simulation were essentially unchanged from the modelled steady-state flows in the absence of dewatering.

Figure 30. Modelled pumping rate over time for SLW1

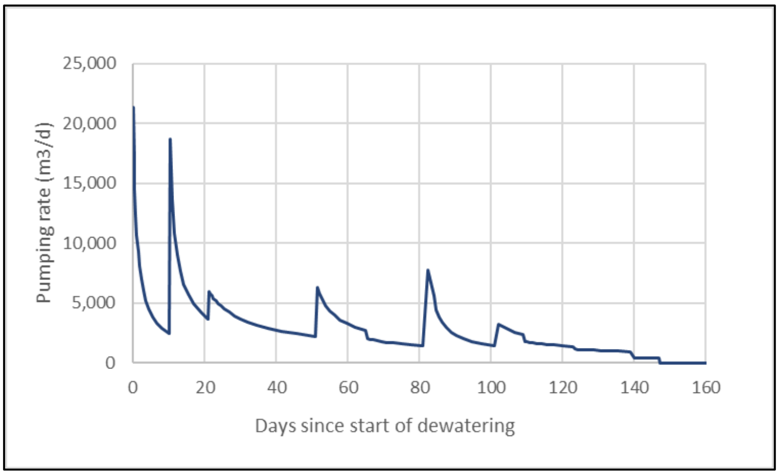


Figure 32 shows the simulated groundwater levels (1 m intervals) across the model domain at the end of the pumping period (147 days).

Figure 31. Modelled groundwater levels at end of pumping

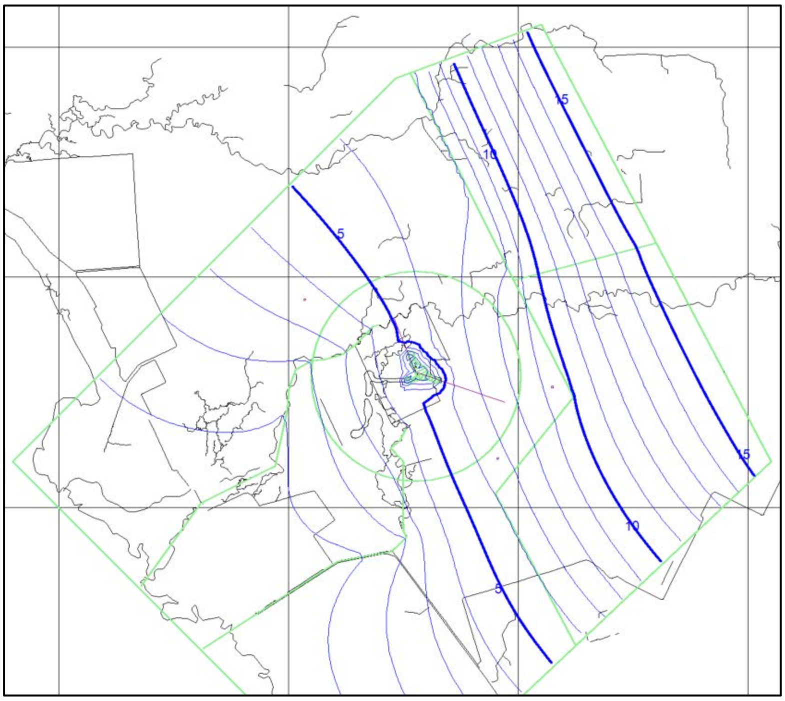
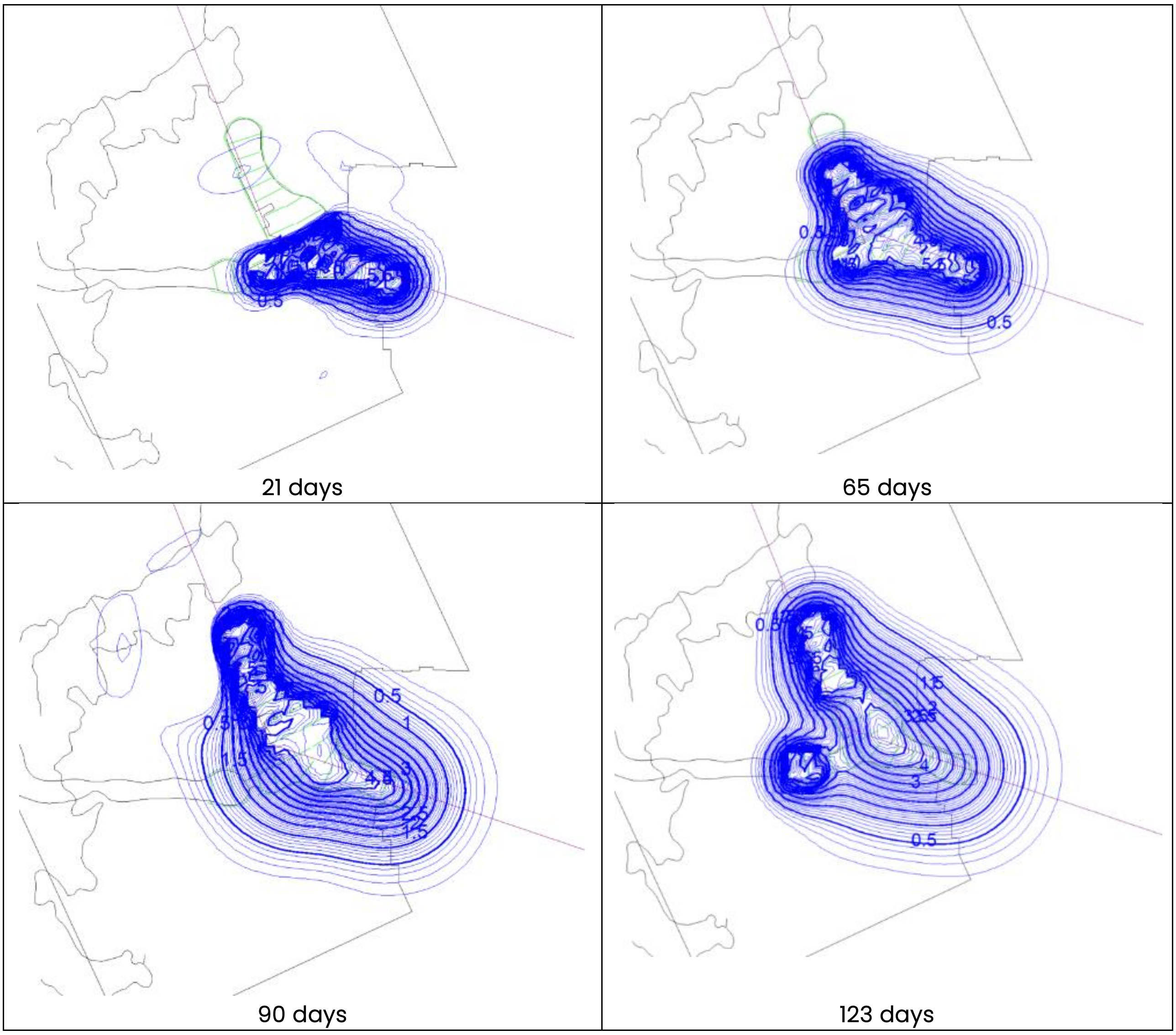
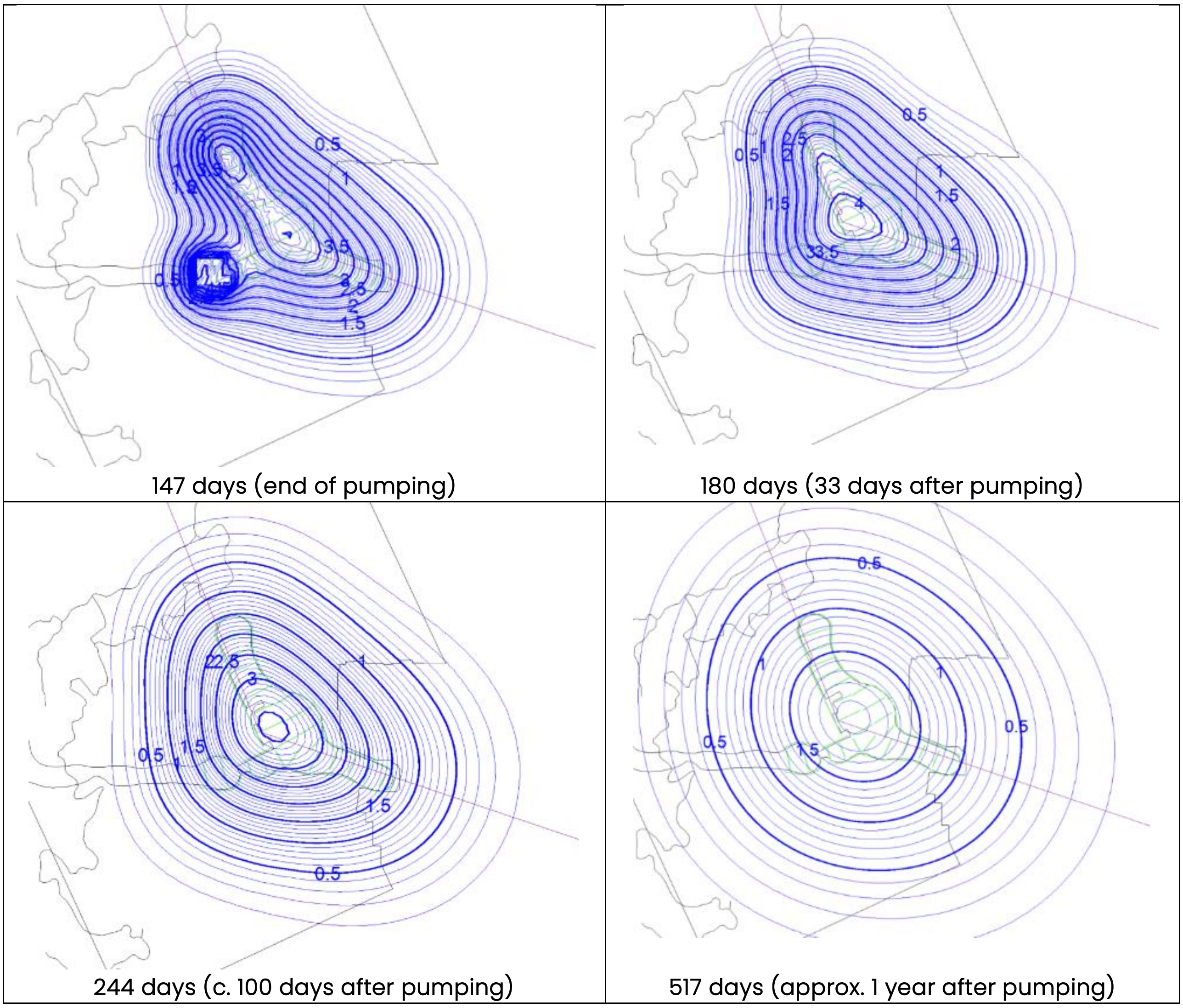


Figure 32 shows the simulated drawdown in groundwater level (0.2 m contour intervals) around SWL1 at various times during and after pumping. The areal influence of pumping is simulated to continue to increase for some time after cessation of pumping. This is because the local groundwater flow conditions at each location respond to the local hydraulic gradient, as pressures approach equilibrium and because it takes time for water to flow downgradient, as well as vertically up from deeper in the aquifer, to refill the pore space that became unsaturated during pumping. The timescale for recovery of groundwater levels will be less if there is significant groundwater recharge (by whatever means) or if there are preferential flowpaths for groundwater from below or from upgradient.

Figure 32. Modelled groundwater drawdown (m) at various times, SWL1





147 days (end of pumping)

180 days (33 days after pumping)

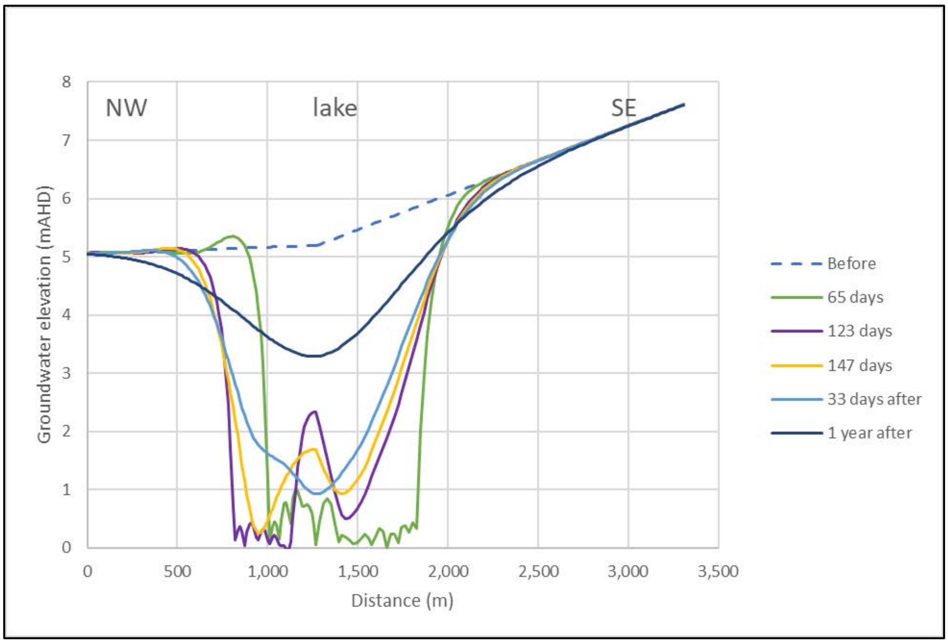
244 days (c. 100 days after pumping)

517 days (approx. 1 year after pumping)

Based on the above, the contour for 0.1 m drawdown is simulated to be within 500 m of SWL1 at the end of pumping and about 850 m from SWL1 at 1 year after cessation of pumping.

Changes in groundwater level over time for the cross-section line passing through SWL1 are shown in *Figure 33*. The cross-section also shows the modelled recovery of groundwater levels approximately 1 month and 1 year after cessation of pumping.

Figure 33. Cross sections of groundwater levels at SWL1 over time



The model was used to calculate the simulated drawdown in groundwater level at locations of the following three registered bores:

- 6528-141
- 6628-2275
- 6628-27168

The modelled drawdown at all three locations due to dewatering was less than 1 mm.

5.3. Delay Contingency Simulation

An additional simulation was run to assess the ptential effects of having to continue pumping for longer, such as could happen if construction works are delayed for some reason during dewatering. The simulation models a 3-month delay and assumes the delay will occur at possibly the 'worst' time, when Bays 1 to 4 are all being actively dewatered. The delay was implemented in the model by extending the period that according to *Table 11* would be planned to run from Day 51 (when pumping starts at Bay 4) to Day 65 (when pumping stops at Bay 1). The simulation assumes that instead of lasting 14 days, this period will last 104 days.

A chart of simulated pumping rate against time for this simulation is shown in *Figure 34* for comparison with *Figure 30* (no delay). The pumping rate gradually reduces during the period of the delay and the total additional volume of water pumped is approximately 126,000 m^3, which increases the pumped total to 554,000 m^3.

The simulated drawdown at the end of pumping (237 days) and 1 year later are shown in *Figure 35* with contours at 0.1 m intervals. The area of influence is larger than in the un-delayed scenario, due to the additional volume of water that has been pumped. However, the modelled drawdown at the three registered bores listed in the previous section (6528-141, 6628-2275, 6628-27168) again remained less than 1 mm in this simulation.

Figure 34. Modelled pumping rate over time for SLW1 (including 90 day delay)

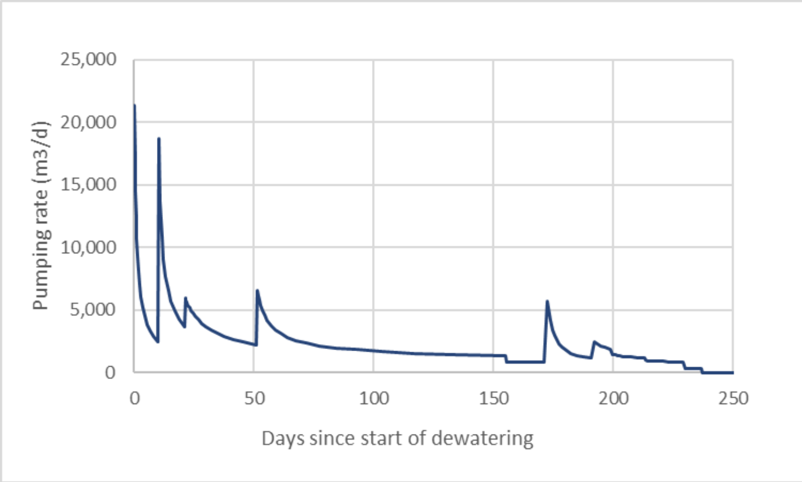
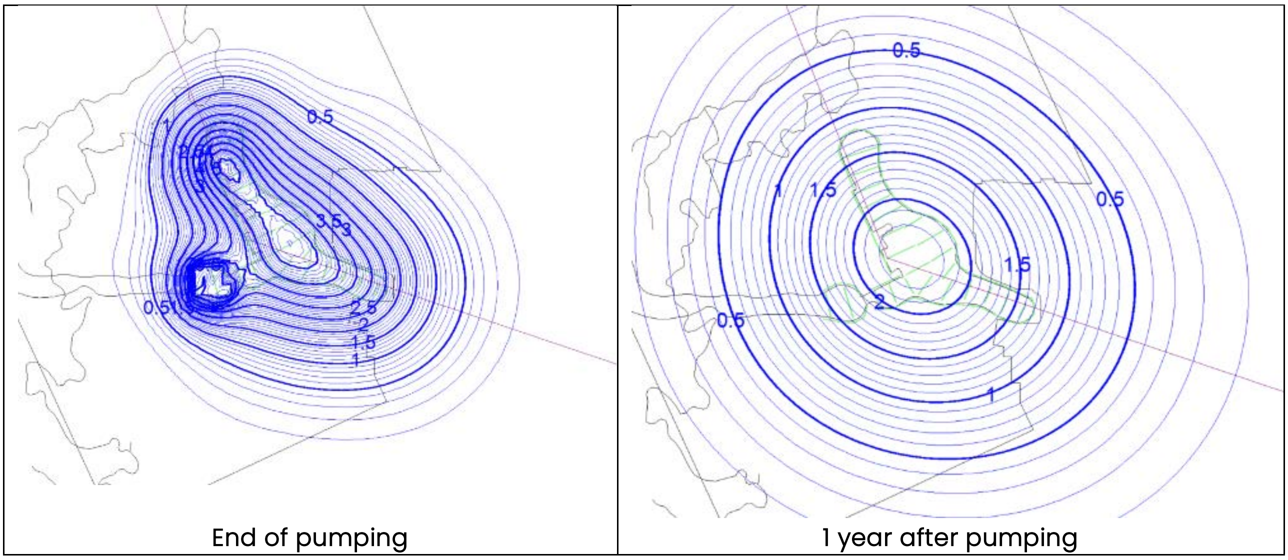


Figure 35. Modelled groundwater drawdown (m) at various times, SWL1 (including 90-day delay)



6. Conclusions

When considering the groundwater modelling results, it must be noted that all groundwater model predictions are uncertain. The model presented in this report is based on a simplified representation of the geological and hydrogeological system and is calibrated against a limited set of data. The model calibration is for steady-state (average) conditions, so the results of transient simulations must be used with caution, noting that this is a Class 1-2 model as defined in the Australian Groundwater Modelling guidelines (2012).

The main conclusions from this work are:

1. Dewatering using wells that are relatively widely spaced appears unlikely to achieve the required drawdown of groundwater levels.

2. Dewatering using wellpoints (whether installed horizontally or vertically), appears more likely to be able to achieve the required dewatering. An engineering assessment is recommended to check the feasibility and practicability of dewatering the site using wellpoints, taking into account geotechnical and engineering considerations as well as cost and the availability of appropriate equipment and experienced contractors.

3. If wellpoints are used, the modelling indicates that wellpoints will be needed within the footprint area of the lake, as well as around its edges. It is assumed that the pumps used to extract water from the wellpoints would be located outside the edges of the lake footprint. This may allow wellpoints to remain in place during and after the lake has been constructed. Given the dimensions of the bays, multiple pumps will likely be needed, each connected to a wellpoint line. The appropriate spacing and design of wellpoint lines will need to be the subject of detailed design, based on ground conditions at different locations and on achieving an appropriate balance between installation cost and dewatering time (if wellpoint lines are placed further apart, dewatering will take longer).

4. The modelling suggests that the required dewatering for Bay 1 may be achieved after approximately one month of pumping. A similar pumping time is likely to be needed for each subsequent bay to achieve the required drawdown before construction.

5. Leakage of pumped water from the location of SWL2 back into the groundwater appears unlikely to interfere significantly with SWL1 dewatering. However, if dewatering of the western part of the SWL1 is to be undertaken at the same time as storage of pumped water in the footprint of SWL2, it may be advisable to create a temporary coffer dam within the SWL2 footprint in order to keep the stored water further away from SWL1.

6. The simulated total pumping volume for the provisionally estimated 147 days of dewatering for construction of SWL1 is approximately 436,000 m^3. More than half of this is simply the water to be removed from pore spaces within the soil beneath the lake footprint.

7. The contour for 0.1 m drawdown is simulated to be within 500 m of SWL1 at the end of pumping and about 850 m from SWL1 at 1 year after cessation of pumping. The modelled recovery of groundwater levels after cessation of pumping is quite slow (more than 1 year) but may be faster if there is significant groundwater recharge.

8. A simulation that incorporated 90 days of additional pumping, such as could occur due to a delay in construction, increased the volume pumped by approximately 126,000 m^3 (an average increase of 1,400 m^3/d) bringing the total to 554,000 m^3.

9. The results of the modelling depend on various factors, particularly the hydraulic conductivity distribution. The model was constructed so that the transmissivity in the vicinity of SWL1 matches the average determined from the pumping tests conducted in December 2023.

10. In some respects, the modelling is conservative (for example, the assumption that the vertical hydraulic conductivity is the same as horizontal). Actual pumping requirements may therefore be below those simulated (although higher pumping rates are also possible).

11. When dewatering starts, it is recommended that good records be kept of pumping times, rates and volumes and of groundwater levels in the vicinity of the lake, so that expectations and plans for later stages can be adapted if needed.

7. Limitations

Hydrogeology Consulting Ltd has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of LBWco Pty Ltd. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice and assessment included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the proposal.

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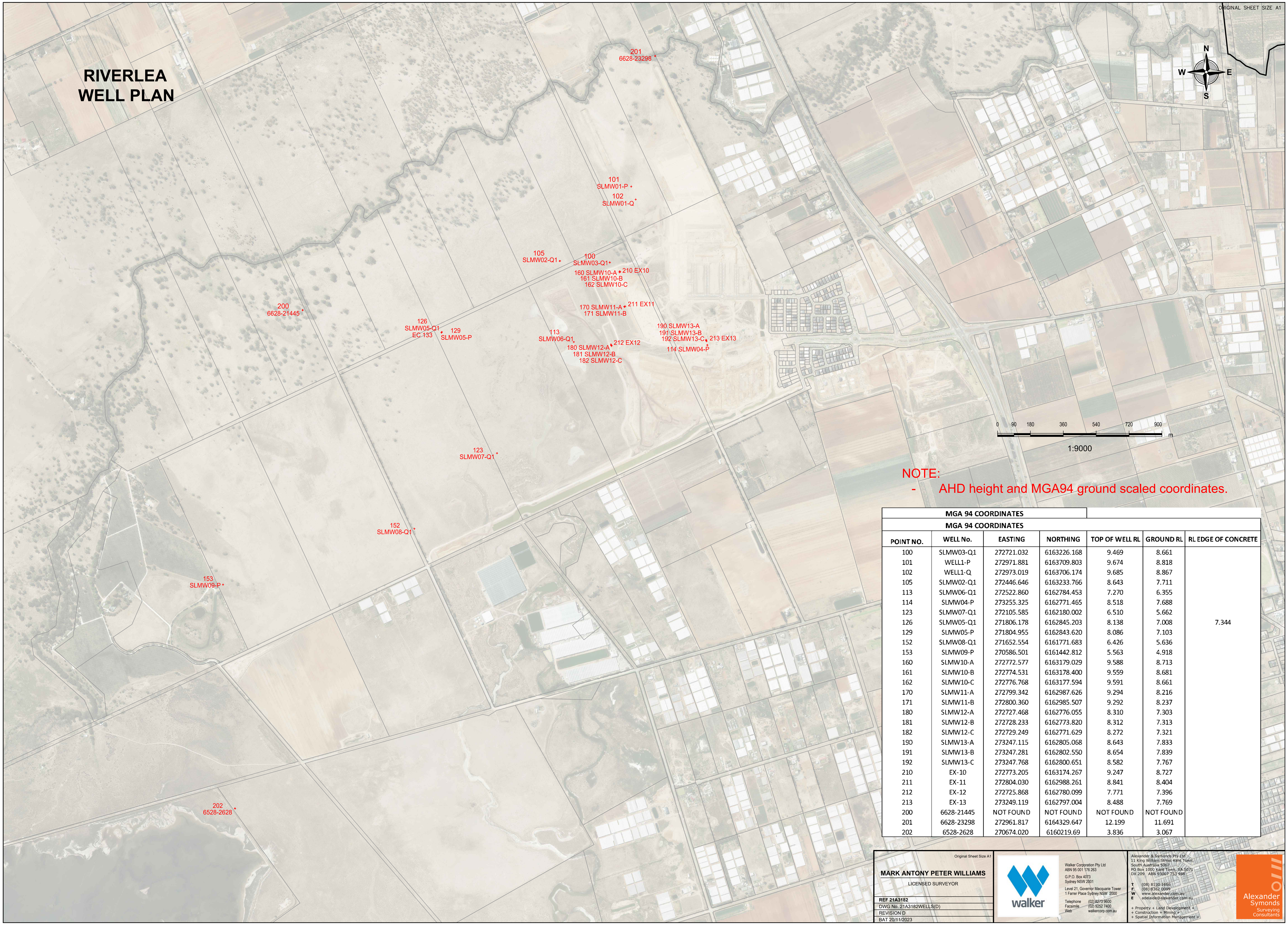
This report does not give legal advice. Legal advice can only be given by qualified legal practitioners.

Appendix I

Well Survey Data

RIVERLEA WELL PLAN



NOTE:
- AHD height and MGA94 ground scaled coordinates.

MGA 94 COORDINATES						
MGA 94 COORDINATES						
POINT NO.	WELL No.	EASTING	NORTHING	TOP OF WELL RL	GROUND RL	RL EDGE OF CONCRETE
100	SLMW03-Q1	272721.032	6163226.168	9.469	8.661	
101	WELL1-P	272971.881	6163709.803	9.674	8.818	
102	WELL1-Q	272973.019	6163706.174	9.685	8.867	
105	SLMW02-Q1	272446.646	6163233.766	8.643	7.711	
113	SLMW06-Q1	272522.860	6162784.453	7.270	6.355	
114	SLMW04-P	273255.325	6162771.465	8.518	7.688	
123	SLMW07-Q1	272105.585	6162180.002	6.510	5.662	
126	SLMW05-Q1	271806.178	6162845.203	8.138	7.008	7.344
129	SLMW05-P	271804.955	6162843.620	8.086	7.103	
152	SLMW08-Q1	271652.554	6161771.683	6.426	5.636	
153	SLMW09-P	270586.501	6161442.812	5.563	4.918	
160	SLMW10-A	272772.577	6163179.029	9.588	8.713	
161	SLMW10-B	272774.531	6163178.400	9.559	8.681	
162	SLMW10-C	272776.768	6163177.594	9.591	8.661	
170	SLMW11-A	272799.342	6162987.626	9.294	8.216	
171	SLMW11-B	272800.360	6162985.507	9.292	8.237	
180	SLMW12-A	272727.468	6162776.055	8.310	7.303	
181	SLMW12-B	272728.233	6162773.820	8.312	7.313	
182	SLMW12-C	272729.249	6162771.629	8.272	7.321	
190	SLMW13-A	273247.115	6162805.068	8.643	7.833	
191	SLMW13-B	273247.281	6162802.550	8.654	7.839	
192	SLMW13-C	273247.768	6162800.651	8.582	7.767	
210	EX-10	272773.205	6163174.267	9.247	8.727	
211	EX-11	272804.030	6162988.261	8.841	8.404	
212	EX-12	272725.868	6162780.099	7.771	7.396	
213	EX-13	273249.119	6162797.004	8.488	7.769	
200	6628-21445	NOT FOUND	NOT FOUND	NOT FOUND	NOT FOUND	
201	6628-23298	272961.817	6164329.647	12.199	11.691	
202	6528-2628	270674.020	6160219.69	3.836	3.067	

Original Sheet Size A1

MARK ANTONY PETER WILLIAMS

LICENSED SURVEYOR

REF 21A3182
DWG No. 21A3182WELLS(D)
REVISION D
BAT 20/11/2023

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Appendix J

Chemical Summary Tables

Location Code	Sample ID	Date	Sample Type	Lab report	Inorganics								Nutrients							
					Total Dissolved Solids	Total Suspended Solids	BOD	Cyanide Total	pH (Lab)	Sulphate	Sulphite as S	Sulphide	Phosphate total (as P)	Phosphorus reactive (as P)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Total Organic Nitrogen	Nitrogen (Total)	Kjeldahl Nitrogen Total
					mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR					10	5	2	0.004	0.1	5	0.5	0.1	0.01	0.01	0.01	0.01	0.01	0.2	0.1	0.1
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY					1200															
GMRRW 2008 Recreation Health (ADWG x10)								0.8		5,000						113	9.1			
ANZG (2018) Freshwater 95% toxicant DGVs															0.9					
ANZG (2018) Marine water 95% toxicant DGVs															0.91	0.05*				
ANZECC 2000 Livestock					13,000															
ANZECC 2000 Irrigation (LTV)									6										5	
Groundwater																				
SLMW01-P	SLMW01-P	5/05/2023	Primary	986883	4,600	20	<5	<0.005	8.1	250	<2.5	<0.1	0.03	<0.01	0.12	17	1.6	1.58	20.7	1.7
	SLMW01-P	1/11/2023	Primary	1040740	1,700	72	<5	<0.005	8.5	630	<2.5	<0.1	0.02	<0.01	0.03	18	<0.02	3.17	21	3.2
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	986883	4,700	15	<5	<0.005	8	220	<2.5	<0.1	0.04	0.07	0.13	24	1.1	3.07	28.2	3.2
	SLMW01-Q1	1/11/2023	Primary	1040740	5,500	110	<5	<0.005	8.2	710	<2.5	<0.1	<0.01	<0.01	0.06	19	0.08	0.74	20	0.8
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	986883	4,900	<5	<5	<0.005	7.9	190	<2.5	<0.1	0.08	0.02	0.09	16	1.1	3.61	20.7	3.7
	SLMW02-Q1	1/11/2023	Primary	1040740	2,100	130	<5	<0.005	8.3	600	<12.5	<0.1	0.02	<0.01	0.11	18	<0.02	0.59	19	0.7
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	986469	9,700	9,800	<5	<0.005	7.9	1,200	<50	<0.1	0.21	0.03	0.03	0.11	<0.02	0.97	1.11	1
	SLMW03-Q1	1/11/2023	Primary	1040740	1,300	700	<5	<0.005	8.3	1300	<12.5	<0.1	0.01	0.01	0.12	0.24	<0.02	<0.2	0.2	<0.2
SLMW04-P	SLMW04-P	8/05/2023	Primary	987308	3,800	240	<5	<0.005	8.2	160	<1	<0.1	<0.01	0.03	0.13	18	0.06	<0.2	18	<0.2
	SLMW04-P	2/11/2023	Primary	1040740	1,400	69	<5	<0.005	8.2	480	<2.5	<0.1	<0.01	0.02	0.02	17	<0.02	0.68	18	0.7
SLMW05-P	SLMW05-P	5/05/2023	Primary	986883	4,500	7.2	<5	<0.005	8.1	240	<2.5	<0.1	0.02	0.14	0.08	0.54	<0.02	0.92	1.54	1
	SLMW05-P	1/11/2023	Primary	1040740	860	65	<5	<0.005	8.4	830	<2.5	<0.1	<0.01	<0.01	0.14	0.54	<0.02	<0.2	0.5	<0.2
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	986883	6,000	31	<5	<0.005	7.8	370	<2.5	<0.1	0.02	0.01	0.09	1	0.22	0.61	1.9	0.7
	SLMW05-Q1	1/11/2023	Primary	1040740	6,800	98	<5	<0.005	8.3	1200	<2.5	<0.1	<0.01	<0.01	0.07	1.4	<0.02	0.23	1.7	0.3
	Dup-2	*1/11/2023*	*Interlab_D*	*EM2319725*	-	-	-	*<0.004*	-	-	-	*<0.1*	*0.02*	-	*<0.01*	-	-	-	*1.8*	*0.3*
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	986469	5,600	160	<5	<0.005	8.2	780	<1	<0.1	0.1	0.02	<0.01	1.1	<0.02	<0.2	1.1	<0.2
	DUP-1	*3/05/2023*	*Interlab_D*	*EM2307883*	*6,360*	*542*	*<2*	*<0.004*	-	*801*	*<2*	*0.2*	*0.16*	*0.01*	*<0.01*	*1.22*	*<0.01*	-	*1.8*	*0.6*
	SLMW06-Q1	1/11/2023	Primary	1040740	1,400	350	<5	<0.005	8.5	800	<12.5	<0.1	0.02	0.01	0.06	1.2	<0.02	<0.2	1.4	0.2
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	986469	7,000	53	<5	<0.005	8.3	870	<1	<0.1	0.21	0.09	0.06	2.3	0.13	8.04	10.5	8.1
	SLMW07-Q1	1/11/2023	Primary	1040740	10,000	1100	<5	<0.005	8.5	980	<25	<0.1	0.09	0.07	0.05	1.9	<0.02	<0.2	1.9	<0.2
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	986841	5,900	24	<5	<0.005	8	750	<6.5	<0.1	0.04	0.02	0.21	0.11	<0.02	1.69	2.01	1.9
	DUP 2	*4/05/2023*	*Intralab_D*	*986841*	*8,100*	*15*	*<5*	*<0.005*	*8*	*740*	*<6.5*	*<0.1*	*0.06*	*<0.01*	*0.19*	*0.12*	*<0.02*	*0.81*	*1.13*	*1*
SLMW09-P	SLMW09-P	4/05/2023	Primary	987102	2,100	<5	<5	0.008	8.1	350	<6.5	<0.1	0.08	0.02	0.12	0.04	<0.02	0.38	0.5	0.5
SLMW10-A	SLMW10-A	2/11/2023	Primary	1041094	7,800	47	<5	<0.005	8.5	560	<2.5	<0.1	<0.01	<0.01	<0.01	0.24	<0.02	<0.2	0.3	<0.2
SLMW10-B	SLMW10-B	2/11/2023	Primary	1041094	2,600	52	<5	<0.005	7	490	<2.5	<0.1	<0.01	<0.01	<0.01	0.42	0.05	<0.2	0.5	<0.2
SLMW10-C	SLMW10-C	2/11/2023	Primary	1041094	1,500	610	<5	<0.005	8.3	570	<12.5	<0.1	<0.01	<0.01	<0.01	10	0.2	1.2	11	1.2
SLMW11-B	SLMW11-B	2/11/2023	Primary	1041094	1,200	340	<5	<0.005	8.2	470	<6.5	<0.1	0.05	<0.01	0.02	11	0.49	0.98	12	1
SLMW11-C	SLMW11-C	2/11/2023	Primary	1041094	5,000	110	<5	<0.005	8.5	810	<2.5	<0.1	<0.01	<0.01	0.04	1.1	0.2	0.36	1.7	0.4

*stressor guideline

					Inorganics								Nutrients								
					Total Dissolved Solids	Total Suspended Solids	BOD	Cyanide Total	pH (Lab)	Sulphate	Sulphite as S	Sulphide	Phosphate total (as P)	Phosphorus reactive (as P)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Total Organic Nitrogen	Nitrogen (Total)	Kjeldahl Nitrogen Total
					mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR					10	5	2	0.004	0.1	5	0.5	0.1	0.01	0.01	0.01	0.01	0.01	0.2	0.1	0.1
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY					1200															
GMRRW 2008 Recreation Health (ADWG x10)								0.8		5,000						113	9.1			
ANZG (2018) Freshwater 95% toxicant DGVs															0.9					
ANZG (2018) Marine water 95% toxicant DGVs															0.91	0.05*				
ANZECC 2000 Livestock					13,000															
ANZECC 2000 Irrigation (LTV)									6										5	
																*stressor guideline				
Location Code	Sample ID	Date	Sample Type	Lab report																
SLMW12-A	SLMW12-A	31/10/2023	Primary	1040188	4,800	1300	<5	<0.005	8.5	1000	<50	<0.1	0.01	<0.01	0.04	1.6	<0.02	0.96	2.6	1
SLMW12-B	SLMW12-B	31/10/2023	Primary	1040188	7,300	550	<5	<0.005	7.9	1100	<5	<0.1	<0.01	<0.01	0.04	1.7	0.08	0.66	2.4	0.7
SLMW12-C	SLMW12-C	31/10/2023	Primary	1040188	8,200	240	<5	<0.005	8.3	1300	<5	<0.1	0.01	<0.01	0.03	2.5	0.06	0.37	2.9	0.4
	DUP-1	*31/10/2023*	*Intralab_D*	1040188	*4,000*	*280*	*<5*	*<0.005*	*7.8*	*1200*	*<5*	*<0.1*	*<0.01*	*<0.01*	*0.03*	*2.5*	*0.06*	*0.47*	*3*	*0.5*
SLMW13-A	SLMW13-A	2/11/2023	Primary	1041094	1,400	72	<5	<0.005	8.2	520	<2.5	<0.1	0.02	<0.01	0.02	18	<0.02	1.08	19	1.1
SLMW13-B	SLMW13-B	2/11/2023	Primary	1041094	4,500	84	<5	<0.005	8.3	490	<12.5	<0.1	0.05	<0.01	0.03	10	0.69	<0.2	11	<0.2
SLMW13-C	SLMW13-C	2/11/2023	Primary	1041094	900	150	<5	<0.005	8.1	740	<2.5	<0.1	0.03	<0.01	0.01	1.4	0.55	< 0..2	2	<0.2
6528-2628	6528-2628	4/05/2023	Primary	986841	99,000	1,200	<5	<0.005	7.6	7,600	<6.5	<0.1	0.85	0.02	0.89	<0.02	<0.02	1.31	2.2	2.2
6628-21445	6628-21445	8/05/2023	Primary	987308	7,400	70	8.1	<0.005	8.2	47	<1	<0.1	<0.01	<0.01	0.04	<0.02	<0.02	0.56	0.6	0.6
6628-23298	6628-23298	5/05/2023	Primary	986883	5,100	10	<5	<0.005	7.6	290	<2.5	0.1	0.11	0.01	0.16	<0.02	<0.02	3.64	3.8	3.8
	6628-23298	7/11/2023	Primary	1042675	4,500	130	<5	<0.005	7.5	890	<1	<0.1	0.07	0.04	2	0.35	<0.02	1	3.4	3

				Metals																				
				Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Cadmium (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Selenium (filtered)	Silver (filtered)	Tin (filtered)	Vanadium (filtered)	Zinc (filtered)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				50	1	1	1	50	0.1	5	1	1	1	50	1	1	0.1	5	1	1	5	5	10	5
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																								
GMRRW 2008 Recreation Health (ADWG x10)					100	20,000	600	40,000	20	500			20,000		100	5,000	10	500	200	100	1,000			
ANZG (2018) Freshwater 95% toxicant DGVs				55				370	0.2	0.4			1.4		3.4	1,900	0.6		11	11	0.05			8
ANZG (2018) Marine water 95% toxicant DGVs									5.5	4.4		1	1.3		4.4		0.4		70		1.4		100	15
ANZECC 2000 Livestock				5,000	500			5,000	10		1,000	1,000	400		100		2	150	1,000	20				20,000
ANZECC 2000 Irrigation (LTV)				5,000	100		100	500	10		100	50	200	200	2,000	200	2	10	200	20			100	2,000
Location Code	Sample ID	Date	Sample Type																					
Groundwater																								
SLMW01-P	SLMW01-P	5/05/2023	Primary	<50	1	40	<1	3,100	<0.2	<5	2	<1	2	<50	<1	55	<0.1	-	19	12	<5	<5	-	8
	SLMW01-P	1/11/2023	Primary	<50	1	40	<1	2600	<0.2	<5	<1	<1	<1	<50	<1	9	<0.1	-	7	15	<5	<5	-	5
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	<50	<1	30	<1	1,000	<0.2	<5	<1	<1	2	<50	<1	140	<0.1	-	5	6	<5	<5	-	10
	SLMW01-Q1	1/11/2023	Primary	<50	<1	30	<1	1900	<0.2	<5	<1	<1	<1	<50	<1	93	<0.1	-	8	8	<5	<5	-	7
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	<50	<1	50	<1	2,400	<0.2	<5	2	1	2	<50	<1	77	<0.1	-	27	7	<5	<5	-	<5
	SLMW02-Q1	1/11/2023	Primary	<50	<1	60	<1	2400	<0.2	<5	<1	<1	<1	<50	<1	39	<0.1	-	8	8	<5	<5	-	7
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	<50	<1	20	<1	4,000	<0.2	<5	<1	2	3	<50	<1	160	<0.1	8	18	1	<5	<5	-	8
	SLMW03-Q1	1/11/2023	Primary	<50	<1	30	<1	3700	<0.2	<5	<1	<1	<1	<50	<1	15	<0.1	-	10	2	<5	<5	-	6
SLMW04-P	SLMW04-P	8/05/2023	Primary	<50	<1	30	<1	5,400	<0.2	<5	36	<1	2	<50	<1	7	<0.1	-	2	30	<5	<5	-	13
	SLMW04-P	2/11/2023	Primary	<50	<1	40	<1	4,400	<0.2	<5	<1	<1	3	<50	<1	<5	<0.1	-	1	38	<5	<5	-	<5
SLMW05-P	SLMW05-P	5/05/2023	Primary	<50	<1	20	<1	2,100	<0.2	~~12~~	8	<1	2	<50	<1	7	<0.1	-	5	34	<5	<5	-	<5
	SLMW05-P	1/11/2023	Primary	<50	<1	30	<1	3600	<0.2	<5	8	<1	1	<50	<1	<5	<0.1	-	1	54	<5	<5	-	8
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	<50	<1	30	<1	3,100	<0.2	~~5~~	12	3	2	<50	<1	160	<0.1	-	25	25	<5	<5	-	9
	SLMW05-Q1	1/11/2023	Primary	<50	<1	30	<1	3100	<0.2	<5	8	<1	<1	<50	<1	21	<0.1	-	11	29	<5	<5	-	8
	Dup-2	*1/11/2023*	*Interlab_D*	*-*	*<1*	*21*	*<1*	*3050*	*<0.1*	*-*	*9*	*<1*	*<1*	*-*	*<1*	*22*	*<0.1*	*-*	*13*	*30*	*-*	*-*	*<10*	*11*
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	<50	<1	<20	<1	5,600	<0.2	<5	2	<1	2	<50	<1	35	<0.1	21	2	20	<5	<5	-	13
	DUP-1	*3/05/2023*	*Interlab_D*	*-*	*<1*	*21*	*<1*	*5,180*	*<0.1*	*-*	*2*	*<1*	*2*	*-*	*<1*	*34*	*<0.1*	*-*	*2*	*30*	*-*	*-*	*10*	*8*
	SLMW06-Q1	1/11/2023	Primary	<50	<1	30	<1	5300	<0.2	<5	2	<1	1	<50	<1	<5	<0.1	-	1	21	<5	<5	-	6
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	<50	2	30	<1	7,400	<0.2	<5	<1	<1	3	<50	<1	14	<0.1	28	26	70	<5	<5	-	<5
	SLMW07-Q1	1/11/2023	Primary	<50	1	40	<1	7000	<0.2	<5	<1	<1	1	<50	<1	<5	<0.1	-	<1	75	<5	<5	-	<5
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	<50	<1	70	<1	1,400	<0.2	<5	<1	1	2	<50	<1	36	<0.1	-	31	6	<5	<5	-	6
	DUP 2	*4/05/2023*	*Intralab_D*	*<50*	*<1*	*70*	*<1*	*1,400*	*<0.2*	*<5*	*<1*	*1*	*2*	*<50*	*<1*	*37*	*<0.1*	*-*	*30*	*6*	*<5*	*<5*	*-*	*6*
SLMW09-P	SLMW09-P	4/05/2023	Primary	<50	<1	160	<1	2,200	<0.2	<5	<1	5	<1	60	<1	150	<0.1	-	45	<1	<5	<5	-	6
SLMW10-A	SLMW10-A	2/11/2023	Primary	<50	<1	30	<1	2,900	<0.2	<5	<1	<1	<1	<50	<1	<5	<0.1	-	<1	2	<5	<5	-	<5
SLMW10-B	SLMW10-B	2/11/2023	Primary	<50	<1	30	<1	4,800	<0.2	<5	<1	<1	2	<50	<1	<5	<0.1	-	7	9	<5	<5	-	<5
SLMW10-C	SLMW10-C	2/11/2023	Primary	<50	<1	20	<1	800	<0.2	<5	<1	<1	<1	<50	<1	52	<0.1	-	<1	30	<5	<5	-	<5
SLMW11-B	SLMW11-B	2/11/2023	Primary	<50	<1	30	<1	4,300	<0.2	<5	<1	<1	<1	<50	<1	10	<0.1	-	1	37	<5	<5	-	<5
SLMW11-C	SLMW11-C	2/11/2023	Primary	<50	<1	60	<1	3,000	<0.2	<5	<1	<1	1	<50	<1	<5	<0.1	-	10	15	<5	<5	-	<5

				Metals																				
				Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Cadmium (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Selenium (filtered)	Silver (filtered)	Tin (filtered)	Vanadium (filtered)	Zinc (filtered)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				50	1	1	1	50	0.1	5	1	1	1	50	1	1	0.1	5	1	1	5	5	10	5
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																								
GMRRW 2008 Recreation Health (ADWG x10)					100	20,000	600	40,000	20	500			20,000		100	5,000	10	500	200	100	1,000			
ANZG (2018) Freshwater 95% toxicant DGVs				55				370	0.2	0.4			1.4		3.4	1,900	0.6		11	11	0.05			8
ANZG (2018) Marine water 95% toxicant DGVs									5.5	4.4		1	1.3		4.4		0.4		70		1.4		100	15
ANZECC 2000 Livestock				5,000	500			5,000	10		1,000	1,000	400		100		2	150	1,000	20				20,000
ANZECC 2000 Irrigation (LTV)				5,000	100		100	500	10		100	50	200	200	2,000	200	2	10	200	20			100	2,000
Location Code	**Sample ID**	**Date**	**Sample Type**																					
SLMW12-A	SLMW12-A	31/10/2023	Primary	<50	<1	30	<1	7500	<0.2	<5	3	<1	1	<50	<1	<5	<0.1	-	<1	58	<5	<5	-	5
SLMW12-B	SLMW12-B	31/10/2023	Primary	<50	<1	30	<1	8300	<0.2	<5	2	<1	2	<50	<1	14	<0.1	-	2	51	<5	<5	-	11
SLMW12-C	SLMW12-C	31/10/2023	Primary	<50	<1	20	<1	7600	<0.2	<5	2	<1	2	<50	<1	18	<0.1	-	25	65	<5	<5	-	14
	DUP-1	*31/10/2023*	*Intralab_D*	*<50*	*<1*	*20*	*<1*	*7400*	*<0.2*	*<5*	*2*	*<1*	*2*	*<50*	*<1*	*18*	*<0.1*	*-*	*25*	*65*	*<5*	*<5*	*-*	*14*
SLMW13-A	SLMW13-A	2/11/2023	Primary	<50	<1	30	<1	4,500	<0.2	<5	<1	<1	2	<50	<1	10	<0.1	-	3	44	<5	<5	-	<5
SLMW13-B	SLMW13-B	2/11/2023	Primary	<50	<1	50	<1	5,000	<0.2	<5	<1	<1	<1	<50	<1	28	<0.1	-	7	93	<5	<5	-	<5
SLMW13-C	SLMW13-C	2/11/2023	Primary	<50	<1	40	<1	4,500	<0.2	<5	<1	1	4	<50	<1	130	<0.1	-	24	30	<5	<5	-	18
6528-2628	6528-2628	4/05/2023	Primary	<50	2	50	<1	11,000	<0.2	<5	<1	5	48	<50	<1	170	<0.1	-	18	<1	<5	<5	-	27
6628-21445	6628-21445	8/05/2023	Primary	<50	1	<20	<1	550	<0.2	<5	5	<1	<1	400	<1	1300	<0.1	-	<1	<1	<5	<5	-	<5
6628-23298	6628-23298	5/05/2023	Primary	<50	3	40	<1	500	<0.2	<5	16	2	<1	330	<1	420	<0.1	-	25	<1	<5	<5	-	<5
	6628-23298	7/11/2023	Primary	<50	1	50	<1	400	<0.2	<5	1	<1	<1	220	<1	440	<0.1	-	5	2	<5	<5	-	6

				TRH											BTEX							PAH
				TRH C6-C10	TRH C6-C10 less BTEX (F1)	TRH >C10-C16	TRH >C10-C16 less Napthalene (F2)	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum of fractions)	TPH >C10-C16 (SG)	TPH >C16-C34 (SG)	TPH >C34-C40 (SG)	TPH >C10 - C40 Fraction (sum) (SG)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				20	20	50	50	100	100	100	50	100	100	100	1	1	1	1	2	2	1	5
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																						
GMRRW 2008 Recreation Health (ADWG x10)															10	8,000	3,000			6,000		
ANZG (2018) Freshwater 95% toxicant DGVs															950			350				16
ANZG (2018) Marine water 95% toxicant DGVs															700							70
ANZECC 2000 Livestock																						
ANZECC 2000 Irrigation (LTV)																						
Location Code	Sample ID	Date	Sample Type																			
Groundwater																						
SLMW01-P	SLMW01-P	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW01-P	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW01-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW02-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW03-Q1	1/11/2023	Primary	<20	<20	<50	<50	200	<100	200	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10
SLMW04-P	SLMW04-P	8/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW04-P	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW05-P	SLMW05-P	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW05-P	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW05-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	Dup-2	*1/11/2023*	*Interlab_D*	*<20*	*<20*	*<100*	*<100*	*<100*	*<100*	*<100*	-	-	-	-	*<1*	*<2*	*<2*	*<2*	*<2*	*<2*	*<1*	*<5*
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	DUP-1	*3/05/2023*	*Interlab_D*	*<20*	*<20*	*<100*	*<100*	*<100*	*<100*	*<100*	-	-	-	-	*<1*	*<2*	*<2*	*<2*	*<2*	*<2*	*<1*	*<5*
	SLMW06-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	SLMW07-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	DUP 2	*4/05/2023*	*Intralab_D*	*<20*	*<20*	*<50*	*<50*	*<100*	*<100*	*<100*	-	-	-	-	*<1*	*<1*	*<1*	*<1*	*<2*	*<3*	-	*<10*
SLMW09-P	SLMW09-P	4/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW10-A	SLMW10-A	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW10-B	SLMW10-B	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW10-C	SLMW10-C	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW11-B	SLMW11-B	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW11-C	SLMW11-C	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10

Location Code	Sample ID	Date	Sample Type	TRH											BTEX							PAH
				TRH C6-C10	TRH C6-C10 less BTEX (F1)	TRH >C10-C16	TRH >C10-C16 less Napthalene (F2)	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum of fractions)	TPH >C10-C16 (SG)	TPH >C16-C34 (SG)	TPH >C34-C40 (SG)	TPH >C10 - C40 Fraction (sum) (SG)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				20	20	50	50	100	100	100	50	100	100	100	1	1	1	1	2	2	1	5
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																						
GMRRW 2008 Recreation Health (ADWG x10)															10	8,000	3,000			6,000		
ANZG (2018) Freshwater 95% toxicant DGVs															950			350				16
ANZG (2018) Marine water 95% toxicant DGVs															700							70
ANZECC 2000 Livestock																						
ANZECC 2000 Irrigation (LTV)																						
SLMW12-A	SLMW12-A	31/10/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW12-B	SLMW12-B	31/10/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW12-C	SLMW12-C	31/10/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	DUP-1	*31/10/2023*	*Intralab_D*	*<20*	*<20*	*<50*	*<50*	*<100*	*<100*	*<100*	-	-	-	-	*<1*	*<1*	*<1*	*<1*	*<2*	*<3*	-	*<10*
SLMW13-A	SLMW13-A	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW13-B	SLMW13-B	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
SLMW13-C	SLMW13-C	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
6528-2628	6528-2628	4/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
6628-21445	6628-21445	8/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
6628-23298	6628-23298	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10
	6628-23298	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	<10	<0.2

				Organochlorine Pesticides																					
				4,4-DDD	4,4-DDE	4,4-DDT	DDT+DDE+DDD	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	chlordane	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.005
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																									
GMRRW 2008 Recreation Health (ADWG x10)						90					100			3								3		3,000	
ANZG (2018) Freshwater 95% toxicant DGVs						0.01					0.2				0.08				0.02			0.09			0.0002
ANZG (2018) Marine water 95% toxicant DGVs																			0.008						
ANZECC 2000 Livestock																									
ANZECC 2000 Irrigation (LTV)																									
Location Code	Sample ID	Date	Sample Type																						
Groundwater																									
SLMW01-P	SLMW01-P	5/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW01-P	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW01-Q1	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW02-Q1	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW03-Q1	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW04-P	SLMW04-P	8/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW04-P	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW05-P	SLMW05-P	5/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW05-P	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW05-Q1	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	Dup-2	*1/11/2023*	*Interlab_D*	*<2*	*<2*	*<4*	*<4*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<4*	*-*	*<2*	*<2*	*<2*	*<2*	*-*	*-*	*<2*	*<2*	*-*	*-*
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	DUP-1	*3/05/2023*	*Interlab_D*	*<2*	*<2*	*<4*	*<4*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<4*	*-*	*<2*	*<2*	*<2*	*<2*	*-*	*-*	*<2*	*<2*	*-*	*-*
	SLMW06-Q1	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW07-Q1	1/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	DUP 2	*4/05/2023*	*Intralab_D*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.005*
SLMW09-P	SLMW09-P	4/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW10-A	SLMW10-A	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW10-B	SLMW10-B	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW10-C	SLMW10-C	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW11-B	SLMW11-B	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW11-C	SLMW11-C	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005

				Organochlorine Pesticides																					
				4,4-DDD	4,4-DDE	4,4-DDT	DDT+DDE+DDD	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	chlordane	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.005
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																									
GMRRW 2008 Recreation Health (ADWG x10)						90					100			3								3		3,000	
ANZG (2018) Freshwater 95% toxicant DGVs						0.01					0.2				0.08				0.02			0.09			0.0002
ANZG (2018) Marine water 95% toxicant DGVs																			0.008						
ANZECC 2000 Livestock																									
ANZECC 2000 Irrigation (LTV)																									
Location Code	Sample ID	Date	Sample Type																						
SLMW12-A	SLMW12-A	31/10/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW12-B	SLMW12-B	31/10/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW12-C	SLMW12-C	31/10/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	DUP-1	*31/10/2023*	*Intralab_D*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.005*
SLMW13-A	SLMW13-A	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW13-B	SLMW13-B	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW13-C	SLMW13-C	2/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
6528-2628	6528-2628	4/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
6628-21445	6628-21445	8/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
6628-23298	6628-23298	5/05/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	6628-23298	7/11/2023	Primary	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005	-

				Phenols							Halogenated Phenols						Halogenated
				3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2-methylphenol	2-nitrophenol	4-chloro-3-methylphenol	Total Phenols	Phenolics Total	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Hexachlorobenzene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				2	1	1	1	1	1	50	1	1	1	1	1	2	0.2
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																	
GMRRW 2008 Recreation Health (ADWG x10)												200	2,000		3,000	100	
ANZG (2018) Freshwater 95% toxicant DGVs									320			20	160		490	10	
ANZG (2018) Marine water 95% toxicant DGVs									400							22	
ANZECC 2000 Livestock																	
ANZECC 2000 Irrigation (LTV)																	
Location Code	Sample ID	Date	Sample Type														
Groundwater																	
SLMW01-P	SLMW01-P	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW01-P	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW01-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW02-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW03-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW04-P	SLMW04-P	8/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW04-P	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW05-P	SLMW05-P	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW05-P	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW05-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	Dup-2	*1/11/2023*	*Interlab_D*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*-*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*-*
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	DUP-1	*3/05/2023*	*Interlab_D*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*-*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*-*
	SLMW06-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW07-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	DUP 2	*4/05/2023*	*Intralab_D*	*-*	*-*	*-*	*-*	*-*	*-*	*<500*	*-*	*-*	*-*	*-*	*-*	*-*	*<0.2*
SLMW09-P	SLMW09-P	4/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW10-A	SLMW10-A	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW10-B	SLMW10-B	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW10-C	SLMW10-C	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW11-B	SLMW11-B	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW11-C	SLMW11-C	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2

				Phenols							Halogenated Phenols						Halogen ated
				3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2-methylphenol	2-nitrophenol	4-chloro-3-methylphenol	Total Phenols	Phenolics Total	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Hexachlorobenzene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				2	1	1	1	1	1	50	1	1	1	1	1	2	0.2
EPP Water Quality 2015 - Drinking water environmental value - TDS ONLY																	
GMRRW 2008 Recreation Health (ADWG x10)												200	2,000		3,000	100	
ANZG (2018) Freshwater 95% toxicant DGVs									320			20	160		490	10	
ANZG (2018) Marine water 95% toxicant DGVs									400							22	
ANZECC 2000 Livestock																	
ANZECC 2000 Irrigation (LTV)																	
Location Code	Sample ID	Date	Sample Type														
SLMW12-A	SLMW12-A	31/10/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW12-B	SLMW12-B	31/10/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW12-C	SLMW12-C	31/10/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	DUP-1	*31/10/2023*	*Intralab_D*	*-*	*-*	*-*	*-*	*-*	*-*	*<50*	*-*	*-*	*-*	*-*	*-*	*-*	*<0.2*
SLMW13-A	SLMW13-A	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW13-B	SLMW13-B	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW13-C	SLMW13-C	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
6528-2628	6528-2628	4/05/2023	Primary	-	-	-	-	-	-	<500	-	-	-	-	-	-	<0.2
6628-21445	6628-21445	8/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
6628-23298	6628-23298	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	6628-23298	7/11/2023	Primary	-	-	-	-	-	<50	-	-	-	-	-	-	-	<0.2

				Inorganics								Nutrients							Metals																				
				Total Dissolved Solids	Total Suspended Solids	BOD	Cyanide Total	pH (Lab)	Sulphate	Sulphite as S	Sulphide	Phosphate total (as P)	Phosphorus reactive (as P)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Kjeldahl Nitrogen Total	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Cadmium (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Selenium (filtered)	Silver (filtered)	Tin (filtered)	Vanadium (filtered)	Zinc (filtered)
				mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				10	5	2	0.004	0.1	5	0.5	0.1	0.01	0.01	0.01	0.01	0.01	0.1	0.1	50	1	1	1	50	0.1	5	1	1	1	50	1	1	0.1	5	1	1	5	5	10	5
ANZG (2018) Freshwater 95% toxicant DGVs														0.9					55				370	0.2	0.4			1.4		3.4	1,900	0.6		11	11	0.05			8
ANZG (2018) Marine water 95% toxicant DGVs														0.91	0.05*									5.5	4.4		1	1.3		4.4		0.4		70		1.4		100	15
															* stressor guideline																								
Location Code	**Field ID**	**Date**	**Sample Type**																																				
Surface Water (BMT 2022)																																							
UPSTREAM																																							
Mouth of Chapman Creek (BMT-1)		10-Mar-22	Primary	-	<5	-	-	8.2	-	-	-	<0.10	0.09	0.09	<0.01	<0.01	<1.0	<1.0	-	<10	-	-	-	<1	-	<10	-	<10	-	<10	-	<0.1	-	<10	-	-	-	-	<52
		23-Mar-22	Primary	-	3	-	-	-	-	-	-	0.07	0.12	<0.02	<0.01	<0.01	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	3	-	-	-	-	-	-	0.19	0.04	0.06	0.01	<0.01	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	2	-	-	-	-	-	-	0.03	0.03	0.01	<0.01	<0.01	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	2	-	-	-	-	-	-	0.11	0.03	0.1	<0.01	<0.01	1.6	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	<1	-	-	-	-	-	-	0.08	0.01	0.12	<0.01	<0.01	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	23	-	-	-	-	-	-	0.19	<0.01	0.02	<0.01	<0.01	0.4	0.4	-	<2	-	-	-	<0.2	-	<2	-	<2	-	<2	-	<0.1	-	<2	-	-	-	-	<10
		28-Jun-22	Primary	-	1	-	-	-	-	-	-	0.11	0.03	0.09	<0.01	<0.01	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	2	-	-	-	-	-	-	0.1	0.04	0.01	0.03	<0.01	1.7	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.01	0.08	<0.01	<0.01	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	1	-	-	-	-	-	-	0.91	0.02	0.05	<0.01	<0.01	1.1	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	<1	-	-	-	-	-	-	0.14	0.02	0.18	<0.01	<0.01	1.3	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	4	-	-	-	-	-	-	<0.10	0.03	0.13	<0.01	<0.01	4.2	4.2	-	6	-	-	-	1.5	-	<2	-	4	-	<2	-	<0.1	-	<2	-	-	-	-	13
		28-Sep-22	Primary	-	64	-	-	-	-	-	-	0.27	0.06	0.14	0.15	0.03	4.4	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	2	-	-	-	-	-	-	<0.10	0.05	<0.05	0.05	<0.01	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	28	-	-	-	-	-	-	0.31	0.13	0.15	0.13	0.01	1.8	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	<1	-	-	-	-	-	-	0.28	0.18	0.18	0.02	0.02	1.6	1.6	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		15-Dec-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.1	0.09	0.04	<0.01	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	<1	-	-	-	-	-	-	0.24	0.08	0.15	<0.01	<0.01	1.4	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	53	-	-	-	-	-	-	<0.10	0.04	<0.05	<0.01	<0.01	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	<1	-	-	-	-	-	-	0.19	0.07	<0.05	<0.01	<0.01	0.9	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	<1	-	-	-	-	-	-	0.09	0.03	<0.05	<0.01	<0.01	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	<1	-	-	-	-	-	-	0.06	0.07	0.06	<0.01	<0.01	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	3	-	-	-	-	-	-	<0.05	0.03	0.1	<0.01	<0.01	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	4	-	-	-	-	-	-	0.08	0.04	<0.02	<0.01	<0.01	0.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	<1	-	-	-	-	-	-	0.08	0.04	0.16	0.01	<0.01	0.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	1.45	0.03	<0.05	0.06	<0.01	0.6	0.5	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		4-Jul-23	Primary	-	59	-	-	-	-	-	-	<0.02	0.04	0.14	0.05	0.01	0.5	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	4	-	-	-	-	-	-	0.1	0.03	0.03	<0.01	<0.01	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	<1	-	-	-	-	-	-	0.34	0.02	0.1	<0.01	<0.01	0.4	0.4	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
Upper Chapman Creek (BMT-2)		10-Mar-22	Primary	-	<5	-	-	8.13	-	-	-	<0.10	0.09	<0.01	<0.01	<0.01	<1.0	<1.0	-	<10	-	-	-	<1	-	<10	-	<10	-	<10	-	<0.1	-	<10	-	-	-	-	<52
		23-Mar-22	Primary	-	<1	-	-	-	-	-	-	0.16	0.07	<0.02	<0.01	<0.01	7.2	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	2	-	-	-	-	-	-	0.25	0.07	0.05	<0.01	<0.01	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	2	-	-	-	-	-	-	0.2	0.05	0.06	0.01	<0.01	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.03	0.22	<0.01	<0.01	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	<1	-	-	-	-	-	-	0.07	0.03	0.04	<0.01	<0.01	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	17	-	-	-	-	-	-	0.3	0.05	0.04	0.24	<0.01	0.7	0.5	-	<2	-	-	-	<0.2	-	<2	-	<2	-	<2	-	<0.1	-	<2	-	-	-	-	<10
		28-Jun-22	Primary	-	3	-	-	-	-	-	-	0.16	0.04	0.09	<0.01	<0.01	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	<1	-	-	-	-	-	-	0.18	0.02	0.03	<0.01	<0.01	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.03	0.06	0.01	<0.01	0.8	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	<1	-	-	-	-	-	-	0.21	0.02	0.08	0.02	<0.01	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	<1	-	-	-	-	-	-	0.2	0.02	0.03	<0.01	<0.01	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	1	-	-	-	-	-	-	<0.10	0.05	0.18	0.08	<0.01	5.7	5.6	-	10	-	-	-	2.6	-	4	-	6	-	3	-	<0.1	-	5	-	-	-	-	<10
		28-Sep-22	Primary	-	16	-	-	-	-	-	-	0.13	0.04	<0.01	0.01	<0.01	2.7	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.05	<0.05	0.05	<0.01	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	51	-	-	-	-	-	-	0.27	0.15	0.16	0.12	0.01	1.7	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	<1	-	-	-	-	-	-	0.12	0.08	0.15	0.01	<0.01	1.1	1.1	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		15-Dec-22	Primary	-	<1	-	-	-	-	-	-	0.24	0.09	0.13	0.04	0.01	1.3	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	<1	-	-	-	-	-	-	0.07	0.08	0.15	<0.01	<0.01	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	57	-	-	-	-	-	-	<0.10	0.06	0.08	<0.01	<0.01	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	<1	-	-	-	-	-	-	0.18	0.07	<0.05	<0.01	<0.01	0.7	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	<1	-	-	-	-	-	-	0.1	0.04	<0.05	<0.01	<0.01	0.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	<1	-	-	-	-	-	-	0.1	0.03	0.11	<0.01	<0.01	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	<1	-	-	-	-	-	-	0.13	0.08	0.09	0.02	<0.01	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	<1	-	-	-	-	-	-	0.1	0.05	0.11	0.02	<0.01	0.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	<1	-	-	-	-	-	-	0.16	0.05	0.3	<0.01	<0.01	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	<1	-	-	-	-	-	-	<0.05	0.03	<0.05	0.02	<0.01	<0.5	<0.5	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		4-Jul-23	Primary	-	32	-	-	-	-	-	-	<0.02	0.06	0.2	0.04	<0.01	0.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	<1	-	-	-	-	-	-	0.1	0.04	0.11	<0.01	<0.01	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	5	-	-	-	-	-	-	0.38	0.06	0.16	0.04	<0.01	0.4	0.4	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
			UPSTREAM Minimum	-	<1	-	-	8.13	-	-	-	0.03	0.01	0.01	0.01	0.01	0.1	0.1	-	<2	-	-	-	<0.2	-	4	-	<10	-	<2	-	<0.1	-	<2	-	-	-	-	<10
			UPSTREAM Maximum	-	64	-	-	8.2	-	-	-	1.45	0.18	0.3	0.24	0.03	7.2	7.2	-	10	-	-	-	2.6	-	4	-	6	-	3	-	<0.1	-	5	-	-	-	-	13

Location Code	Field ID	Date	Sample Type	Total Dissolved Solids	Total Suspended Solids	BOD	Cyanide Total	pH (Lab)	Sulphate	Sulphite as S	Sulphide	Phosphate total (as P)	Phosphorus reactive (as P)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Kjeldahl Nitrogen Total
				Inorganics								Nutrients						
				mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR				10	5	2	0.004	0.1	5	0.5	0.1	0.01	0.01	0.01	0.01	0.01	0.1	0.1
ANZG (2018) Freshwater 95% toxicant DGVs														0.9				
ANZG (2018) Marine water 95% toxicant DGVs														0.91	0.05*			
															* stressor guideline			
DOWNSTREAM																		
Channel (BMT-4)		10-Mar-22	Primary	-	46	-	-	9.01	-	-	-	0.27	<0.01	0.09	0.05	<0.01	3.4	3.4
		22-Mar-22	Primary	-	6	-	-	-	-	-	-	0.08	0.01	0.4	0.01	0.27	1.5	1.2
		4-Apr-22	Primary	-	<1	-	-	-	-	-	-	0.08	<0.01	0.17	0.04	0.1	1.6	1.5
		20-Apr-22	Primary	-	<1	-	-	-	-	-	-	0.2	0.12	0.16	7.16	0.79	10.6	2.6
		2-May-22	Primary	-	2	-	-	-	-	-	-	0.24	0.07	0.15	3.11	0.22	6.2	2.9
		18-May-22	Primary	-	<1	-	-	-	-	-	-	0.14	0.06	0.08	9.45	0.07	11.1	1.6
		1-Jun-22	Primary	-	8	-	-	-	-	-	-	0.13	<0.01	<0.01	0.69	0.03	1.7	1
		28-Jun-22	Primary	-	10	-	-	-	-	-	-	0.21	0.18	0.09	29.9	0.16	32.7	2.6
		13-Jul-22	Primary	-	5	-	-	-	-	-	-	0.22	<0.01	0.04	31.8	0.1	34.5	2.6
		27-Jul-22	Primary	-	2	-	-	-	-	-	-	0.14	0.12	0.07	22.6	0.12	25	2.3
		8-Aug-22	Primary	-	10	-	-	-	-	-	-	0.24	<0.01	0.01	19.5	0.14	23.8	4.2
		31-Aug-22	Primary	-	4	-	-	-	-	-	-	0.28	0.14	0.01	16.3	0.1	21.4	5
		6-Sep-22	Primary	-	14	-	-	-	-	-	-	0.2	<0.01	0.03	19.9	0.2	30.8	10.7
		29-Sep-22	Primary	-	2	-	-	-	-	-	-	0.13	0.05	0.15	12.6	0.16	17.6	4.8
		10-Oct-22	Primary	-	13	-	-	-	-	-	-	<0.10	<0.01	0.03	11.4	0.12	16.5	5
		16-Nov-22	Primary	-	39	-	-	-	-	-	-	0.2	<0.01	<0.01	1.7	0.06	3.6	1.8
		30-Nov-22	Primary	-	<1	-	-	-	-	-	-	0.31	<0.01	0.18	15.8	0.36	24.9	8.7
		15-Dec-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.01	0.13	14	0.35	17.4	3
		11-Jan-23	Primary	-	48	-	-	-	-	-	-	0.3	0.02	0.6	2.92	1.96	10.7	5.8
		9-Feb-23	Primary	-	39	-	-	-	-	-	-	0.27	<0.01	0.11	4.13	0.78	6.7	1.8
		21-Feb-23	Primary	-	36	-	-	-	-	-	-	1.19	<0.01	<0.01	0.33	1.55	11.6	9.7
		15-Mar-23	Primary	-	18	-	-	-	-	-	-	0.4	0.24	0.2	0.62	0.96	4.3	2.7
		29-Mar-23	Primary	-	10	-	-	-	-	-	-	0.64	0.47	0.11	4.21	0.45	8.7	4
		4-Apr-23	Primary	-	20	-	-	-	-	-	-	0.65	0.31	0.02	5.1	0.46	10.2	4.6
		17-Apr-23	Primary	-	<1	-	-	-	-	-	-	0.79	0.61	0.06	6.09	0.27	8.3	1.9
		5-May-23	Primary	-	12	-	-	-	-	-	-	0.8	0.76	0.09	14.7	0.21	16.3	1.4
		20-Jun-23	Primary	-	5	-	-	-	-	-	-	0.34	0.39	0.05	9.33	0.03	10.6	1.2
		4-Jul-23	Primary	-	24	-	-	-	-	-	-	0.07	0.14	0.17	16.3	0.31	19.1	2.5
		1-Aug-23	Primary	-	22	-	-	-	-	-	-	0.25	0.12	0.04	16.2	0.06	18.7	2.4
		13-Sep-23	Primary	-	11	-	-	-	-	-	-	0.16	0.1	0.12	13.9	0.16	15.9	1.8
Thompson Creek (BMT-5)		10-Mar-22	Primary	-	113	-	-	9.13	-	-	-	0.52	0.08	0.07	<0.01	<0.01	4.5	4.5
		23-Mar-22	Primary	-	34	-	-	-	-	-	-	0.45	0.49	0.08	<0.01	<0.01	3.7	3.7
		4-Apr-22	Primary	-	20	-	-	-	-	-	-	0.55	0.12	0.16	<0.01	<0.01	4.8	4.8
		20-Apr-22	Primary	-	11	-	-	-	-	-	-	0.87	0.54	2.8	0.24	0.29	7.5	7
		2-May-22	Primary	-	17	-	-	-	-	-	-	0.55	0.36	0.13	0.42	0.26	6.5	5.8
		18-May-22	Primary	-	26	-	-	-	-	-	-	1.43	0.9	1.8	0.45	0.25	6	5.3
		1-Jun-22	Primary	-	32	-	-	-	-	-	-	0.6	0.48	0.03	2.47	0.25	5.1	2.4
		28-Jun-22	Primary	-	13	-	-	-	-	-	-	0.4	0.34	0.9	24.1	0.47	27.2	2.6
		13-Jul-22	Primary	-	5	-	-	-	-	-	-	0.39	0.4	0.47	26.4	0.36	28.4	1.6
		27-Jul-22	Primary	-	<1	-	-	-	-	-	-	0.5	0.48	0.5	9.69	0.41	11.6	1.5
		8-Aug-22	Primary	-	5	-	-	-	-	-	-	0.48	0.39	0.73	14.3	0.44	19.5	4.8
		31-Aug-22	Primary	-	10	-	-	-	-	-	-	0.78	0.25	0.56	13.1	0.52	19.4	5.8
		6-Sep-22	Primary	-	8	-	-	-	-	-	-	0.71	0.41	0.88	12.4	0.45	21.2	8.4
		29-Sep-22	Primary	-	10	-	-	-	-	-	-	0.38	0.38	0.9	10.7	0.56	16.6	5.3
		10-Oct-22	Primary	-	<1	-	-	-	-	-	-	1.17	0.47	0.7	4.95	0.67	9.7	4.1
		16-Nov-22	Primary	-	11	-	-	-	-	-	-	0.72	0.5	0.03	2.04	0.48	5.6	3.1
		30-Nov-22	Primary	-	43	-	-	-	-	-	-	2.22	0.06	0.1	3.15	0.56	10.6	6.9
		15-Dec-22	Primary	-	3	-	-	-	-	-	-	0.39	0.01	0.81	1.45	0.61	7.3	5.2
		11-Jan-23	Primary	-	100	-	-	-	-	-	-	2.03	0.23	0.08	<0.01	<0.01	12.2	12.2
		9-Feb-23	Primary	-	27	-	-	-	-	-	-	0.75	0.38	0.03	<0.01	<0.01	1.6	1.6
		21-Feb-23	Primary	-	61	-	-	-	-	-	-	1.77	0.97	<0.01	<0.01	<0.01	7.4	7.4
		15-Mar-23	Primary	-	14	-	-	-	-	-	-	0.81	0.5	<0.01	<0.01	<0.01	3.6	3.6
		29-Mar-23	Primary	-	35	-	-	-	-	-	-	0.78	0.23	<0.01	<0.01	<0.01	4.5	4.5
		4-Apr-23	Primary	-	49	-	-	-	-	-	-	0.66	0.07	0.1	0.33	0.14	5.2	4.7
		17-Apr-23	Primary	-	25	-	-	-	-	-	-	0.87	0.26	0.01	1.73	0.25	6.5	4.5
		5-May-23	Primary	-	71	-	-	-	-	-	-	0.91	<0.01	0.06	5.08	0.49	12.1	6.5
		20-Jun-23	Primary	-	17	-	-	-	-	-	-	0.64	0.59	0.27	15.3	0.32	17.6	2
		4-Jul-23	Primary	-	33	-	-	-	-	-	-	0.49	0.59	0.13	17.5	0.28	20.5	2.7
		1-Aug-23	Primary	-	52	-	-	-	-	-	-	0.39	0.09	0.04	17.5	0.41	20.5	2.6
		13-Sep-23	Primary	-	15	-	-	-	-	-	-	0.38	0.29	0.44	6.88	0.47	9.6	2.3

Location Code	Date	Sample Type	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Cadmium (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Selenium (filtered)	Silver (filtered)	Tin (filtered)	Vanadium (filtered)	Zinc (filtered)
			Metals																				
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR			50	1	1	1	50	0.1	5	1	1	1	50	1	1	0.1	5	1	1	5	5	10	5
ANZG (2018) Freshwater 95% toxicant DGVs			55				370	0.2	0.4			1.4		3.4	1,900	0.6		11	11	0.05			8
ANZG (2018) Marine water 95% toxicant DGVs								5.5	4.4		1	1.3		4.4		0.4		70		1.4		100	15
DOWNSTREAM																							
Channel (BMT-4)	10-Mar-22	Primary	-	8	-	-	-	<0.1	-	<1	-	1	-	<1	-	<0.1	-	14	-	-	-	-	<5
	22-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1-Jun-22	Primary	-	1	-	-	-	<0.1	-	<1	-	3	-	2	-	<0.1	-	<1	-	-	-	-	6
	28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-Sep-22	Primary	-	2	-	-	-	<0.1	-	<1	-	8	-	<1	-	<0.1	-	7	-	-	-	-	14
	29-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	30-Nov-22	Primary	-	2	-	-	-	<0.1	-	<1	-	5	-	<1	-	<0.1	-	8	-	-	-	-	20
	15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20-Jun-23	Primary	-	2	-	-	-	<0.1	-	<1	-	4	-	<1	-	<0.1	-	3	-	-	-	-	7
	4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Sep-23	Primary	-	2	-	-	-	<0.1	-	<1	-	5	-	<1	-	<0.1	-	6	-	-	-	-	<5
Thompson Creek (BMT-5)	10-Mar-22	Primary	-	9	-	-	-	<0.1	-	2	-	2	-	<1	-	<0.1	-	17	-	-	-	-	6
	23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1-Jun-22	Primary	-	3	-	-	-	<0.1	-	2	-	4	-	5	-	<0.1	-	<1	-	-	-	-	8
	28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-Sep-22	Primary	-	3	-	-	-	<0.1	-	<1	-	6	-	<1	-	<0.1	-	12	-	-	-	-	12
	29-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	30-Nov-22	Primary	-	5	-	-	-	<0.1	-	<1	-	5	-	<1	-	<0.1	-	13	-	-	-	-	13
	15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20-Jun-23	Primary	-	3	-	-	-	<0.1	-	<1	-	4	-	<1	-	<0.1	-	8	-	-	-	-	19
	4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Sep-23	Primary	-	3	-	-	-	<0.1	-	<1	-	5	-	<1	-	<0.1	-	10	-	-	-	-	13

Location Code	Field ID	Date	Sample Type	Inorganics: Total Dissolved Solids	Total Suspended Solids	BOD	Cyanide Total	pH (Lab)	Sulphate	Sulphite as S	Sulphide	Nutrients: Phosphate total (as P)	Phosphorus reactive (as P)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Kjeldahl Nitrogen Total
				mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR				10	5	2	0.004	0.1	5	0.5	0.1	0.01	0.01	0.01	0.01	0.01	0.1	0.1
ANZG (2018) Freshwater 95% toxicant DGVs														0.9				
ANZG (2018) Marine water 95% toxicant DGVs														0.91	0.05*			
															* stressor guideline			
Offshore (BMT-3)		10-Mar-22	Primary	-	<5	-	-	8.04	-	-	-	<0.10	0.08	0.13	<0.01	<0.01	<1.0	<1.0
		23-Mar-22	Primary	-	<1	-	-	-	-	-	-	0.14	0.13	<0.02	<0.01	<0.01	5.2	5.2
		4-Apr-22	Primary	-	15	-	-	-	-	-	-	0.03	<0.01	0.05	<0.01	<0.01	<0.1	<0.1
		20-Apr-22	Primary	-	3	-	-	-	-	-	-	0.49	0.02	0.06	0.02	<0.01	0.7	0.7
		2-May-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.05	0.18	0.05	<0.01	1.6	1.5
		18-May-22	Primary	-	4	-	-	-	-	-	-	0.11	*0.03*	0.16	0.06	*<0.01*	0.4	0.3
		1-Jun-22	Primary	-	26	-	-	-	-	-	-	0.26	<0.01	<0.01	<0.01	<0.01	0.2	0.2
		28-Jun-22	Primary	-	1	-	-	-	-	-	-	0.12	0.06	0.04	0.1	<0.01	0.2	0.1
		13-Jul-22	Primary	-	3	-	-	-	-	-	-	0.16	0.04	0.03	0.05	0.01	1.9	1.8
		27-Jul-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.02	0.06	<0.01	<0.01	<0.1	<0.1
		8-Aug-22	Primary	-	4	-	-	-	-	-	-	0.56	0.02	0.1	0.01	<0.01	0.2	0.2
		31-Aug-22	Primary	-	4	-	-	-	-	-	-	0.1	0.04	0.13	0.02	0.01	1	1
		6-Sep-22	Primary	-	2	-	-	-	-	-	-	0.18	0.06	0.14	0.1	0.02	5.7	5.6
		28-Sep-22	Primary	-	23	-	-	-	-	-	-	0.12	0.02	0.09	<0.01	<0.01	3.6	3.6
		10-Oct-22	Primary	-	<1	-	-	-	-	-	-	<0.10	0.06	<0.05	0.03	<0.01	<1.0	<1.0
		16-Nov-22	Primary	-	7	-	-	-	-	-	-	0.16	0.13	0.22	0.02	0.02	0.4	0.4
		30-Nov-22	Primary	-	<1	-	-	-	-	-	-	0.23	0.14	0.2	0.14	0.03	1.9	1.7
		15-Dec-22	Primary	-	<1	-	-	-	-	-	-	0.14	0.11	0.09	0.17	0.03	1.6	1.4
		11-Jan-23	Primary	-	71	-	-	-	-	-	-	<0.02	0.03	0.21	<0.01	<0.01	<0.2	<0.2
		9-Feb-23	Primary	-	36	-	-	-	-	-	-	0.29	0.04	0.08	<0.01	<0.01	<1.0	<1.0
		21-Feb-23	Primary	-	<1	-	-	-	-	-	-	0.4	0.32	0.18	0.01	0.01	1.3	1.3
		15-Mar-23	Primary	-	<1	-	-	-	-	-	-	0.06	0.02	<0.05	<0.01	<0.01	<0.5	<0.5
		29-Mar-23	Primary	-	<1	-	-	-	-	-	-	0.06	<0.01	0.06	<0.01	<0.01	<0.5	<0.5
		4-Apr-23	Primary	-	<1	-	-	-	-	-	-	<0.05	0.04	0.07	0.06	<0.01	1.2	1.1
		17-Apr-23	Primary	-	<1	-	-	-	-	-	-	0.1	0.04	<0.02	0.02	<0.01	0.5	0.5
		5-May-23	Primary	-	<1	-	-	-	-	-	-	0.17	0.09	0.22	0.14	0.02	0.8	0.6
		20-Jun-23	Primary	-	9	-	-	-	-	-	-	0.07	0.08	<0.05	0.24	0.02	<0.5	<0.5
		4-Jul-23	Primary	-	113	-	-	-	-	-	-	<0.02	0.04	0.14	0.09	0.01	0.4	0.3
		1-Aug-23	Primary	-	7	-	-	-	-	-	-	0.09	0.04	<0.01	0.01	<0.01	0.2	0.2
		13-Sep-23	Primary	-	<1	-	-	-	-	-	-	0.3	0.09	0.14	0.43	0.01	0.7	0.3
Inshore Bolivar Outlet (BMT-7)		20-Jun-23	Primary	-	<1	-	-	-	-	-	-	0.08	0.12	<0.05	0.34	0.02	<0.5	<0.5
		4-Jul-23	Primary	-	122	-	-	-	-	-	-	0.04	0.06	0.15	0.09	0.01	0.4	0.3
		1-Aug-23	Primary	-	6	-	-	-	-	-	-	0.22	0.17	0.18	0.37	0.03	0.9	0.5
		13-Sep-23	Primary	-	43	-	-	-	-	-	-	0.65	0.48	0.4	0.17	0.1	1.9	1.6
Surface Water (LBWco 2023)																		
SW01	SW01	7/11/2023	Primary	480	35	<5	0.01	9.1	1,200	-	<0.1	<0.01	<0.01	0.6	0.14	<0.02	1.1	0.9
SW02	SW02	7/11/2023	Primary	3,700	44	<5	<0.005	8.1	740	-	<0.1	4.2	4.6	0.39	70	0.07	72	2.4
SW03	SW03	7/11/2023	Primary	4,300	45	7.7	<0.005	8.6	450	-	<0.1	1.7	1.7	<0.01	<0.02	<0.02	2.5	2.5
SW04	SW04	7/11/2023	Primary	16,000	170	16	0.006	8.9	2,300	-	<0.1	0.69	0.42	0.31	<0.02	<0.02	4.8	4.8
SW05	SW05	7/11/2023	Primary	3,200	100	<5	0.005	9.3	1,300	-	<0.1	0.96	0.78	0.65	0.48	0.27	4.4	3.6
SW06	SW06	7/11/2023	Primary	7,500	150	<5	0.078	9.1	1,300	-	<0.1	0.72	0.29	0.38	17	0.71	21	3.2
SW07	SW07	7/11/2023	Primary	8,100	140	<5	0.006	9.1	1,200	-	<0.1	0.95	0.67	0.71	3.7	0.53	6.8	2.6
SW08	SW08	7/11/2023	Primary	9,900	120	<5	0.005	9.2	1,400	-	<0.1	0.62	0.37	0.39	-	0.4	5.7	2.3
	SW-DUP-1	*7/11/2023*	*Field_D*	*10,000*	*130*	*<5*	*0.008*	*9.2*	*1,400*	-	*<0.1*	*0.57*	*0.37*	*0.54*	*2.9*	*0.44*	*5.1*	*1.7*
SW09	SW09	7/11/2023	Primary	37,000	540	<5	<0.005	8.4	4,600	-	<0.1	0.04	<0.01	0.96	0.03	<0.02	1.2	1.2
DOWNSTREAM Minimum				480	1	<5	<0.005	8.04	450	-	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DOWNSTREAM Maximum				37000	540	16	0.078	9.3	4600	-	<0.1	4.2	4.6	2.8	70	1.96	72	12.2

Location Code	Field ID	Date	Sample Type	Metals: Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Cadmium (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Selenium (filtered)	Silver (filtered)	Tin (filtered)	Vanadium (filtered)	Zinc (filtered)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				50	1	1	1	50	0.1	5	1	1	1	50	1	1	0.1	5	1	1	5	5	10	5
ANZG (2018) Freshwater 95% toxicant DGVs				55				370	0.2	0.4			1.4		3.4	1,900	0.6		11	11	0.05			8
ANZG (2018) Marine water 95% toxicant DGVs									5.5	4.4		1	1.3		4.4		0.4		70		1.4		100	15
Offshore (BMT-3)		10-Mar-22	Primary	-	<10	-	-	-	<1.0	-	<10	-	<10	-	<10	-	<0.1	-	<10	-	-	-	-	<52
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	<2	-	-	-	<0.2	-	<2	-	<2	-	<2	-	<0.1	-	<2	-	-	-	-	<10
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	7	-	-	-	1.7	-	<2	-	3	-	<2	-	<0.1	-	2	-	-	-	-	<10
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
Inshore Bolivar Outlet (BMT-7)		20-Jun-23	Primary	-	<5	-	-	-	<0.5	-	<5	-	<5	-	<5	-	<0.1	-	<5	-	-	-	-	<26
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	<5	-	-	-	<0.5	-	<5	-	9	-	<5	-	<0.1	-	<5	-	-	-	-	<26
Surface Water (LBWco 2023)																								
SW01	SW01	7/11/2023	Primary	360	3	50	<1	6,600	<0.2	<5	<1	1	3	310	<1	6	<0.1	-	3	15	<5	<5	-	<5
SW02	SW02	7/11/2023	Primary	510	6	40	<1	5,500	<0.2	<5	1	<1	4	550	<1	30	<0.1	-	4	10	<5	<5	-	46
SW03	SW03	7/11/2023	Primary	70	9	90	<1	2,400	<0.2	<5	<1	2	<1	170	<1	540	0.3	-	34	<1	<5	<5	-	<5
SW04	SW04	7/11/2023	Primary	1,800	18	130	<1	8,600	<0.2	<5	3	2	2	1,600	<1	180	<0.1	-	19	3	<5	<5	-	<5
SW05	SW05	7/11/2023	Primary	350	6	-	<1	8,600	<0.2	<5	<1	2	2	330	<1	23	<0.1	-	8	7	<5	<5	-	<5
SW06	SW06	7/11/2023	Primary	70	5	40	<1	6,100	<0.2	<5	<1	2	6	80	<1	19	<0.1	-	6	11	<5	<5	-	11
SW07	SW07	7/11/2023	Primary	320	4	40	<1	8,000	<0.2	<5	1	2	6	310	<1	34	<0.1	-	7	9	<5	<5	-	7
SW08	SW08	7/11/2023	Primary	<50	4	30	<1	7,500	<0.2	<5	<1	2	3	60	<1	24	<0.1	-	7	12	<5	<5	-	9
	SW-DUP-1	*7/11/2023*	*Field_D*	*50*	*4*	*30*	*<1*	*8,100*	*<0.2*	*<5*	*<1*	*2*	*7*	*50*	*<1*	*23*	*<0.1*	-	*6*	*11*	*<5*	*<5*	-	*<5*
SW09	SW09	7/11/2023	Primary	70	3	30	<1	12,000	<0.2	<5	<1	1	1	240	<1	25	<0.1	-	5	4	<5	<5	-	<5
DOWNSTREAM Minimum				<50	1	30	<1	2400	<0.2	0	1	<1	<1	50	<1	6	<0.1	-	2	<1	<5	<5	-	<5
DOWNSTREAM Maximum				1800	18	130	<1	12000	1.7	0	3	2	9	1600	5	540	0.3	-	34	15	<5	<5	-	46

Groundwater Chemical Summary Table

				Inorganics								Nutrients							Metals																				
				Total Dissolved Solids	Total Suspended Solids	BOD	Cyanide Total	pH (Lab)	Sulphate	Sulphite as S	Sulphide	Phosphate total (as P)	Phosphorus reactive (as P)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Kjeldahl Nitrogen Total	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Cadmium (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Selenium (filtered)	Silver (filtered)	Tin (filtered)	Vanadium (filtered)	Zinc (filtered)
				mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				10	5	2	0.004	0.1	5	0.5	0.1	0.01	0.01	0.01	0.01	0.01	0.1	0.1	50	1	1	1	50	0.1	5	1	1	1	50	1	1	0.1	5	1	1	5	5	10	5
ANZG (2018) Freshwater 95% toxicant DGVs														0.9					55				370	0.2	0.4			1.4		3.4	1,900	0.6		11	11	0.05			8
ANZG (2018) Marine water 95% toxicant DGVs														0.91	0.05*									5.5	4.4		1	1.3		4.4		0.4		70		1.4		100	15
														* stressor guideline																									
Location Code	**Field ID**	**Date**	**Sample Type**																																				
Groundwater																																							
SLMW01-P	SLMW01-P	5/05/2023	Primary	4,600	20	<5	<0.005	8.1	250	<2.5	<0.1	0.03	<0.01	0.12	17	1.6	20.7	1.7	<50	1	40	<1	3,100	<0.2	<5	2	<1	2	<50	<1	55	<0.1	-	19	12	<5	<5	-	8
	SLMW01-P	1/11/2023	Primary	1700	72	<5	<0.005	8.5	630	<2.5	<0.1	0.02	<0.01	0.03	18	<0.02	21	3.2	<50	1	40	<1	2600	<0.2	<5	<1	<1	<1	<50	<1	9	<0.1	-	7	15	<5	<5	-	5
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	4,700	15	<5	<0.005	8	220	<2.5	<0.1	0.04	0.07	0.13	24	1.1	28.2	3.2	<50	<1	30	<1	1,000	<0.2	<5	<1	<1	2	<50	<1	140	<0.1	-	5	6	<5	<5	-	10
	SLMW01-Q1	1/11/2023	Primary	5500	110	<5	<0.005	8.2	710	<2.5	<0.1	<0.01	<0.01	0.06	19	0.08	20	0.8	<50	<1	30	<1	1900	<0.2	<5	<1	<1	<1	<50	<1	93	<0.1	-	8	8	<5	<5	-	7
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	4,900	<5	<5	<0.005	7.9	190	<2.5	<0.1	0.08	0.02	0.09	16	1.1	20.7	3.7	<50	<1	50	<1	2,400	<0.2	<5	2	1	2	<50	<1	77	<0.1	-	27	7	<5	<5	-	<5
	SLMW02-Q1	1/11/2023	Primary	2100	130	<5	<0.005	8.3	600	<12.5	<0.1	0.02	<0.01	0.11	18	<0.02	19	0.7	<50	<1	60	<1	2400	<0.2	<5	<1	<1	<1	<50	<1	39	<0.1	-	8	8	<5	<5	-	7
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	9,700	9,800	<5	<0.005	7.9	1,200	<50	<0.1	0.21	0.03	0.03	0.11	<0.02	1.11	1	<50	<1	20	<1	4,000	<0.2	<5	<1	2	3	<50	<1	160	<0.1	8	18	1	<5	<5	-	8
	SLMW03-Q1	1/11/2023	Primary	1300	700	<5	<0.005	8.3	1300	<12.5	<0.1	0.01	0.01	0.12	0.24	<0.02	0.2	<0.2	<50	<1	30	<1	3700	<0.2	<5	<1	<1	<1	<50	<1	15	<0.1	-	10	2	<5	<5	-	6
SLMW04-P	SLMW04-P	8/05/2023	Primary	3,800	240	<5	<0.005	8.2	160	<1	<0.1	<0.01	0.03	0.13	18	0.06	18	<0.2	<50	<1	30	<1	5,400	<0.2	<5	36	<1	2	<50	<1	7	<0.1	-	2	30	<5	<5	-	13
	SLMW04-P	2/11/2023	Primary	1400	69	<5	<0.005	8.2	480	<2.5	<0.1	<0.01	0.02	0.02	17	<0.02	18	0.7	<50	<1	40	<1	4,400	<0.2	<5	<1	<1	3	<50	<1	<5	<0.1	-	1	38	<5	<5	-	<5
SLMW05-P	SLMW05-P	5/05/2023	Primary	4,500	7.2	<5	<0.005	8.1	240	<2.5	<0.1	0.02	0.14	0.08	0.54	<0.02	1.54	1	<50	<1	20	<1	2,100	<0.2	12	8	<1	2	<50	<1	7	<0.1	-	5	34	<5	<5	-	<5
	SLMW05-P	1/11/2023	Primary	860	65	<5	<0.005	8.4	830	<2.5	<0.1	<0.01	<0.01	0.14	0.54	<0.02	0.5	<0.2	<50	<1	30	<1	3600	<0.2	<5	8	<1	1	<50	<1	<5	<0.1	-	1	54	<5	<5	-	8
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	6,000	31	<5	<0.005	7.8	370	<2.5	<0.1	0.02	0.01	0.09	1	0.22	1.9	0.7	<50	<1	30	<1	3,100	<0.2	5	12	3	2	<50	<1	160	<0.1	-	25	25	<5	<5	-	9
	SLMW05-Q1	1/11/2023	Primary	6800	98	<5	<0.005	8.3	1200	<2.5	<0.1	<0.01	<0.01	0.07	1.4	<0.02	1.7	0.3	<50	<1	30	<1	3100	<0.2	<5	8	<1	<1	<50	<1	21	<0.1	-	11	29	<5	<5	-	8
	Dup-2	*1/11/2023*	*Interlab_D*	-	-	-	<0.004	-	-	-	<0.1	0.02	-	<0.01	-	-	1.8	0.3	-	<1	21	<1	3050	<0.1	-	9	<1	<1	-	<1	22	<0.1	-	13	30	-	-	<10	11
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	5,600	160	<5	<0.005	8.2	780	<1	<0.1	0.1	0.02	<0.01	1.1	<0.02	1.1	<0.2	<50	<1	<20	<1	5,600	<0.2	<5	2	<1	2	<50	<1	35	<0.1	21	2	20	<5	<5	-	13
	DUP-1	*3/05/2023*	*Interlab_D*	6,360	542	<2	<0.004	-	801	<2	0.2	0.16	0.01	<0.01	1.22	<0.01	1.8	0.6	-	<1	21	<1	5,180	<0.1	-	2	<1	2	-	<1	34	<0.1	-	2	30	-	-	10	8
	SLMW06-Q1	1/11/2023	Primary	1400	350	<5	<0.005	8.5	800	<12.5	<0.1	0.02	0.01	0.06	1.2	<0.02	1.4	0.2	<50	<1	30	<1	5300	<0.2	<5	2	<1	1	<50	<1	<5	<0.1	-	1	21	<5	<5	-	6
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	7,000	53	<5	<0.005	8.3	870	<1	<0.1	0.21	0.09	0.06	2.3	0.13	10.5	8.1	<50	2	30	<1	7,400	<0.2	<5	<1	<1	3	<50	<1	14	<0.1	28	26	70	<5	<5	-	<5
	SLMW07-Q1	1/11/2023	Primary	10000	1100	<5	<0.005	8.5	980	<25	<0.1	0.09	0.07	0.05	1.9	<0.02	1.9	<0.2	<50	1	40	<1	7000	<0.2	<5	<1	<1	1	<50	<1	<5	<0.1	-	<1	75	<5	<5	-	<5
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	5,900	24	<5	<0.005	8	750	<6.5	<0.1	0.04	0.02	0.21	0.11	<0.02	2.01	1.9	<50	<1	70	<1	1,400	<0.2	<5	<1	1	2	<50	<1	36	<0.1	-	31	6	<5	<5	-	6
	DUP 2	*4/05/2023*	*Intralab_D*	8,100	15	<5	<0.005	8	740	<6.5	<0.1	0.06	<0.01	0.19	0.12	<0.02	1.13	1	<50	<1	70	<1	1,400	<0.2	<5	<1	1	2	<50	<1	37	<0.1	-	30	6	<5	<5	-	6
SLMW09-P	SLMW09-P	4/05/2023	Primary	2,100	<5	<5	0.008	8.1	350	<6.5	<0.1	0.08	0.02	0.12	0.04	<0.02	0.5	0.5	<50	<1	160	<1	2,200	<0.2	<5	<1	5	<1	60	<1	150	<0.1	-	45	<1	<5	<5	-	6
SLMW10-A	SLMW10-A	2/11/2023	Primary	7800	47	<5	<0.005	8.5	560	<2.5	<0.1	<0.01	<0.01	<0.01	0.24	<0.02	0.3	<0.2	<50	<1	30	<1	2,900	<0.2	<5	<1	<1	<1	<50	<1	<5	<0.1	-	<1	2	<5	<5	-	<5
SLMW10-B	SLMW10-B	2/11/2023	Primary	2600	52	<5	<0.005	7	490	<2.5	<0.1	<0.01	<0.01	<0.01	0.42	0.05	0.5	<0.2	<50	<1	30	<1	4800	<0.2	<5	<1	<1	2	<50	<1	<5	<0.1	-	7	9	<5	<5	-	<5
SLMW10-C	SLMW10-C	2/11/2023	Primary	1500	610	<5	<0.005	8.3	570	<12.5	<0.1	<0.01	<0.01	<0.01	10	0.2	11	1.2	<50	<1	20	<1	800	<0.2	<5	<1	<1	<1	<50	<1	52	<0.1	-	<1	30	<5	<5	-	<5
SLMW11-B	SLMW11-B	2/11/2023	Primary	1200	340	<5	<0.005	8.2	470	<6.5	<0.1	0.05	<0.01	0.02	11	0.49	12	1	<50	<1	30	<1	4300	<0.2	<5	<1	<1	<1	<50	<1	10	<0.1	-	1	37	<5	<5	-	<5
SLMW11-C	SLMW11-C	2/11/2023	Primary	5000	110	<5	<0.005	8.5	810	<2.5	<0.1	<0.01	<0.01	0.04	1.1	0.2	1.7	0.4	<50	<1	60	<1	3000	<0.2	<5	<1	<1	1	<50	<1	<5	<0.1	-	10	15	<5	<5	-	<5
SLMW12-A	SLMW12-A	31/10/2023	Primary	4800	1300	<5	<0.005	8.5	1000	<50	<0.1	0.01	<0.01	0.04	1.6	<0.02	2.6	1	<50	<1	30	<1	7500	<0.2	<5	3	<1	1	<50	<1	<5	<0.1	-	<1	58	<5	<5	-	5
SLMW12-B	SLMW12-B	31/10/2023	Primary	7300	550	<5	<0.005	7.9	1100	<5	<0.1	<0.01	<0.01	0.04	1.7	0.08	2.4	0.7	<50	<1	30	<1	8300	<0.2	<5	2	<1	2	<50	<1	14	<0.1	-	2	51	<5	<5	-	11
SLMW12-C	SLMW12-C	31/10/2023	Primary	8200	240	<5	<0.005	8.3	1300	<5	<0.1	0.01	<0.01	0.03	2.5	0.06	2.9	0.4	<50	<1	20	<1	7600	<0.2	<5	2	<1	2	<50	<1	18	<0.1	-	25	65	<5	<5	-	14
	DUP-1	*31/10/2023*	*Intralab_D*	4000	280	<5	<0.005	7.8	1200	<5	<0.1	<0.01	<0.01	0.03	2.5	0.06	3	0.5	<50	<1	20	<1	7400	<0.2	<5	2	<1	2	<50	<1	18	<0.1	-	25	65	<5	<5	-	14
SLMW13-A	SLMW13-A	2/11/2023	Primary	1400	72	<5	<0.005	8.2	520	<2.5	<0.1	0.02	<0.01	0.02	18	<0.02	19	1.1	<50	<1	30	<1	4500	<0.2	<5	<1	<1	2	<50	<1	10	<0.1	-	3	44	<5	<5	-	<5
SLMW13-B	SLMW13-B	2/11/2023	Primary	4500	84	<5	<0.005	8.3	490	<12.5	<0.1	0.05	<0.01	0.03	10	0.69	11	<0.2	<50	<1	50	<1	5000	<0.2	<5	<1	<1	<1	<50	<1	28	<0.1	-	7	93	<5	<5	-	<5
SLMW13-C	SLMW13-C	2/11/2023	Primary	900	150	<5	<0.005	8.1	740	<2.5	<0.1	0.03	<0.01	0.01	1.4	0.55	2	<0.2	<50	<1	40	<1	4500	<0.2	<5	<1	1	4	<50	<1	130	<0.1	-	24	30	<5	<5	-	18
6628-21445	6628-21445	8/05/2023	Primary	7,400	70	8.1	<0.005	8.2	47	<1	<0.1	<0.01	<0.01	0.04	<0.02	<0.02	0.6	0.6	<50	1	<20	<1	550	<0.2	<5	5	<1	<1	400	<1	1,300	<0.1	-	<1	<1	<5	<5	-	<5
6628-23298	6628-23298	5/05/2023	Primary	5,100	10	<5	<0.005	7.6	290	<2.5	0.1	0.11	0.01	0.16	<0.02	<0.02	3.8	3.8	<50	3	40	<1	500	<0.2	<5	16	2	<1	330	<1	420	<0.1	-	25	<1	<5	<5	-	<5
	6628-23298	7/11/2023	Primary	4,500	130	<5	<0.005	7.5	890	<1	<0.1	0.07	0.04	2	0.35	<0.02	3.4	3	<50	1	50	<1	400	<0.2	<5	<1	<1	<1	220	<1	440	<0.1	-	5	2	<5	<5	-	6
6528-2628 (offsite)	6528-2628	4/05/2023	Primary	99,000	1,200	<5	<0.005	7.6	7,600	<6.5	<0.1	0.85	0.02	0.89	<0.02	<0.02	2.2	2.2	<50	2	50	<1	11,000	<0.2	<5	<1	5	48	<50	<1	170	<0.1	-	18	<1	<5	<5	-	27
			ONSITE GROUNDWATER Minimum	860	7.2	<5	<0.005	7	47	<1	<0.1	<0.01	<0.01	<0.01	<0.02	<0.02	0.2	<0.2	<50	<1	<20	<1	400	<0.2	<5	<1	<1	<1	<50	<1	<5	<0.1	8	<1	<1	<5	<5	<10	<5
			ONSITE GROUNDWATER Maximum	10,000	9800	8.1	0.008	8.5	1300	<25	0.2	0.21	0.14	0.21	24	1.6	28.2	8.1	<50	3	160	<1	8300	<0.2	12	36	5	4	400	<1	1300	<0.1	28	45	93	<5	<5	10	18

				TRH											BTEX							PAH	Organochlorine Pesticides																					
				TRH C6-C10	TRH C6-C10 less BTEX (F1)	TRH >C10-C16	TRH >C10-C16 less Napthalene (F2)	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum of fractions)	TPH >C10-C16 (SG)	TPH >C16-C34 (SG)	TPH >C34-C40 (SG)	TPH >C10 - C40 Fraction (sum) (SG)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene	4,4-DDD	4,4-DDE	4,4-DDT	DDT+DDE+DDD	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	chlordane	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				20	20	50	50	100	100	100	50	100	100	100	1	1	1	1	2	2	1	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.005
ANZG (2018) Freshwater 95% toxicant DGVs															950			350				16			0.01					0.2				0.08				0.02			0.09			0.0002
ANZG (2018) Marine water 95% toxicant DGVs															700							70																0.008						
Location Code	**Field ID**	**Date**	**Sample Type**																																									
Surface Water (BMT 2022)																																												
UPSTREAM																																												
Mouth of Chapman Creek (BMT-1)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Chapman Creek (BMT-2)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			UPSTREAM Minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			UPSTREAM Maximum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

				TRH											BTEX							PAH	Organochlorine Pesticides																					
				TRH C6-C10	TRH C6-C10 less BTEX (F1)	TRH >C10-C16	TRH >C10-C16 less Napthalene (F2)	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum of fractions)	TPH >C10-C16 (SG)	TPH >C16-C34 (SG)	TPH >C34-C40 (SG)	TPH >C10 - C40 fraction (sum) (SG)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene	4,4-DDD	4,4-DDE	4,4-DDT	DDT+DDE+DDD	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	chlordane	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				20	20	50	50	100	100	100	50	100	100	100	1	1	1	1	2	2	1	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.005
ANZG (2018) Freshwater 95% toxicant DGVs															950			350				16			0.01					0.2				0.08				0.02			0.09			0.0002
ANZG (2018) Marine water 95% toxicant DGVs															700							70																0.008						
Location Code	**Field ID**	**Date**	**Sample Type**																																									
DOWNSTREAM																																												
Channel (BMT-4)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		22-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thompson Creek (BMT-5)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Groundwater Chemical Summary Table

Location Code	Field ID	Date	Sample Type	TRH											BTEX							PAH	Organochlorine Pesticides																					
				TRH C6-C10	TRH C6-C10 less BTEX (F1)	TRH >C10-C16	TRH >C10-C16 less Napthalene (F2)	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum of fractions)	TPH >C10-C16 (SG)	TPH >C16-C34 (SG)	TPH >C34-C40 (SG)	TPH >C10 - C40 fraction (sum) (SG)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene	4,4-DDD	4,4-DDE	4,4-DDT	DDT+DDE+DDD	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	chlordane	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				20	20	50	50	100	100	100	50	100	100	100	1	1	1	1	2	2	1	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.005
ANZG (2018) Freshwater 95% toxicant DGVs															950			350				16			0.01					0.2				0.08				0.02			0.09			0.0002
ANZG (2018) Marine water 95% toxicant DGVs															700							70																0.008						
Offshore (BMT-3)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inshore Bolivar Outlet (BMT-7)		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surface Water (LBWco 2023)																																												
SW01	SW01	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW02	SW02	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW03	SW03	7/11/2023	Primary	<20	<20	60	60	300	<100	360	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW04	SW04	7/11/2023	Primary	<20	<20	390	390	900	<100	1,290	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW05	SW05	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW06	SW06	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW07	SW07	7/11/2023	Primary	<20	<20	110	110	200	<100	310	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SW08	SW08	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SW-DUP-1	*7/11/2023*	*Field_D*	*<20*	*<20*	*<50*	*<50*	*<100*	*<100*	*<100*	-	-	-	-	*<1*	*<1*	*<1*	*<1*	*<2*	*<3*	-	*<10*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.005*
SW09	SW09	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
			DOWNSTREAM Minimum	<20	<20	60	60	200	<100	310	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
			DOWNSTREAM Maximum	<20	<20	390	390	900	<100	1290	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005

				TRH											BTEX							PAH	Organochlorine Pesticides																					
				TRH C6-C10	TRH C6-C10 less BTEX (F1)	TRH >C10-C16	TRH >C10-C16 less Napthalene (F2)	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum of fractions)	TPH >C10-C16 (SG)	TPH >C16-C34 (SG)	TPH >C34-C40 (SG)	TPH >C10 - C40 Fraction (sum) (SG)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene	4,4-DDD	4,4-DDE	4,4-DDT	DDT+DDE+DDD	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	chlordane	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				20	20	50	50	100	100	100	50	100	100	100	1	1	1	1	2	2	1	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.005
ANZG (2018) Freshwater 95% toxicant DGVs															950			350				16			0.01					0.2				0.08				0.02			0.09			0.0002
ANZG (2018) Marine water 95% toxicant DGVs															700							70																0.008						
Location Code	**Field ID**	**Date**	**Sample Type**																																									
Groundwater																																												
SLMW01-P	SLMW01-P	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW01-P	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW01-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW02-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW03-Q1	1/11/2023	Primary	<20	<20	<50	<50	200	<100	200	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW04-P	SLMW04-P	8/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW04-P	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW05-P	SLMW05-P	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW05-P	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW05-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	Dup-2	*1/11/2023*	*Interlab_D*	<20	<20	<100	<100	<100	<100	<100	-	-	-	-	<1	<2	<2	<2	<2	<2	<1	<5	<2	<2	<4	<4	<2	<2	<2	<2	<2	<2	<4	-	<2	<2	<2	<2	-	-	<2	<2	-	-
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	DUP-1	*3/05/2023*	*Interlab_D*	<20	<20	<100	<100	<100	<100	<100	-	-	-	-	<1	<2	<2	<2	<2	<2	<1	<5	<2	<2	<4	<4	<2	<2	<2	<2	<2	<2	<4	-	<2	<2	<2	<2	-	-	<2	<2	-	-
	SLMW06-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	SLMW07-Q1	1/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	DUP 2	*4/05/2023*	*Intralab_D*	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW09-P	SLMW09-P	4/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW10-A	SLMW10-A	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW10-B	SLMW10-B	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW10-C	SLMW10-C	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW11-B	SLMW11-B	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW11-C	SLMW11-C	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW12-A	SLMW12-A	31/10/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW12-B	SLMW12-B	31/10/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW12-C	SLMW12-C	31/10/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	DUP-1	*31/10/2023*	*Intralab_D*	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW13-A	SLMW13-A	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW13-B	SLMW13-B	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
SLMW13-C	SLMW13-C	2/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
6628-21445	6628-21445	8/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
6628-23298	6628-23298	5/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
	6628-23298	7/11/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005	-
6528-2628 (offsite)	6528-2628	4/05/2023	Primary	<20	<20	<50	<50	<100	<100	<100	-	-	-	-	<1	<1	<1	<1	<2	<3	-	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
ONSITE GROUNDWATER Minimum				<20	<20	<50	<50	<100	<100	<100	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005
ONSITE GROUNDWATER Maximum				<20	<20	<50	<50	200	<100	200	<50	<100	<100	<100	<1	<1	<1	<1	<2	<3	<10	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.005

				Phenols							Halogenated Phenols						Halogenated
				3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2-methylphenol	2-nitrophenol	4-chloro-3-methylphenol	Total Phenols	Phenolics Total	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Hexachlorobenzene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				2	1	1	1	1	1	50	1	1	1	1	1	2	0.2
ANZG (2018) Freshwater 95% toxicant DGVs									320			20	160		490	10	
ANZG (2018) Marine water 95% toxicant DGVs									400							22	
Location Code	Field ID	Date	Sample Type														
Surface Water (BMT 2022)																	
UPSTREAM																	
Mouth of Chapman Creek (BMT-1)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Chapman Creek (BMT-2)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			UPSTREAM Minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			UPSTREAM Maximum	-	-	-	-	-	-	-	-	-	-	-	-	-	-

				Phenols							Halogenated Phenols						Halogenated
				3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2-methylphenol	2-nitrophenol	4-chloro-3-methylphenol	Total Phenols	Phenolics Total	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Hexachlorobenzene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				2	1	1	1	1	1	50	1	1	1	1	1	2	0.2
ANZG (2018) Freshwater 95% toxicant DGVs									320			20	160		490	10	
ANZG (2018) Marine water 95% toxicant DGVs									400							22	
Location Code	**Field ID**	**Date**	**Sample Type**														
DOWNSTREAM																	
Channel (BMT-4)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		22-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thompson Creek (BMT-5)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-

				Phenols							Halogenated Phenols						Halogenated
				3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2-methylphenol	2-nitrophenol	4-chloro-3-methylphenol	Total Phenols	Phenolics Total	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Hexachlorobenzene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				2	1	1	1	1	1	50	1	1	1	1	1	2	0.2
ANZG (2018) Freshwater 95% toxicant DGVs									320			20	160		490	10	
ANZG (2018) Marine water 95% toxicant DGVs									400							22	
Location Code	**Field ID**	**Date**	**Sample Type**														
Offshore (BMT-3)		10-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23-Mar-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Apr-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18-May-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Jun-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		27-Jul-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		31-Aug-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		6-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28-Sep-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10-Oct-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		30-Nov-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Dec-22	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		11-Jan-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		9-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-Feb-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		15-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		29-Mar-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17-Apr-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5-May-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inshore Bolivar Outlet (BMT-7)		20-Jun-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4-Jul-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1-Aug-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		13-Sep-23	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surface Water (LBWco 2023)																	
SW01	SW01	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW02	SW02	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW03	SW03	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW04	SW04	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW05	SW05	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW06	SW06	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW07	SW07	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SW08	SW08	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SW-DUP-1	*7/11/2023*	*Field_D*	-	-	-	-	-	-	*<50*	-	-	-	-	-	-	*<0.2*
SW09	SW09	7/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
DOWNSTREAM Minimum				-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
DOWNSTREAM Maximum				-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2

Location Code	Field ID	Date	Sample Type	3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2-methylphenol	2-nitrophenol	4-chloro-3-methylphenol	Total Phenols	Phenolics Total	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Hexachlorobenzene
				Phenols							Halogenated Phenols						Halogenated
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				2	1	1	1	1	1	50	1	1	1	1	1	2	0.2
ANZG (2018) Freshwater 95% toxicant DGVs									320			20	160		490	10	
ANZG (2018) Marine water 95% toxicant DGVs									400							22	
Groundwater																	
SLMW01-P	SLMW01-P	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW01-P	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW01-Q1	SLMW01-Q1	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW01-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW02-Q1	SLMW02-Q1	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW02-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW03-Q1	SLMW03-Q1	3/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW03-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW04-P	SLMW04-P	8/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW04-P	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW05-P	SLMW05-P	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW05-P	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW05-Q1	SLMW05-Q1	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW05-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	Dup-2	*1/11/2023*	*Interlab_D*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*-*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*-*
SLMW06-Q1	SLMW06-Q1	3/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	DUP-1	*3/05/2023*	*Interlab_D*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*-*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*-*
	SLMW06-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW07-Q1	SLMW07-Q1	3/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	SLMW07-Q1	1/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW08-Q1	SLMW08-Q1	4/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	DUP 2	*4/05/2023*	*Intralab_D*	*-*	*-*	*-*	*-*	*-*	*-*	*<500*	*-*	*-*	*-*	*-*	*-*	*-*	*<0.2*
SLMW09-P	SLMW09-P	4/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW10-A	SLMW10-A	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW10-B	SLMW10-B	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW10-C	SLMW10-C	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW11-B	SLMW11-B	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW11-C	SLMW11-C	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW12-A	SLMW12-A	31/10/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW12-B	SLMW12-B	31/10/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW12-C	SLMW12-C	31/10/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	DUP-1	*31/10/2023*	*Intralab_D*	*-*	*-*	*-*	*-*	*-*	*-*	*<50*	*-*	*-*	*-*	*-*	*-*	*-*	*<0.2*
SLMW13-A	SLMW13-A	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW13-B	SLMW13-B	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
SLMW13-C	SLMW13-C	2/11/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
6628-21445	6628-21445	8/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
6628-23298	6628-23298	5/05/2023	Primary	-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
	6628-23298	7/11/2023	Primary	-	-	-	-	-	<50	-	-	-	-	-	-	-	<0.2
6528-2628 (offsite)	6528-2628	4/05/2023	Primary	-	-	-	-	-	-	<500	-	-	-	-	-	-	<0.2
ONSITE GROUNDWATER Minimum				-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2
ONSITE GROUNDWATER Maximum				-	-	-	-	-	-	<50	-	-	-	-	-	-	<0.2

Appendix K

Laboratory Certificates and Chain of Custody Documentation

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

104 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 59 126 992 274

LABORATORY TESTING ORDER

Project Title: Riverlea Dewatering Assessment
Job Number: 231445-01
Project Manager: Tess O'Leary
Email: tess.ole...@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au, lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: 230303LBWS

Secondary Laboratory: ALS
Laboratory Quote Ref: ADBQ-001-18_LBWco_SO

LBW co's COC REFERENCE (sample delivery group)
231445-01_COC_20230503

Turnaround Required
Standard (5 Day)

SAMPLE DETAILS				CHEMICAL TESTING REQUIRED																											
Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	BOD 5 Day	pH	TSS	TDS	...A (plus additional metals)	B19E	OCP	Sulfate as S	Sulfide as S	Sulfite as S	Cyanide	Phenolics (total) - Spectrophotometric technique	M13	TRH C6-C10		W-3 (13 Metals)	W-4 (TRH/BTEX)	EP075I (OCP)	EP075A (Phenols)	EP030 (BOD 5 day)	ED041 (sulfate)	ED085 (sulfide)	Total Suspended Solids	Total Dissolved Solids	Cyanide (total)	EK026 (sulfite)	NT-8A	HOLD
03-May-23	SLMW03-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X																
03-May-23	SLMW06-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X																
03-May-23	SLMW07-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X																
03-May-23	DUP-1	Water	Forward to ALS																X	X	X	X	X	X	X	X	X	X	X	X	
03-May-23	RINSE-1	Water														X															X
03-May-23	TB-1	Water															X														X
LBW co AUTHORISATION		LABORATORY RECEIPT		3	3	3	3	3	3	3	3	3	3	3	3	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	22

LBW co AUTHORISATION	LABORATORY RECEIPT
Requested by: T O'Leary	Received by:
Date\time requested: 03-May-23	Date\time received:
Signature:	Signature:

Additional Comments

Please forward sample DUP-1 to ALS for analysis

Analysis as per quote 230303LBWS

4986469
4/5/23

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 125 992 274

12

COPY

LABORATORY TESTING ORDER

Project Title: Riverlea Dewatering Assessment
Job Number: 231445-01
Project Manager: Tess O'Leary
Email: [illegible]s.ole[illegible]@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au, lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: 230303LBWS
Secondary Laboratory: ALS
Laboratory Quote Ref: ADBQ-001-18_LBWco_SO

LBW co's COC REFERENCE (sample delivery group)
231445-01_COC_20230503

Turnaround Required
Standard (5 Day)

SAMPLE DETAILS / CHEMICAL TESTING REQUIRED

Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	BOD 5 Day	pH	TSS	TDS	A (plus additional metals)	RYE	OCP	Sulfate as S	Sulfide as S	Sulfite as S	Cyanide	Phenolics (total) - Spectrophotometric technique	M13	TRH C6-C10	
03-May-23	SLMW03-Q1	Water		x	x	x	x	x	x	x	x	x	x	x	x			
03-May-23	SLMW04-Q1	Water		x	x	x	x	x	x	x	x	x	x	x	x			
03-May-23	SLMW07-Q1	Water		x	x	x	x	x	x	x	x	x	x	x	x			
03-May-23	DUP-1	Water	Forward to ALS															
03-May-23	RINSE-1	Water														x		
03-May-23	TB-1	Water															x	
				3	3	3	3	3	3	3	3	3	3	3	3	1	1	0

Sample ID	W-3 (13 Metals)	W-4 (TRH/BTEX)	EP075I (OCP)	EP075A (Phenols)	EP030 (BOD 5 day)	ED041 (sulfate)	ED085 (sulfide)	Total Suspended Solids	Total Dissolved Solids	Cyanide (total)	EK026 (sulfite)	NT-8A	HOLD
SLMW03-Q1													
SLMW04-Q1													
SLMW07-Q1													
DUP-1	x	x	x	x	x	x	x	x	x	x	x	x	
RINSE-1													x
TB-1													x
	1	1	1	1	1	1	1	1	1	1	1	1	22

LBW co AUTHORISATION	LABORATORY RECEIPT
Requested by: T O'Leary	Received by:
Date\time requested: 03-May-23	Date\time received:
Signature:	Signature:

Additional Comments

Please forward sample DUP-1 to ALS for analysis

Analysis as per quote 230303LBWS

4986469
[illegible]
4/5/23

Tyrone Gowans

From:	Tess O Leary <tess.oleary@lbwco.com.au>
Sent:	Wednesday, 3 May 2023 5:44 PM
To:	#AU_CAU001_EnviroSampleVic; Amy Meunier
Cc:	Jarrod Bishop
Subject:	LTO for Job 231445-01
Attachments:	231445-01_LTO_230503.pdf
Categories:	Incoming Transit

Hi Amy / Sample Receipt

Please find attached testing order for water samples dropped to Parimal this afternoon. Please use quote 230303LBWS.

Let me know if there are any queries relating to this.

Kind regards
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

lbw co
DELIVERING
ENVIRONMENTAL
SOLUTIONS

CELEBRATING 15 YEARS

The last 15 years wouldn't have been possible without our fabulous team, our valued clients, our trusted suppliers, and our support network. We wouldn't be LBWco without you all - thank you!

08 8331 2417
0405 480 106
www.lbwco.com.au

#98 6469
4/5/23

lbw co DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea SALTWATER DEWATERING
Job Number: 231445-01
Project manager: Annabel Geitz
Email: annabel.geitz@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: Price Book 2017-2018
Secondary lab: ALS
ADBQ-001-18_LBWco_SO

COC Reference: (sample delivery group) 231445-01_COC20230503

Sample Details 1	Sample Details 2
SLMW03-Q1 231445-01 WATER 03/05/2023	**SLMW06-Q1** LBW Job#: 231445-01 Matrix: Water Date: 03/05/2023
SLMW07-Q1 LBW Job#: 231445-01 Matrix: Water Date: 03/05/2023	**DUP-1** LBW Job#: 231445-01 Matrix: Water Date: 03/05/2023
RINSE-1 231445-01 3/5/23	TB-1 231445-01 3/5/23

Sample Custody - Step 1

Relinquished by: GAETANO GARFI
Date/Time Relinquished: 3/5/23 4.00 pm
Signature:
Courier and consignment number:
Received by: Pasqual
Date/Time Received: 03/05 4 pm
Signature:

10.2°C
+0.3°C
10.5°C
on IB

Sample Custody - Step 2

Relinqished by:
Date/Time Relinquished:
Signature:
Courier and consignment number: H986469 4/5/23
Received by:
Date/Time Received:
Signature:

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West NSW 2304
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	Tel: +61 2 4968 8448
Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	NATA# 1261
NATA# 1261 Site# 1254	NATA# 1261 Site# 25403	NATA# 1261 Site# 18217	NATA# 1261 Site# 25466	NATA# 1261 Site# 20794	Site# 25079 & 25289

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Christchurch
35 O'Rorke Road	43 Detroit Drive
Penrose,	Rolleston,
Auckland 1061	Christchurch 7675
Tel: +64 9 526 45 51	Tel: 0800 856 450
IANZ# 1327	IANZ# 1290

Sample Receipt Advice

Company name:	LBW co Pty Ltd
Contact name:	- cc ALL RESULTS - SEND TO PM AS WELL
Project name:	RIVERLEA DEWATERING ASSESSMENT
Project ID:	231445-01
Turnaround time:	5 Day
Date/Time received	May 3, 2023 5:44 PM
Eurofins reference	986469

Sample Information

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

Notes

Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Amy Meunier on phone : or by email: AmyMeunier@eurofins.com

Results will be delivered electronically via email to - cc ALL RESULTS - SEND TO PM AS WELL - results@lbwco.com.au.

Note: A copy of these results will also be delivered to the general LBW co Pty Ltd email address.

Global Leader - Results you can trust

eurofins | Environment Testing

Certificate of Analysis

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **TESS O'LEARY**

Report **986469-W**
Project name RIVERLEA DEWATERING ASSESSMENT
Project ID 231445-01
Received Date May 03, 2023

Client Sample ID			**SLMW03-Q1**	**SLMW06-Q1**	**SLMW07-Q1**	**RINSE-1**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-My0011351**	**M23-My0011352**	**M23-My0011353**	**M23-My0011354**
Date Sampled			**May 03, 2023**	**May 03, 2023**	**May 03, 2023**	**May 03, 2023**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	-
4-Bromofluorobenzene (surr.)	1	%	102	112	123	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	-
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-

Client Sample ID			SLMW03-Q1	SLMW06-Q1	SLMW07-Q1	RINSE-1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0011351	M23-My0011352	M23-My0011353	M23-My0011354
Date Sampled			May 03, 2023	May 03, 2023	May 03, 2023	May 03, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Dibutylchlorendate (surr.)	1	%	59	91	80	-
Tetrachloro-m-xylene (surr.)	1	%	68	103	88	-
Ammonia (as N)	0.01	mg/L	0.03	< 0.01	0.06	-
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Nitrate & Nitrite (as N)	0.05	mg/L	0.11	1.1	2.4	-
Nitrate (as N)	0.02	mg/L	0.11	1.1	2.3	-
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	0.13	-
Organic Nitrogen (as N)*	0.2	mg/L	0.97	< 0.2	8.04	-
pH (at 25 °C)	0.1	pH Units	7.9	8.2	8.3	-
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Phosphate total (as P)	0.01	mg/L	0.21	0.10	0.21	-
Phosphorus reactive (as P)	0.01	mg/L	0.03	0.02	0.09	-
Sulphate (as SO4)	5	mg/L	1200	780	870	-
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
Sulphite (as S)	0.5	mg/L	< 50	< 1	< 1	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	9700	5600	7000	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	< 0.2	8.1	-
Total Nitrogen (as N)*	0.2	mg/L	1.11	1.1	10.5	-
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	9800	160	53	-
Heavy Metals						
Aluminium	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Arsenic	0.001	mg/L	< 0.001	< 0.001	0.002	-
Arsenic (filtered)	0.001	mg/L	-	-	-	< 0.001
Barium	0.02	mg/L	0.02	< 0.02	0.03	-
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Beryllium (filtered)	0.001	mg/L	-	-	-	< 0.001
Boron	0.05	mg/L	4.0	5.6	7.4	-
Boron (filtered)	0.05	mg/L	-	-	-	< 0.05
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Cadmium (filtered)	0.0002	mg/L	-	-	-	< 0.0002
Chromium	0.001	mg/L	< 0.001	0.002	< 0.001	-
Chromium (filtered)	0.001	mg/L	-	-	-	< 0.001
Cobalt	0.001	mg/L	0.002	< 0.001	< 0.001	-

Client Sample ID			SLMW03-Q1	SLMW06-Q1	SLMW07-Q1	RINSE-1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0011351	M23-My0011352	M23-My0011353	M23-My0011354
Date Sampled			May 03, 2023	May 03, 2023	May 03, 2023	May 03, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Cobalt (filtered)	0.001	mg/L	-	-	-	< 0.001
Copper	0.001	mg/L	0.003	0.002	0.004	-
Copper (filtered)	0.001	mg/L	-	-	-	< 0.001
Iron	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Lead (filtered)	0.001	mg/L	-	-	-	< 0.001
Manganese	0.005	mg/L	0.16	0.035	0.014	-
Manganese (filtered)	0.005	mg/L	-	-	-	< 0.005
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	-
Mercury (filtered)	0.0001	mg/L	-	-	-	< 0.0001
Nickel	0.001	mg/L	0.019	0.003	0.027	-
Nickel (filtered)	0.001	mg/L	-	-	-	< 0.001
Selenium	0.001	mg/L	0.001	0.019	0.066	-
Selenium (filtered)	0.001	mg/L	-	-	-	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Zinc	0.005	mg/L	0.009	0.009	< 0.005	-
Zinc (filtered)	0.005	mg/L	-	-	-	< 0.005

Client Sample ID			TB-1
Sample Matrix			Water
Eurofins Sample No.			M23-My0011355
Date Sampled			May 03, 2023
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
TRH C6-C10	0.02	mg/L	< 0.02

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 05, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 05, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 05, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	May 05, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	May 05, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12	Melbourne	May 05, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons	Melbourne	May 05, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Organochlorine Pesticides	Melbourne	May 05, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	May 05, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	May 05, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	May 05, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	May 05, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	May 05, 2023	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Sulphide (as S)	Melbourne	May 09, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as S)	Melbourne	May 05, 2023	28 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 05, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Heavy Metals	Melbourne	May 11, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
NEPM 2013 Filtered Metals without Cr6+ (As, Be, B, Cd, Co, Cr, Cu, Hg, Pb, Ni, Mn, Se, Zn)	Melbourne	May 05, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	May 05, 2023	28 Days
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Nitrate & Nitrite (as N)	Melbourne	May 05, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrate (as N)	Melbourne	May 05, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrite (as N)	Melbourne	May 05, 2023	2 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Organic Nitrogen (as N)*	Melbourne	May 11, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphate total (as P)	Melbourne	May 05, 2023	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Phosphorus reactive (as P)	Melbourne	May 05, 2023	2 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 05, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	May 05, 2023	28 Days

- Method: LTM-INO-4170 Total Dissolved Solids in Water

Company Name: LBW co Pty Ltd
Address: 184 Magill Road
Norwood
SA 5069

Project Name: RIVERLEA DEWATERING ASSESSMENT
Project ID: 231445-01

Order No.:
Report #: 986469
Phone: 08 8331 2417
Fax: 08 8331 2415

Received: May 3, 2023 5:44 PM
Due: May 9, 2023
Priority: 5 Day
Contact Name: - cc ALL RESULTS - SEND TO PM

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as S)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	NEPM 2013 Filtered Metals without Cr6+ (As, Be, B, Cd, Co, Cr, Cu, Hg, Pb, Ni, Mn,	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																			
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	SLMW03-Q1	May 03, 2023		Water	M23-My0011351	X	X	X	X	X	X	X	X		X	X	X		X
2	SLMW06-Q1	May 03, 2023		Water	M23-My0011352	X	X	X	X	X	X	X	X		X	X	X		X
3	SLMW07-Q1	May 03, 2023		Water	M23-My0011353	X	X	X	X	X	X	X	X		X	X	X		X
4	RINSE-1	May 03, 2023		Water	M23-My0011354													X	
5	TB-1	May 03, 2023		Water	M23-My0011355									X					
Test Counts						3	3	3	3	3	3	3	3	1	3	3	3	1	3

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Eurofins Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Silver	mg/L	< 0.005			0.005	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	103			70-130	Pass	
TRH C6-C10	%	104			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	89			70-130	Pass	
Toluene	%	86			70-130	Pass	
Ethylbenzene	%	87			70-130	Pass	
m&p-Xylenes	%	93			70-130	Pass	
Xylenes - Total*	%	91			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	94			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	89			70-130	Pass	
4.4'-DDD	%	102			70-130	Pass	
4.4'-DDE	%	93			70-130	Pass	
4.4'-DDT	%	93			70-130	Pass	
a-HCH	%	93			70-130	Pass	
Aldrin	%	87			70-130	Pass	
b-HCH	%	97			70-130	Pass	
d-HCH	%	97			70-130	Pass	
Dieldrin	%	92			70-130	Pass	
Endosulfan I	%	92			70-130	Pass	
Endosulfan II	%	93			70-130	Pass	
Endosulfan sulphate	%	101			70-130	Pass	
Endrin	%	108			70-130	Pass	
Endrin aldehyde	%	89			70-130	Pass	
Endrin ketone	%	91			70-130	Pass	
g-HCH (Lindane)	%	93			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor			%	101			70-130	Pass	
Heptachlor epoxide			%	88			70-130	Pass	
Hexachlorobenzene			%	87			70-130	Pass	
Methoxychlor			%	97			70-130	Pass	
LCS - % Recovery									
Total Kjeldahl Nitrogen (as N)			%	84			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M23-My0011351	CP	%	106			70-130	Pass	
TRH C6-C10	M23-My0011351	CP	%	105			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M23-My0011351	CP	%	98			70-130	Pass	
Toluene	M23-My0011351	CP	%	94			70-130	Pass	
Ethylbenzene	M23-My0011351	CP	%	95			70-130	Pass	
m&p-Xylenes	M23-My0011351	CP	%	103			70-130	Pass	
o-Xylene	M23-My0011351	CP	%	96			70-130	Pass	
Xylenes - Total*	M23-My0011351	CP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M23-My0011351	CP	%	86			70-130	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-My0011351	CP	%	74			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M23-My0011351	CP	%	92			75-125	Pass	
Barium	M23-My0011351	CP	%	120			75-125	Pass	
Beryllium	M23-My0011351	CP	%	92			75-125	Pass	
Cadmium	M23-My0011351	CP	%	84			75-125	Pass	
Chromium	M23-My0011351	CP	%	100			75-125	Pass	
Cobalt	M23-My0011351	CP	%	95			75-125	Pass	
Copper	M23-My0011351	CP	%	96			75-125	Pass	
Lead	M23-My0011351	CP	%	84			75-125	Pass	
Mercury	M23-My0011351	CP	%	91			75-125	Pass	
Nickel	M23-My0011351	CP	%	110			75-125	Pass	
Selenium	M23-My0011351	CP	%	86			75-125	Pass	
Silver	M23-My0011351	CP	%	80			75-125	Pass	
Tin	M23-My0011351	CP	%	93			75-125	Pass	
Zinc	M23-My0011351	CP	%	119			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M23-My0011351	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	M23-My0011351	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium	M23-My0011351	CP	mg/L	0.02	0.02	<1	30%	Pass	
Beryllium	M23-My0011351	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	M23-My0011351	CP	mg/L	4.0	4.0	<1	30%	Pass	
Cadmium	M23-My0011351	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M23-My0011351	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	M23-My0011351	CP	mg/L	0.002	0.002	<1	30%	Pass	
Copper	M23-My0011351	CP	mg/L	0.003	0.003	<1	30%	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron	M23-My0011351	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead	M23-My0011351	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	M23-My0011351	CP	mg/L	0.16	0.16	<1	30%	Pass	
Mercury	M23-My0011351	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M23-My0011351	CP	mg/L	0.019	0.019	<1	30%	Pass	
Selenium	M23-My0011351	CP	mg/L	0.001	0.001	<1	30%	Pass	
Silver	M23-My0011351	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin	M23-My0011351	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	M23-My0011351	CP	mg/L	0.009	0.009	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-My0011352	CP	mg/L	< 0.01	0.01	29	30%	Pass	
Nitrate & Nitrite (as N)	M23-My0011352	CP	mg/L	1.1	1.2	2.0	30%	Pass	
Nitrite (as N)	M23-My0011352	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

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Environment Testing

Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Amy Meunier	Analytical Services Manager
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Harry Bacalis	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal
Mele Singh	Senior Analyst-Volatile

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

LABORATORY TESTING ORDER

Project Title: Riverlea Dewatering Assessment
Job Number: 231445-01
Project Manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: 230303LBWS
Secondary Laboratory: ALS
Laboratory Quote Ref: ADBQ-001-18_LBWco_SO

LBW co's COC REFERENCE (sample delivery group)
231445-01_COC_20230504

Turnaround Required
Standard (5 Day)

SAMPLE DETAILS				CHEMICAL TESTING REQUIRED															
Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	BOD 5 Day	pH	TSS	TDS	B6A (plus additional metals)	B19E	OCP	Sulfate as S	Sulfide as S	Sulfite as S	Cyanide	Phenolics (total) - Spectrophotometric technique	M13	TRH C6-C10		HOLD
04-May-23	SLMW08-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X				
04-May-23	6528-2628	Water		X	X	X	X	X	X	X	X	X	X	X	X				
04-May-23	SLMW09-P	Water		X	X	X	X	X	X	X	X	X	X	X	X				
04-May-23	RINSE-2	Water														X			
04-May-23	TB-02	Water															X		
LBW co AUTHORISATION		LABORATORY RECEIPT		3	3	3	3	3	3	3	3	3	3	3	3	1	1	0	19

LBW co AUTHORISATION	LABORATORY RECEIPT	Additional Comments
Requested by: T O'Leary	Received by:	Analysis as per quote 230303LBWS
Date\time requested: 04-May-23	Date\time received:	
Signature	Signature:	

986841
5/5

231445-01_COC_GW sampling.xlsx

Tyrone Gowans

From:	Amy Meunier
Sent:	Thursday, 4 May 2023 6:17 PM
To:	#AU_CAU001_EnviroSampleVic
Subject:	FW: Testing Order - Job 231445-01
Attachments:	231445-01_LTO_230504.pdf
Categories:	Incoming Transit

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

COC attached for transit samples tomorrow.

Kind regards,

Amy Meunier

Analytical Services Manager
Mobile : +61 477 574 867
Email : AmyMeunier@eurofins.com

Eurofins
6 Monterey Road,
Dandenong VIC 3175
Australia

To see Eurofins full Field Services Capabilities click here

From: Tess O Leary <tess.oleary@lbwco.com.au>
Sent: Thursday, 4 May 2023 5:41 PM
To: #AU_CAU001_EnviroSampleVic <EnviroSampleVic@eurofins.com>; Amy Meunier <AmyMeunier@eurofins.com>
Cc: Jarrod Bishop <jarrod.bishop@lbwco.com.au>
Subject: Testing Order - Job 231445-01

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins.
Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Amy

Please see attached testing order for samples dropped to Parimal this afternoon.

If there are any queries, please let me know.

Kind regards
Tess

#986844
5/5

Tess O'Leary
Senior Environmental Advisor | Team Leader

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184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Dewatering GME
Job Number: 231445-01
Project manager: Annabel Geitz
Email: annabel.geitz@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: Price Book 2017-2018

Secondary lab: Envirolab
19SA158

COC Reference: (sample delivery group) 231445-01_COC_20230504

Sample Details 1	Sample Details 2
SLMW08-Q1 LBW Job#: 231445-01 Matrix: Water Date: 04/05/2023	**6528-2628** LBW Job#: 231445-01 Matrix: Water Date: 04/05/2023
TB-02 231445-01 04/05/2023	**Rinse-2** LBW Job#: 231445-01 Matrix: Water Date: 04/05/2023

Sample Custody - Step 1

Relinqished by: Gaetano Garfi

Date/Time Relinquished: 04/05/2023 3.50pm

Signature: [signature]

Courier and consignment number:

Received by: Pasqual.

Date/Time Received: 04/05 4pm.

Signature: [signature]

Sample Custody - Step 2

Relinqished by:

Date/Time Relinquished:

Signature:

Courier and consignment number:

Received by: #986841

Date/Time Received: 5/5

Signature:

Tyrone Gowans

From:	Tess O Leary <tess.oleary@lbwco.com.au>
Sent:	Monday, 8 May 2023 8:48 AM
To:	#AU_CAU001_EnviroSampleVic; Amy Meunier
Subject:	RE: Eurofins Sample Receipt Advice - Report 986841 : Site RIVERLEA DEWARTERING ASSESSMENT (231445-01)
Importance:	High
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Amy / Sample Receipt

Could you please assign testing to sample DUP-2? Same testing as sample SLMW08-Q1.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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08 8331 2417
0405 480 106
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From: EnviroSampleVic@eurofins.com <EnviroSampleVic@eurofins.com>
Sent: Friday, May 5, 2023 3:04 PM
To: Tess O Leary <tess.oleary@lbwco.com.au>
Subject: Eurofins Sample Receipt Advice - Report 986841 : Site RIVERLEA DEWARTERING ASSESSMENT (231445-01)

Dear Valued Client,

Sample DUP 2 received instead of SLMW09-P

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

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention: **TESS O'LEARY**

Report **986841-W**
Project name RIVERLEA DEWARTERING ASSESSMENT
Project ID 231445-01
Received Date May 05, 2023

Client Sample ID			**SLMW08-Q1**	**6528-2628**	**RINSE-2**	**TB-02**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-My0014385**	**M23-My0014386**	**M23-My0014387**	**M23-My0014388**
Date Sampled			**May 04, 2023**	**May 04, 2023**	**May 04, 2023**	**May 04, 2023**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	-	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	-	-
Toluene	0.001	mg/L	< 0.001	< 0.001	-	-
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	-	-
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	-	-
o-Xylene	0.001	mg/L	< 0.001	< 0.001	-	-
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	-	-
4-Bromofluorobenzene (surr.)	1	%	105	101	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	-	-
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	-	-
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	-	-
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	-	-
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	-	-

Client Sample ID			SLMW08-Q1	6528-2628	RINSE-2	TB-02
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014385	M23-My0014386	M23-My0014387	M23-My0014388
Date Sampled			May 04, 2023	May 04, 2023	May 04, 2023	May 04, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	-	-
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Toxaphene	0.005	mg/L	< 0.005	< 0.005	-	-
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	-	-
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	-	-
Dibutylchlorendate (surr.)	1	%	55	72	-	-
Tetrachloro-m-xylene (surr.)	1	%	72	84	-	-
Ammonia (as N)	0.01	mg/L	0.21	0.89	-	-
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	-	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	-	-
Nitrate & Nitrite (as N)	0.05	mg/L	0.11	< 0.05	-	-
Nitrate (as N)	0.02	mg/L	0.11	< 0.02	-	-
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
Organic Nitrogen (as N)*	0.2	mg/L	1.69	1.31	-	-
pH (at 25 °C)	0.1	pH Units	8.0	7.6	-	-
Phenolics (total)	0.05	mg/L	< 0.05	< 0.5	-	-
Phosphate total (as P)	0.01	mg/L	0.04	0.85	-	-
Phosphorus reactive (as P)	0.01	mg/L	0.02	0.02	-	-
Sulphate (as SO4)	5	mg/L	750	7600	-	-
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	-	-
Sulphite (as SO3)	0.5	mg/L	< 6.5	< 6.5	-	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	5900	99000	-	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.9	2.2	-	-
Total Nitrogen (as N)*	0.2	mg/L	2.01	2.2	-	-
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	24	1200	-	-
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	-	-
Arsenic (filtered)	0.001	mg/L	< 0.001	0.002	< 0.001	-
Barium (filtered)	0.02	mg/L	0.07	0.05	-	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Boron (filtered)	0.05	mg/L	1.4	11	< 0.05	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Cobalt (filtered)	0.001	mg/L	0.001	0.005	< 0.001	-
Copper (filtered)	0.001	mg/L	0.002	0.048	< 0.001	-
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	-	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Manganese (filtered)	0.005	mg/L	0.036	0.17	< 0.005	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	-

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Client Sample ID			SLMW08-Q1	6528-2628	RINSE-2	TB-02
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014385	M23-My0014386	M23-My0014387	M23-My0014388
Date Sampled			May 04, 2023	May 04, 2023	May 04, 2023	May 04, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	0.031	0.018	< 0.001	-
Selenium (filtered)	0.001	mg/L	0.006	< 0.001	< 0.001	-
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Zinc (filtered)	0.005	mg/L	0.006	0.027	< 0.005	-

Client Sample ID			DUP 2
Sample Matrix			Water
Eurofins Sample No.			M23-My0014389
Date Sampled			May 04, 2023
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	103
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
Organochlorine Pesticides			
Chlordanes - Total	0.002	mg/L	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002

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Environment Testing

Client Sample ID			DUP 2
Sample Matrix			Water
Eurofins Sample No.			M23-My0014389
Date Sampled			May 04, 2023
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
Endrin	0.0002	mg/L	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002
Toxaphene	0.005	mg/L	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002
Dibutylchlorendate (surr.)	1	%	78
Tetrachloro-m-xylene (surr.)	1	%	82
Ammonia (as N)	0.01	mg/L	0.19
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	0.13
Nitrate (as N)	0.02	mg/L	0.12
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.81
pH (at 25 °C)	0.1	pH Units	8.0
Phenolics (total)	0.05	mg/L	< 0.5
Phosphate total (as P)	0.01	mg/L	0.06
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Sulphate (as SO4)	5	mg/L	740
Sulphide (as S)	0.1	mg/L	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 6.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	8100
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0
Total Nitrogen (as N)*	0.2	mg/L	1.13
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	15
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.07
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	1.4
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.001
Copper (filtered)	0.001	mg/L	0.002
Iron (filtered)	0.05	mg/L	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.037
Mercury (filtered)	0.0001	mg/L	< 0.0001

Client Sample ID			DUP 2
Sample Matrix			Water
Eurofins Sample No.			M23-My0014389
Date Sampled			May 04, 2023
Test/Reference	LOR	Unit	
Heavy Metals			
Nickel (filtered)	0.001	mg/L	0.030
Selenium (filtered)	0.001	mg/L	0.006
Silver (filtered)	0.005	mg/L	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.006

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	May 08, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	May 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Organochlorine Pesticides	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	May 08, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	May 08, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	May 08, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	May 08, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Sulphide (as S)	Melbourne	May 10, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as SO3)	Melbourne	May 08, 2023	2 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 08, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Heavy Metals (filtered)	Melbourne	May 08, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	May 08, 2023	28 Days
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Nitrate & Nitrite (as N)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrate (as N)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrite (as N)	Melbourne	May 08, 2023	2 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Organic Nitrogen (as N)*	Melbourne	May 08, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphate total (as P)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Phosphorus reactive (as P)	Melbourne	May 08, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 08, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Mobil Metals : Metals M15	Melbourne	May 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name:	LBW co Pty Ltd	**Order No.:**		**Received:**	May 5, 2023 5:41 PM
Address:	184 Magill Road Norwood SA 5069	**Report #:**	986841	**Due:**	May 15, 2023
		Phone:	08 8331 2417	**Priority:**	5 Day
		Fax:	08 8331 2415	**Contact Name:**	TESS O'LEARY
Project Name:	RIVERLEA DEWARTERING ASSESSMENT				
Project ID:	231445-01				

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Barium (filtered)	Biochemical Oxygen Demand (BOD-5 Day)	Chromium (filtered)	Cyanide (total)	Iron (filtered)	pH (at 25 °C)	Phenolics (total)	Silver (filtered)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as SO3)	Tin (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A (filtered metals)	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																				
1	SLMW08-Q1	May 04, 2023		Water	M23-My0014385	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
2	6528-2628	May 04, 2023		Water	M23-My0014386	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
3	RINSE-2	May 04, 2023		Water	M23-My0014387																	X			
4	TB-02	May 04, 2023		Water	M23-My0014388															X					
5	DUP 2	May 04, 2023		Water	M23-My0014389	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Test Counts						3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	3	1	3	3	3

Environment Testing

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

eurofins Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	96			70-130	Pass	
TRH C10-C14	%	102			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
TRH >C10-C16	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	86			70-130	Pass	
Toluene	%	85			70-130	Pass	
Ethylbenzene	%	82			70-130	Pass	
m&p-Xylenes	%	82			70-130	Pass	
Xylenes - Total*	%	83			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	78			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	87			70-130	Pass	
4.4'-DDD	%	97			70-130	Pass	
4.4'-DDE	%	99			70-130	Pass	
4.4'-DDT	%	111			70-130	Pass	
a-HCH	%	89			70-130	Pass	
Aldrin	%	88			70-130	Pass	
b-HCH	%	106			70-130	Pass	
d-HCH	%	97			70-130	Pass	
Dieldrin	%	89			70-130	Pass	
Endosulfan I	%	99			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan II	%	106			70-130	Pass	
Endosulfan sulphate	%	106			70-130	Pass	
Endrin	%	114			70-130	Pass	
Endrin aldehyde	%	93			70-130	Pass	
Endrin ketone	%	121			70-130	Pass	
g-HCH (Lindane)	%	95			70-130	Pass	
Heptachlor	%	99			70-130	Pass	
Heptachlor epoxide	%	77			70-130	Pass	
Hexachlorobenzene	%	79			70-130	Pass	
Methoxychlor	%	123			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	120			70-130	Pass	
Chromium (hexavalent)	%	92			70-130	Pass	
Cyanide (total)	%	100			70-130	Pass	
Nitrate & Nitrite (as N)	%	128			70-130	Pass	
Nitrite (as N)	%	108			70-130	Pass	
Phenolics (total)	%	104			70-130	Pass	
Phosphate total (as P)	%	106			70-130	Pass	
Phosphorus reactive (as P)	%	94			70-130	Pass	
Sulphate (as SO4)	%	108			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	120			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	129			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	102			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	98			80-120	Pass	
Arsenic (filtered)	%	95			80-120	Pass	
Boron (filtered)	%	81			80-120	Pass	
Cadmium (filtered)	%	97			80-120	Pass	
Chromium (filtered)	%	99			80-120	Pass	
Cobalt (filtered)	%	99			80-120	Pass	
Copper (filtered)	%	100			80-120	Pass	
Iron (filtered)	%	99			80-120	Pass	
Lead (filtered)	%	99			80-120	Pass	
Manganese (filtered)	%	100			80-120	Pass	
Mercury (filtered)	%	93			80-120	Pass	
Nickel (filtered)	%	100			80-120	Pass	
Selenium (filtered)	%	95			80-120	Pass	
Silver (filtered)	%	94			80-120	Pass	
Tin (filtered)	%	95			80-120	Pass	
Zinc (filtered)	%	96			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C10-C14	M23-My0014425	NCP	%	84			70-130	Pass	
TRH >C10-C16	M23-My0014425	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	B23-My0006056	NCP	%	79			70-130	Pass	
4.4'-DDD	B23-My0006056	NCP	%	87			70-130	Pass	
4.4'-DDE	B23-My0006056	NCP	%	80			70-130	Pass	
4.4'-DDT	B23-My0006056	NCP	%	86			70-130	Pass	
a-HCH	B23-My0006056	NCP	%	73			70-130	Pass	
Aldrin	B23-My0006056	NCP	%	72			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
b-HCH	B23-My0006056	NCP	%	87			70-130	Pass	
d-HCH	B23-My0006056	NCP	%	83			70-130	Pass	
Dieldrin	B23-My0006056	NCP	%	76			70-130	Pass	
Endosulfan I	B23-My0006056	NCP	%	83			70-130	Pass	
Endosulfan II	B23-My0006056	NCP	%	91			70-130	Pass	
Endosulfan sulphate	B23-My0006056	NCP	%	85			70-130	Pass	
Endrin	B23-My0006056	NCP	%	77			70-130	Pass	
Endrin aldehyde	B23-My0006056	NCP	%	74			70-130	Pass	
Endrin ketone	B23-My0006056	NCP	%	84			70-130	Pass	
g-HCH (Lindane)	B23-My0006056	NCP	%	76			70-130	Pass	
Heptachlor	B23-My0006056	NCP	%	83			70-130	Pass	
Heptachlor epoxide	B23-My0006056	NCP	%	72			70-130	Pass	
Hexachlorobenzene	B23-My0006056	NCP	%	83			70-130	Pass	
Methoxychlor	B23-My0006056	NCP	%	72			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrite (as N)	M23-My0016033	NCP	%	108			70-130	Pass	
Phosphate total (as P)	B23-My0007982	NCP	%	87			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-My0013797	NCP	%	93			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-My0018317	NCP	%	108			75-125	Pass	
Arsenic (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Barium (filtered)	M23-My0018317	NCP	%	98			75-125	Pass	
Beryllium (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Cadmium (filtered)	M23-My0018317	NCP	%	105			75-125	Pass	
Chromium (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Cobalt (filtered)	M23-My0018317	NCP	%	104			75-125	Pass	
Copper (filtered)	M23-My0018317	NCP	%	104			75-125	Pass	
Iron (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Lead (filtered)	M23-My0018317	NCP	%	110			75-125	Pass	
Manganese (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Mercury (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Nickel (filtered)	M23-My0018317	NCP	%	104			75-125	Pass	
Selenium (filtered)	M23-My0018317	NCP	%	105			75-125	Pass	
Silver (filtered)	M23-My0018317	NCP	%	100			75-125	Pass	
Tin (filtered)	M23-My0018317	NCP	%	87			75-125	Pass	
Zinc (filtered)	M23-My0018317	NCP	%	108			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Boron (filtered)	M23-My0022183	NCP	%	108			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-My0011725	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M23-My0015748	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-My0015748	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M23-My0015748	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C6-C10	M23-My0011725	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M23-My0015748	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M23-My0015748	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M23-My0015748	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-My0011725	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-My0011725	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-My0011725	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-My0015829	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-My0015829	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-My0015829	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-My0016032	NCP	mg/L	0.11	0.11	1.1	30%	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	M23-My0014354	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Chromium (hexavalent)	M23-My0014587	NCP	mg/L	0.005	0.009	54	30%	Fail	Q15
Cyanide (total)	M23-My0010238	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-My0016031	NCP	mg/L	0.06	0.05	12	30%	Pass	
Nitrate (as N)	M23-My0015850	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Nitrite (as N)	M23-My0016031	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Phosphate total (as P)	M23-My0030930	NCP	mg/L	0.08	0.04	18	30%	Pass	
Phosphorus reactive (as P)	M23-Ap0053720	NCP	mg/L	< 0.01	0.02	74	30%	Fail	Q15
Sulphate (as SO4)	M23-Ap0053720	NCP	mg/L	340	340	<1	30%	Pass	
Sulphide (as S)	S23-Ap0058795	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Sulphite (as SO3)	M23-My0025758	NCP	mg/L	< 12.5	< 12.5	<1	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-My0012404	NCP	mg/L	6000	4600	27	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-My0014585	NCP	mg/L	3.2	3.1	<1	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-My0012404	NCP	mg/L	53	54	1.5	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-My0018317	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-My0018317	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M23-My0018317	NCP	mg/L	0.10	0.10	<1	30%	Pass	
Beryllium (filtered)	M23-My0018317	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-My0015577	NCP	mg/L	3.1	3.2	1.8	30%	Pass	
Cadmium (filtered)	M23-My0018317	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M23-My0018317	NCP	mg/L	0.008	0.008	<1	30%	Pass	
Cobalt (filtered)	M23-My0018317	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M23-My0018317	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M23-My0018317	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M23-My0018317	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M23-My0018317	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury (filtered)	M23-My0018317	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-My0018317	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Selenium (filtered)	M23-My0018317	NCP	mg/L	0.005	0.005	<1	30%	Pass	
Silver (filtered)	M23-My0018317	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	M23-My0018317	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-My0018317	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Catherine Wilson	Analytical Services Manager
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Joseph Edouard	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

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PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

LABORATORY TESTING ORDER

Project Title : Riverlea Dewatering Assessment
Job Number : 231445-01
Project Manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au, lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: 230303LBWS

Secondary Laboratory: ALS
Laboratory Quote Ref: ADBQ-001-18_LBWco_SO

LBW co's COC REFERENCE (sample delivery group)
231445-01_COC_20230505

Turnaround Required
Standard (5 Day)

SAMPLE DETAILS				CHEMICAL TESTING REQUIRED															
Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	BOD 5 Day	pH	TSS	TDS	B6A (plus additional metals)	B19E	OCP	Sulfate as S	Sulfide as S	Sulfite as S	Cyanide	Phenolics (total) - Spectrophotometric technique	M13	TRH C6-C10		HOLD
05-May-23	SLMW01-P	Water		X	X	X	X	X	X	X	X	X	X	X	X				
05-May-23	SLMW01-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X				
05-May-23	SLMW05-P	Water		X	X	X	X	X	X	X	X	X	X	X	X				
05-May-23	SLMW05-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X				
05-May-23	SLMW02-Q1	Water		X	X	X	X	X	X	X	X	X	X	X	X				
05-May-23	6628-23298	Water		X	X	X	X	X	X	X	X	X	X	X	X				
05-May-23	RINSE-3	Water														X			
05-May-23	TB-03	Water															X		
LBW co AUTHORISATION		LABORATORY RECEIPT		6	6	6	6	6	6	6	6	6	6	6	6	1	1	0	22

LBW co AUTHORISATION	LABORATORY RECEIPT	Additional Comments
Requested by: T O'Leary	Received by: Parmal	Analysis as per quote 230303LBWS. Note that nitrite analysis is requested.
Date\time requested: 05-May-23	Date\time received: 05/05 3:38pm	
Signature	Signature:	

#986883
Parmal

7.7°C
+0.3°C
8.0°C on ice

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
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E: admin@lbwco.com.au
ABN: 58 126 992 274

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Dewatering GME
Job Number: 231445-01
Project manager: Annabel Geitz
Email: annabel.geitz@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: Price Book 2017-2018

Secondary lab: Envirolab
19SA158

COC Reference: (sample delivery group) 231445-01_COC_20230505

Sample Details 1	Sample Details 2
SLMW01-Q1 LBW Job#: 231445-01 Matrix: Water Date: 05/05/2023	**SLMW02-Q1** LBW Job#: 231445-01 Matrix: Water Date: 05/05/2023
SLMW01-P LBW Job#: 231445-01 Matrix: Water Date: 05/05/2023	**SLMW05-Q1** LBW Job#: 231445-01 Matrix: Water Date: 05/05/2023
SLMW05-P LBW Job#: 231445-01 Matrix: Water Date: 05/05/2023	**6628-23298** LBW Job#: 231445-01 Matrix: Water Date: 05/05/2023
RINSE-3 231445 05/05/2023	TB-03 231445-01 05/05/2023

Sample Custody - Step 1

Relinquished by: Gaetano Garfi

Date/Time Relinquished: 5/5/23 3.20pm

Signature: Gaetano Garfi

Courier and consignment number:

Received by: Parmal

Date/Time Received: 05/05 3:30pm

Signature:

Sample Custody - Step 2

Relinqished by: 7.7°C +0.3°C 8.0°C

Date/Time Relinquished: on ice

Signature: # 98683 Parmal

Courier and consignment number:

Received by:

Date/Time Received:

Signature:

Certificate of Analysis

Environment Testing

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention: **TESS O'LEARY**

Report	**986883-W**
Project name	Riverlea Dewatering Assessment
Project ID	231445-01
Received Date	May 05, 2023

Client Sample ID			**SLMW01-P**	**SLMW01-Q1**	**SLMW05-P**	**SLMW05-Q1**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-My0014584**	**M23-My0014585**	**M23-My0014586**	**M23-My0014587**
Date Sampled			**May 05, 2023**	**May 05, 2023**	**May 05, 2023**	**May 05, 2023**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	104	96	101	101
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Client Sample ID			SLMW01-P	SLMW01-Q1	SLMW05-P	SLMW05-Q1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014584	M23-My0014585	M23-My0014586	M23-My0014587
Date Sampled			May 05, 2023	May 05, 2023	May 05, 2023	May 05, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	125	98	81	113
Tetrachloro-m-xylene (surr.)	1	%	102	84	73	95
Ammonia (as N)	0.01	mg/L	0.12	0.13	0.08	0.09
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	0.012	0.005
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	19	25	0.54	1.2
Nitrate (as N)	0.02	mg/L	17	24	0.54	1.0
Nitrite (as N)	0.02	mg/L	1.6	1.1	< 0.02	0.22
Organic Nitrogen (as N)*	0.2	mg/L	1.58	3.07	0.92	0.61
pH (at 25 °C)	0.1	pH Units	8.1	8.0	8.1	7.8
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphate total (as P)	0.01	mg/L	0.03	0.04	0.02	0.02
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	0.07	0.14	0.01
Sulphate (as S)	5	mg/L	250	220	240	370
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as S)	0.5	mg/L	G01< 2.5	G01< 2.5	G01< 2.5	G01< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	4600	4700	4500	6000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.7	3.2	1.0	0.7
Total Nitrogen (as N)*	0.2	mg/L	20.7	28.2	1.54	1.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	20	15	7.2	31
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium (filtered)	0.02	mg/L	0.04	0.03	0.02	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	3.1	1.0	2.1	3.1
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	0.002	< 0.001	0.008	0.012
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.003
Copper (filtered)	0.001	mg/L	0.002	0.002	0.002	0.002
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.055	0.14	0.007	0.16
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

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Environment Testing

Client Sample ID			SLMW01-P	SLMW01-Q1	SLMW05-P	SLMW05-Q1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014584	M23-My0014585	M23-My0014586	M23-My0014587
Date Sampled			May 05, 2023	May 05, 2023	May 05, 2023	May 05, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	0.019	0.005	0.005	0.025
Selenium (filtered)	0.001	mg/L	0.012	0.006	0.034	0.025
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.008	0.010	< 0.005	0.009

Client Sample ID			SLMW02-Q1	6628-23298	Rinse-3	TB-03
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014588	M23-My0014589	M23-My0014590	M23-My0014591
Date Sampled			May 05, 2023	May 05, 2023	May 05, 2023	May 05, 2023
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	-	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	-	-
Toluene	0.001	mg/L	< 0.001	< 0.001	-	-
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	-	-
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	-	-
o-Xylene	0.001	mg/L	< 0.001	< 0.001	-	-
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	-	-
4-Bromofluorobenzene (surr.)	1	%	101	99	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	-	-
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	-	-
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	-	-
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	-	-
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	-	-

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Client Sample ID			SLMW02-Q1	6628-23298	Rinse-3	TB-03
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014588	M23-My0014589	M23-My0014590	M23-My0014591
Date Sampled			May 05, 2023	May 05, 2023	May 05, 2023	May 05, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	-	-
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Toxaphene	0.005	mg/L	< 0.005	< 0.005	-	-
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	-	-
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	-	-
Dibutylchlorendate (surr.)	1	%	101	88	-	-
Tetrachloro-m-xylene (surr.)	1	%	80	67	-	-
Ammonia (as N)	0.01	mg/L	0.09	0.16	-	-
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	-	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	-	-
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	-	-
Nitrate & Nitrite (as N)	0.05	mg/L	17	< 0.05	-	-
Nitrate (as N)	0.02	mg/L	16	< 0.02	-	-
Nitrite (as N)	0.02	mg/L	1.1	< 0.02	-	-
Organic Nitrogen (as N)*	0.2	mg/L	3.61	3.64	-	-
pH (at 25 °C)	0.1	pH Units	7.9	7.6	-	-
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	-	-
Phosphate total (as P)	0.01	mg/L	0.08	0.11	-	-
Phosphorus reactive (as P)	0.01	mg/L	0.02	0.01	-	-
Sulphate (as S)	5	mg/L	190	290	-	-
Sulphide (as S)	0.1	mg/L	< 0.1	0.1	-	-
Sulphite (as S)	0.5	mg/L	G01< 2.5	G01< 2.5	-	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	4900	5100	-	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.7	3.8	-	-
Total Nitrogen (as N)*	0.2	mg/L	20.7	3.8	-	-
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	< 5	10	-	-
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	-	-
Arsenic	0.001	mg/L	-	-	< 0.001	-
Arsenic (filtered)	0.001	mg/L	< 0.001	0.003	-	-
Barium (filtered)	0.02	mg/L	0.05	0.04	-	-
Beryllium	0.001	mg/L	-	-	< 0.001	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Boron	0.05	mg/L	-	-	< 0.05	-
Boron (filtered)	0.05	mg/L	2.4	0.50	-	-
Cadmium	0.0002	mg/L	-	-	< 0.0002	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Chromium	0.001	mg/L	0.002	0.016	< 0.001	-
Cobalt	0.001	mg/L	-	-	< 0.001	-
Cobalt (filtered)	0.001	mg/L	0.001	0.002	-	-

Client Sample ID			SLMW02-Q1	6628-23298	Rinse-3	TB-03
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0014588	M23-My0014589	M23-My0014590	M23-My0014591
Date Sampled			May 05, 2023	May 05, 2023	May 05, 2023	May 05, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Copper	0.001	mg/L	-	-	< 0.001	-
Copper (filtered)	0.001	mg/L	0.002	< 0.001	-	-
Iron (filtered)	0.05	mg/L	< 0.05	0.33	-	-
Lead	0.001	mg/L	-	-	< 0.001	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Manganese	0.005	mg/L	-	-	< 0.005	-
Manganese (filtered)	0.005	mg/L	0.077	0.42	-	-
Mercury	0.0001	mg/L	-	-	< 0.0001	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-	-
Nickel	0.001	mg/L	-	-	< 0.001	-
Nickel (filtered)	0.001	mg/L	0.027	0.025	-	-
Selenium	0.001	mg/L	-	-	< 0.001	-
Selenium (filtered)	0.001	mg/L	0.007	< 0.001	-	-
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Zinc	0.005	mg/L	-	-	< 0.005	-
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	May 08, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	May 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Organochlorine Pesticides	Melbourne	May 08, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	May 08, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	May 08, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	May 08, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	May 08, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as S)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Sulphide (as S)	Melbourne	May 09, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as S)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 08, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Heavy Metals (filtered)	Melbourne	May 08, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
NEPM 2013 Metals without Cr6+ (As, Be, B, Cd, Co, Cr, Cu, Hg, Pb, Ni, Mn, Se, Zn)	Melbourne	May 10, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals	Melbourne	May 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	May 08, 2023	28 Days
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Nitrate & Nitrite (as N)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrate (as N)	Melbourne	May 08, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrite (as N)	Melbourne	May 08, 2023	2 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Organic Nitrogen (as N)*	Melbourne	May 05, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphate total (as P)	Melbourne	May 08, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: LTM-INO-4040 Phosphate by CFA			
Phosphorus reactive (as P)	Melbourne	May 08, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 08, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	May 08, 2023	28 Days

- Method: LTM-INO-4170 Total Dissolved Solids in Water

Company Name: LBW co Pty Ltd
Address: 184 Magill Road
Norwood
SA 5069

Order No.:
Report #: 986883
Phone: 08 8331 2417
Fax: 08 8331 2415

Received: May 5, 2023 4:10 PM
Due: May 12, 2023
Priority: 5 Day
Contact Name: TESS O'LEARY

Project Name: Riverlea Dewatering Assessment
Project ID: 231445-01

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Barium (filtered)	Biochemical Oxygen Demand (BOD-5 Day)	Chromium	Cyanide (total)	Iron (filtered)	pH (at 25 °C)	Phenolics (total)	Silver (filtered)	Sulphate (as S)	Sulphide (as S)	Sulphite (as S)	Tin (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	NEPM 2013 Metals without Cr6+ (As, Be, B, Cd, Co, Cr, Cu, Hg, Pb, Ni, Mn, Se, Zn)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A (filtered metals)	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																				
1	SLMW01-P	May 05, 2023		Water	M23-My0014584	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
2	SLMW01-Q1	May 05, 2023		Water	M23-My0014585	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
3	SLMW05-P	May 05, 2023		Water	M23-My0014586	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
4	SLMW05-Q1	May 05, 2023		Water	M23-My0014587	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
5	SLMW02-Q1	May 05, 2023		Water	M23-My0014588	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
6	6628-23298	May 05, 2023		Water	M23-My0014589	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
7	Rinse-3	May 05, 2023		Water	M23-My0014590																	X			
8	TB-03	May 05, 2023		Water	M23-My0014591															X					
Test Counts						6	6	6	6	6	6	6	6	6	6	6	6	6	6	1	6	1	6	6	6

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**μg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Sulphite (as S)	mg/L	< 0.5			0.5	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	96			70-130	Pass	
TRH C10-C14	%	116			70-130	Pass	
TRH C6-C10	%	94			70-130	Pass	
TRH >C10-C16	%	120			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	85			70-130	Pass	
Toluene	%	83			70-130	Pass	
Ethylbenzene	%	80			70-130	Pass	
m&p-Xylenes	%	81			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Xylenes - Total*	%	82			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	75			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	118			70-130	Pass	
4.4'-DDD	%	124			70-130	Pass	
4.4'-DDE	%	118			70-130	Pass	
4.4'-DDT	%	115			70-130	Pass	
a-HCH	%	118			70-130	Pass	
Aldrin	%	121			70-130	Pass	
b-HCH	%	124			70-130	Pass	
d-HCH	%	125			70-130	Pass	
Dieldrin	%	118			70-130	Pass	
Endosulfan I	%	118			70-130	Pass	
Endosulfan II	%	121			70-130	Pass	
Endosulfan sulphate	%	116			70-130	Pass	
Endrin	%	123			70-130	Pass	
Endrin aldehyde	%	106			70-130	Pass	
Endrin ketone	%	113			70-130	Pass	
g-HCH (Lindane)	%	120			70-130	Pass	
Heptachlor	%	125			70-130	Pass	
Heptachlor epoxide	%	123			70-130	Pass	
Hexachlorobenzene	%	113			70-130	Pass	
Methoxychlor	%	115			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	105			70-130	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	%	94			85-115	Pass	
Chromium (hexavalent)	%	97			70-130	Pass	
Cyanide (total)	%	100			70-130	Pass	
Nitrate & Nitrite (as N)	%	119			70-130	Pass	
Nitrite (as N)	%	110			70-130	Pass	
Phenolics (total)	%	115			70-130	Pass	
Phosphate total (as P)	%	106			70-130	Pass	
Phosphorus reactive (as P)	%	81			70-130	Pass	
Sulphate (as S)	%	112			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	98			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	128			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	99			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	98			80-120	Pass	
Arsenic (filtered)	%	95			80-120	Pass	
Boron	%	116			80-120	Pass	
Boron (filtered)	%	81			80-120	Pass	
Cadmium (filtered)	%	97			80-120	Pass	
Chromium	%	97			80-120	Pass	
Cobalt (filtered)	%	99			80-120	Pass	
Copper (filtered)	%	100			80-120	Pass	
Iron (filtered)	%	99			80-120	Pass	
Lead (filtered)	%	99			80-120	Pass	
Manganese (filtered)	%	100			80-120	Pass	
Mercury (filtered)	%	93			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel (filtered)			%	100			80-120	Pass	
Selenium (filtered)			%	95			80-120	Pass	
Silver (filtered)			%	94			80-120	Pass	
Tin (filtered)			%	95			80-120	Pass	
Zinc (filtered)			%	96			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C10-C14	M23-My0018535	NCP	%	120			70-130	Pass	
TRH >C10-C16	M23-My0018535	NCP	%	124			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-My0023293	NCP	%	79			70-130	Pass	
4.4'-DDD	M23-My0023293	NCP	%	89			70-130	Pass	
4.4'-DDE	M23-My0023293	NCP	%	70			70-130	Pass	
4.4'-DDT	M23-My0023293	NCP	%	76			70-130	Pass	
a-HCH	M23-My0023293	NCP	%	80			70-130	Pass	
Aldrin	M23-My0023293	NCP	%	82			70-130	Pass	
b-HCH	M23-My0023293	NCP	%	83			70-130	Pass	
d-HCH	M23-My0023293	NCP	%	82			70-130	Pass	
Dieldrin	M23-My0023293	NCP	%	81			70-130	Pass	
Endosulfan I	M23-My0023293	NCP	%	82			70-130	Pass	
Endosulfan II	M23-My0023293	NCP	%	78			70-130	Pass	
Endosulfan sulphate	M23-My0023293	NCP	%	74			70-130	Pass	
Endrin	M23-My0023293	NCP	%	83			70-130	Pass	
Endrin aldehyde	M23-My0023293	NCP	%	71			70-130	Pass	
Endrin ketone	M23-My0023293	NCP	%	75			70-130	Pass	
g-HCH (Lindane)	M23-My0023293	NCP	%	81			70-130	Pass	
Heptachlor	M23-My0023293	NCP	%	87			70-130	Pass	
Heptachlor epoxide	M23-My0023293	NCP	%	83			70-130	Pass	
Hexachlorobenzene	M23-My0023293	NCP	%	74			70-130	Pass	
Methoxychlor	M23-My0023293	NCP	%	75			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	B23-My0007982	NCP	%	87			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-My0013797	NCP	%	93			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-My0018467	NCP	%	105			75-125	Pass	
Arsenic (filtered)	M23-My0018467	NCP	%	95			75-125	Pass	
Barium (filtered)	B23-My0020861	NCP	%	80			75-125	Pass	
Beryllium (filtered)	M23-My0018467	NCP	%	102			75-125	Pass	
Boron (filtered)	M23-My0022183	NCP	%	108			75-125	Pass	
Cadmium (filtered)	B23-My0020861	NCP	%	89			75-125	Pass	
Chromium	M23-My0026657	NCP	%	96			75-125	Pass	
Cobalt (filtered)	M23-My0018467	NCP	%	95			75-125	Pass	
Copper (filtered)	M23-My0018467	NCP	%	93			75-125	Pass	
Iron (filtered)	M23-My0018467	NCP	%	74			75-125	Fail	Q08
Lead (filtered)	M23-My0018467	NCP	%	97			75-125	Pass	
Manganese (filtered)	M23-My0018467	NCP	%	94			75-125	Pass	
Mercury (filtered)	M23-My0018467	NCP	%	102			75-125	Pass	
Nickel (filtered)	M23-My0018467	NCP	%	90			75-125	Pass	
Selenium (filtered)	M23-My0018467	NCP	%	94			75-125	Pass	
Silver (filtered)	M23-My0018467	NCP	%	89			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Tin (filtered)	M23-My0018467	NCP	%	77			75-125	Pass	
Zinc (filtered)	M23-My0018467	NCP	%	95			75-125	Pass	
Spike - % Recovery									
				Result 1					
Nitrite (as N)	M23-My0016033	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Boron	M23-My0014756	NCP	%	104			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-My0011725	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	N23-My0017006	NCP	mg/L	0.95	0.82	15	30%	Pass	
TRH C15-C28	N23-My0017006	NCP	mg/L	1.2	1.1	8.4	30%	Pass	
TRH C29-C36	N23-My0017006	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C6-C10	M23-My0011725	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	N23-My0017006	NCP	mg/L	0.61	0.55	10	30%	Pass	
TRH >C16-C34	N23-My0017006	NCP	mg/L	1.1	1.0	8.6	30%	Pass	
TRH >C34-C40	N23-My0017006	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-My0011725	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-My0011725	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-My0011725	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-My0011725	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	B23-My0014390	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	B23-My0014390	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	B23-My0014390	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Cyanide (total)	M23-My0010238	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Phosphate total (as P)	M23-My0030930	NCP	mg/L	0.08	0.04	18	30%	Pass	
Sulphate (as S)	M23-My0014584	CP	mg/L	250	200	21	30%	Pass	
Sulphide (as S)	M23-My0015553	NCP	mg/L	0.4	0.4	<1	30%	Pass	
Sulphite (as S)	M23-My0012404	NCP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-My0016048	NCP	mg/L	4000	4200	6.5	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-My0018467	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-My0018467	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M23-My0018467	NCP	mg/L	0.20	0.20	<1	30%	Pass	
Beryllium (filtered)	M23-My0018467	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-My0022183	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	M23-My0018467	NCP	mg/L	0.12	0.12	1.8	30%	Pass	
Chromium	M23-My0026657	NCP	mg/L	0.002	0.002	<1	30%	Pass	
Cobalt (filtered)	M23-My0018467	NCP	mg/L	0.014	0.015	3.1	30%	Pass	
Copper (filtered)	M23-My0018467	NCP	mg/L	0.002	0.002	1.3	30%	Pass	
Iron (filtered)	M23-My0018467	NCP	mg/L	2.7	2.7	1.5	30%	Pass	
Lead (filtered)	M23-My0018467	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M23-My0018467	NCP	mg/L	0.015	0.015	1.4	30%	Pass	
Mercury (filtered)	M23-My0018467	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-My0018467	NCP	mg/L	0.036	0.036	1.6	30%	Pass	
Selenium (filtered)	M23-My0018467	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M23-My0018467	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	M23-My0018467	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-My0018467	NCP	mg/L	0.013	0.013	1.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M23-My0014585	CP	mg/L	3.2	3.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M23-My0014587	CP	mg/L	0.005	0.009	54	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-My0014588	CP	mg/L	0.09	0.11	13	30%	Pass	
Chromium (hexavalent)	M23-My0014588	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-My0014588	CP	mg/L	17	17	3.2	30%	Pass	
Nitrate (as N)	M23-My0014588	CP	mg/L	16	15	3.6	30%	Pass	
Nitrite (as N)	M23-My0014588	CP	mg/L	1.1	1.2	3.3	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Biochemical Oxygen Demand (BOD-5 Day)	M23-My0014589	CP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Boron	M23-My0014756	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	

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Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Catherine Wilson	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal
Joseph Edouard	Senior Analyst-Organic
Joseph Edouard	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

LABORATORY TESTING ORDER

Project Title : Riverlea Saltwater Lakes GME
Job Number : 231445-01
Project Manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au, lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: 230303LBWS
Secondary Laboratory: ALS
Laboratory Quote Ref: ADBQ-001-18_LBWco_SO

LBW co's COC REFERENCE (sample delivery group)
231445-01_COC_20230508

Turnaround Required
Standard (5 Day)

SAMPLE DETAILS				CHEMICAL TESTING REQUIRED																
Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	BOD 5 Day	pH	TSS	TDS	B6A (plus additional metals)	B19E	OCP	Sulfate as S	Sulfide as S	Sulfite as S	Cyanide	Phenolics (total) - Spectrophotometric technique	M13	TRH C6-C10		HOLD
08-May-23	6628-21445	Water		X	X	X	X	X	X	X	X	X	X	X	X				
08-May-23	SLMW04-P	Water		X	X	X	X	X	X	X	X	X	X	X	X				
08-May-23	RINSE-4	Water														X			
08-May-23	TB-04	Water															X		
				2	2	2	2	2	2	2	2	2	2	2	2	1	1	0	22

LBW co AUTHORISATION	LABORATORY RECEIPT
Requested by: T O'Leary	Received by: Pathmal
Date\time requested: 08-May-23	Date\time received: 08/05 2:30pm
Signature:	Signature:

Additional Comments

Analysis as per quote 230303LBWS. Note that nitrite analysis is requested.

#987308
Pathmal

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

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DELIVERING **ENVIRONMENTAL SOLUTIONS**

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes GME
Job Number: 231445-01
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: 230303LBWS

Secondary lab: ALS
ADBQ-001-18_LBWco_SO

COC Reference: 231445-01_COC_20230508
(sample delivery group)

Sample Details 1	Sample Details 2	Sample Custody - Step 1
SLMW04-P LBW Job#: 231445-01 Matrix: Water Date: 08 /05/2023	**6628-21445** LBW Job#: 231445-01 Matrix: Water Date: 08 /05/2023	Relinqished by: Gaetano Garfi
RINSE-4 231445-01 08/05/2023	TB-04 231445-01 08/05/2023	Date/Time Relinquished: 08/05/2023
		Signature: Gaetano Garfi
		Courier and consignment number:
		Received by: Paefmal
		Date/Time Received: 08/05 2:30pm
		Signature: 9.0°C +0.3°C 9.3°C
		Sample Custody - Step 2 on IB
		Relinqished by:
		Date/Time Relinquished: #987308
		Signature: Paefmal
		Courier and consignment number:
		Received by:
		Date/Time Received:
		Signature:

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Certificate of Analysis

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention:	**TESS O'LEARY**
Report	**987308-W**
Project name	Riverlea Saltwater Lakes GME
Project ID	231445-01
Received Date	May 08, 2023

Client Sample ID			**6628-21445**	**SLMW04-P**	**RINSE-4**	**TB-04**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-My0018154**	**M23-My0018155**	**M23-My0018156**	**M23-My0018157**
Date Sampled			**May 08, 2023**	**May 08, 2023**	**May 08, 2023**	**May 08, 2023**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	-	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	-	-
Toluene	0.001	mg/L	< 0.001	< 0.001	-	-
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	-	-
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	-	-
o-Xylene	0.001	mg/L	< 0.001	< 0.001	-	-
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	-	-
4-Bromofluorobenzene (surr.)	1	%	118	120	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	-	-
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	-	-
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	-	-
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	-	-
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	-	-

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Client Sample ID			6628-21445	SLMW04-P	RINSE-4	TB-04
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0018154	M23-My0018155	M23-My0018156	M23-My0018157
Date Sampled			May 08, 2023	May 08, 2023	May 08, 2023	May 08, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	-	-
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Toxaphene	0.005	mg/L	< 0.005	< 0.005	-	-
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	-	-
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	-	-
Dibutylchlorendate (surr.)	1	%	109	129	-	-
Tetrachloro-m-xylene (surr.)	1	%	96	130	-	-
Ammonia (as N)	0.01	mg/L	0.04	0.13	-	-
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	8.1	< 5	-	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	-	-
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	-	-
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	18	-	-
Nitrate (as N)	0.02	mg/L	< 0.02	18	-	-
Nitrite (as N)	0.02	mg/L	< 0.02	0.06	-	-
Organic Nitrogen (as N)*	0.2	mg/L	0.56	< 0.2	-	-
pH (at 25 °C)	0.1	pH Units	8.2	8.2	-	-
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	-	-
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	-	-
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	0.03	-	-
Sulphate (as S)	5	mg/L	47	160	-	-
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	-	-
Sulphite (as S)	0.5	mg/L	< 1	< 1	-	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	7400	3800	-	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.6	< 0.2	-	-
Total Nitrogen (as N)*	0.2	mg/L	0.6	18	-	-
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	70	240	-	-
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	-	-
Arsenic (filtered)	0.001	mg/L	0.001	< 0.001	< 0.001	-
Barium (filtered)	0.02	mg/L	< 0.02	0.03	-	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Boron (filtered)	0.05	mg/L	0.55	5.4	< 0.05	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Chromium	0.001	mg/L	0.005	0.036	-	-
Chromium (filtered)	0.001	mg/L	-	-	< 0.001	-
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Copper (filtered)	0.001	mg/L	< 0.001	0.002	< 0.001	-
Iron (filtered)	0.05	mg/L	0.40	< 0.05	-	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Manganese (filtered)	0.005	mg/L	1.3	0.007	< 0.005	-

Client Sample ID			6628-21445	SLMW04-P	RINSE-4	TB-04
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-My0018154	M23-My0018155	M23-My0018156	M23-My0018157
Date Sampled			May 08, 2023	May 08, 2023	May 08, 2023	May 08, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	-
Nickel (filtered)	0.001	mg/L	< 0.001	0.002	< 0.001	-
Selenium (filtered)	0.001	mg/L	< 0.001	0.030	< 0.001	-
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Zinc (filtered)	0.005	mg/L	< 0.005	0.013	< 0.005	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 09, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 09, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 09, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	May 09, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	May 10, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons	Melbourne	May 09, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Organochlorine Pesticides	Melbourne	May 09, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	May 09, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	May 09, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	May 09, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	May 09, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as S)	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Sulphide (as S)	Melbourne	May 10, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as S)	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 09, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Heavy Metals (filtered)	Melbourne	May 10, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
NEPM 2013 Filtered Metals without Cr6+ (As, Be, B, Cd, Co, Cr, Cu, Hg, Pb, Ni, Mn, Se, Zn)	Melbourne	May 09, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals	Melbourne	May 10, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	May 09, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	May 08, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphate total (as P)	Melbourne	May 09, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: LTM-INO-4040 Phosphate by CFA			
Phosphorus reactive (as P)	Melbourne	May 09, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 09, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	May 09, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			

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email: EnviroSales@eurofins.com

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ABN: 50 005 085 521

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IANZ# 1327

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Rolleston,
Christchurch 7675
Tel: 0800 856 450
IANZ# 1290

Company Name: LBW co Pty Ltd
Address: 184 Magill Road
Norwood
SA 5069

Order No.:
Report #: 987308
Phone: 08 8331 2417
Fax: 08 8331 2415

Received: May 8, 2023 3:05 PM
Due: May 15, 2023
Priority: 5 Day
Contact Name: TESS O'LEARY

Project Name: Riverlea Saltwater Lakes GME
Project ID: 231445-01

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Barium (filtered)	Biochemical Oxygen Demand (BOD-5 Day)	Chromium	Cyanide (total)	Iron (filtered)	pH (at 25 °C)	Phenolics (total)	Silver (filtered)	Sulphate (as S)	Sulphide (as S)	Sulphite (as S)	Tin (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A (filtered metals)	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																				
1	6628-21445	May 08, 2023		Water	M23-My0018154	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
2	SLMW04-P	May 08, 2023		Water	M23-My0018155	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
3	RINSE-4	May 08, 2023		Water	M23-My0018156																	X			
4	TB-04	May 08, 2023		Water	M23-My0018157															X					
Test Counts						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	1	2	2	2

Environment Testing

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Sulphite (as S)	mg/L	< 0.5			0.5	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	93			70-130	Pass	
TRH C10-C14	%	104			70-130	Pass	
TRH C6-C10	%	92			70-130	Pass	
TRH >C10-C16	%	100			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	81			70-130	Pass	
Toluene	%	80			70-130	Pass	
Ethylbenzene	%	79			70-130	Pass	
m&p-Xylenes	%	81			70-130	Pass	
Xylenes - Total*	%	82			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	89			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	86			70-130	Pass	
4.4'-DDD	%	76			70-130	Pass	
4.4'-DDE	%	80			70-130	Pass	
4.4'-DDT	%	73			70-130	Pass	
a-HCH	%	89			70-130	Pass	
Aldrin	%	89			70-130	Pass	
b-HCH	%	90			70-130	Pass	
d-HCH	%	91			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dieldrin			%	89			70-130	Pass	
Endosulfan I			%	85			70-130	Pass	
Endosulfan II			%	86			70-130	Pass	
Endosulfan sulphate			%	80			70-130	Pass	
Endrin			%	90			70-130	Pass	
Endrin aldehyde			%	81			70-130	Pass	
Endrin ketone			%	79			70-130	Pass	
g-HCH (Lindane)			%	88			70-130	Pass	
Heptachlor			%	95			70-130	Pass	
Heptachlor epoxide			%	91			70-130	Pass	
Hexachlorobenzene			%	83			70-130	Pass	
Methoxychlor			%	71			70-130	Pass	
LCS - % Recovery									
Ammonia (as N)			%	116			70-130	Pass	
Chromium (hexavalent)			%	91			70-130	Pass	
Cyanide (total)			%	108			70-130	Pass	
Nitrate & Nitrite (as N)			%	123			70-130	Pass	
Nitrite (as N)			%	104			70-130	Pass	
Phenolics (total)			%	93			70-130	Pass	
Phosphate total (as P)			%	101			70-130	Pass	
Phosphorus reactive (as P)			%	110			70-130	Pass	
Sulphate (as S)			%	109			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C			%	121			70-130	Pass	
Total Kjeldahl Nitrogen (as N)			%	107			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			%	100			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Aluminium (filtered)			%	104			80-120	Pass	
Arsenic (filtered)			%	97			80-120	Pass	
Boron (filtered)			%	118			80-120	Pass	
Cadmium (filtered)			%	98			80-120	Pass	
Chromium			%	99			80-120	Pass	
Chromium (filtered)			%	103			80-120	Pass	
Cobalt (filtered)			%	99			80-120	Pass	
Copper (filtered)			%	99			80-120	Pass	
Iron (filtered)			%	104			80-120	Pass	
Lead (filtered)			%	103			80-120	Pass	
Manganese (filtered)			%	99			80-120	Pass	
Mercury (filtered)			%	101			80-120	Pass	
Nickel (filtered)			%	100			80-120	Pass	
Selenium (filtered)			%	96			80-120	Pass	
Silver (filtered)			%	98			80-120	Pass	
Tin (filtered)			%	92			80-120	Pass	
Zinc (filtered)			%	98			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C10-C14	M23-My0026235	NCP	%	87			70-130	Pass	
TRH >C10-C16	M23-My0026235	NCP	%	89			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-My0023293	NCP	%	79			70-130	Pass	
4.4'-DDD	M23-My0023293	NCP	%	89			70-130	Pass	
4.4'-DDE	M23-My0023293	NCP	%	70			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDT	M23-My0023293	NCP	%	76			70-130	Pass	
a-HCH	M23-My0023293	NCP	%	80			70-130	Pass	
Aldrin	M23-My0023293	NCP	%	82			70-130	Pass	
b-HCH	M23-My0023293	NCP	%	83			70-130	Pass	
d-HCH	M23-My0023293	NCP	%	82			70-130	Pass	
Dieldrin	M23-My0023293	NCP	%	81			70-130	Pass	
Endosulfan I	M23-My0023293	NCP	%	82			70-130	Pass	
Endosulfan II	M23-My0023293	NCP	%	78			70-130	Pass	
Endosulfan sulphate	M23-My0023293	NCP	%	74			70-130	Pass	
Endrin	M23-My0023293	NCP	%	83			70-130	Pass	
Endrin aldehyde	M23-My0023293	NCP	%	71			70-130	Pass	
Endrin ketone	M23-My0023293	NCP	%	75			70-130	Pass	
g-HCH (Lindane)	M23-My0023293	NCP	%	81			70-130	Pass	
Heptachlor	M23-My0023293	NCP	%	87			70-130	Pass	
Heptachlor epoxide	M23-My0023293	NCP	%	83			70-130	Pass	
Hexachlorobenzene	M23-My0023293	NCP	%	74			70-130	Pass	
Methoxychlor	M23-My0023293	NCP	%	75			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrite (as N)	M23-My0018154	CP	%	124			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-My0022654	NCP	%	103			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	B23-My0020861	NCP	%	98			75-125	Pass	
Arsenic (filtered)	B23-My0020861	NCP	%	89			75-125	Pass	
Barium (filtered)	B23-My0020861	NCP	%	80			75-125	Pass	
Beryllium (filtered)	B23-My0020861	NCP	%	98			75-125	Pass	
Boron (filtered)	M23-My0027694	NCP	%	107			75-125	Pass	
Cadmium (filtered)	B23-My0020861	NCP	%	89			75-125	Pass	
Chromium	M23-My0015290	NCP	%	89			75-125	Pass	
Cobalt (filtered)	B23-My0020861	NCP	%	90			75-125	Pass	
Copper (filtered)	B23-My0020861	NCP	%	89			75-125	Pass	
Iron (filtered)	B23-My0020861	NCP	%	95			75-125	Pass	
Lead (filtered)	B23-My0020861	NCP	%	91			75-125	Pass	
Manganese (filtered)	M23-My0018467	NCP	%	94			75-125	Pass	
Mercury (filtered)	B23-My0020861	NCP	%	92			75-125	Pass	
Nickel (filtered)	B23-My0020861	NCP	%	89			75-125	Pass	
Selenium (filtered)	B23-My0020861	NCP	%	91			75-125	Pass	
Silver (filtered)	B23-My0020861	NCP	%	85			75-125	Pass	
Tin (filtered)	B23-My0020861	NCP	%	77			75-125	Pass	
Zinc (filtered)	B23-My0020861	NCP	%	90			75-125	Pass	
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	M23-My0018155	CP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium (filtered)	M23-My0018317	NCP	%	106			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C10-C14	M23-My0026226	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-My0026226	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M23-My0026226	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C10-C16	M23-My0026226	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH >C16-C34	M23-My0026226	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M23-My0026226	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-My0029385	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-My0029385	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-My0029385	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	B23-Ap0051597	NCP	mg/L	54	53	<1	30%	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	N23-My0017663	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Chromium (hexavalent)	M23-My0018154	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Cyanide (total)	M23-My0010238	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-My0015850	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrate (as N)	M23-My0015850	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Nitrite (as N)	M23-My0015850	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Phosphate total (as P)	M23-My0018154	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Sulphate (as S)	M23-My0018154	CP	mg/L	47	48	1.8	30%	Pass	
Sulphide (as S)	M23-My0014371	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Sulphite (as S)	M23-My0012404	NCP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-My0029197	NCP	mg/L	910	880	3.1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-My0014351	NCP	mg/L	2.0	2.1	2.0	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-My0029197	NCP	mg/L	100	64	46	30%	Fail	Q15
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	B23-My0020861	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	B23-My0020861	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	B23-My0020861	NCP	mg/L	0.06	0.06	<1	30%	Pass	
Beryllium (filtered)	B23-My0020861	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-My0027694	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	B23-My0020861	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M23-My0015290	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cobalt (filtered)	B23-My0020861	NCP	mg/L	0.005	0.005	<1	30%	Pass	
Copper (filtered)	B23-My0020861	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	B23-My0020861	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	B23-My0020861	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	B23-My0020861	NCP	mg/L	4.8	4.8	<1	30%	Pass	
Mercury (filtered)	B23-My0020861	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	B23-My0020861	NCP	mg/L	0.005	0.005	1.1	30%	Pass	
Selenium (filtered)	B23-My0020861	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	B23-My0020861	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	B23-My0020861	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	B23-My0020861	NCP	mg/L	0.011	0.011	4.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphate (as S)	M23-My0018155	CP	mg/L	160	170	5.4	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Chromium (filtered)	M23-My0018317	NCP	mg/L	0.008	0.008	<1	30%	Pass	

Environment Testing

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Amy Meunier	Analytical Services Manager
Carroll Lee	Senior Analyst-Volatile
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Joseph Edouard	Senior Analyst-Organic
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Company	LBWco
Project ID	231445-01
Project Name	Riverlea Saltwater Lakes Dewatering Assessment
SDG/COC #	2023-10-31-Eurofins-AB
Request / Version	1/1

Laboratory

Destination Lab	Eurofins
Lab Quote No	Q01470
Lab Contact	Amy Meunier amymeunier@eurofins.com

Report To

Primary Contact	LBWco Laboratory Results results@lbwco.com.au
Secondary Contact	Tess O'Leary tess.oleary@lbwco.com.au

Billing

Purchase Order #	231445-01
Org to be Billed	LBWco
Bill To	finance@lbwco.com.au
Attention	Tess O'Leary

Turnaround Request: 5 Days
Special Instructions: -
Sampled by: LBWco Tab1

Field ID	Matrix	Date	Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	Eurofins Suite B1	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	Metals M13	Organic TRH C6-C10	Organochlorine Pesticides	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Hold	Comments
SLMW12-A	Water	31/10/2023 01:04PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW12-B	Water	31/10/2023 02:28PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW12-Q2	Na	31/10/2023 03:00PM	✓	✓		✓	✓			✓	✓	✓	✓		
Dup-1	Water	31/10/2023 03:00PM	✓	✓		✓	✓			✓	✓	✓	✓		
RINSE--1	Water	31/10/2023 04:47PM			✓			✓							
TB--1	Water	31/10/2023 04:47PM							✓						

1/11/23
1040188

Turnaround Request: 5 Days
Special Instructions: -
Sampled by: LBWco Tab1

Field ID	Matrix	Date	Sulphide (as S)	Sulphite (as SO3)	Total Dissolved Solids Dried at 180 °C ± 2 °C	Total Suspended Solids Dried at 103 °C to 105 °C	Hold	Comments
SLMW12-A	Water	31/10/2023 01:04PM	✓	✓	✓	✓		
SLMW12-B	Water	31/10/2023 02:28PM	✓	✓	✓	✓		
SLMW12-Q2	Na	31/10/2023 03:00PM	✓	✓	✓	✓		
Dup-1	Water	31/10/2023 03:00PM	✓	✓	✓	✓		
RINSE--1	Water	31/10/2023 04:47PM						
Tb--1	Water	31/10/2023 04:47PM						

Hand Over

# of Delivery Boxes 1
Cooled no
Con Note -

	Relinquished	Received	Relinquished	Received
Signature				
Name	Antonio Brito			
Org	-			
Date	31/10/2023 04:46PM			

e-Request Sent

Name -
Org -
Date -

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DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes Dewatering
Job Number: 221408
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: Price Book 2017-2018

Secondary lab: ALS
ADBQ-001-18_LBWco_SO

COC Reference: (sample delivery group) 221445-01_COC_ 20231031

Sample Details 1	Sample Details 2	Sample Custody - Step 1
SLMW12-A Project number 231445-01 Matrix: Water Date 31/10/23	**SLMW12-B** Project number 231445-01 Matrix: Water Date 31-10-23	Relinqished by: Antonio Brito
Rinse-1 Project number 231445-01 Matrix: Water Date 31-10-23	**DUP-1** Project number 231445-01 Matrix: Water Date 31-10-23	Date/Time Relinquished: 31/10/2023
SLMW12-C Project number 231445-01 Matrix: Water Date 31-10-23	TB-01 water 31-10-23	Signature:
		Courier and consignment number:
		Received by: Pazemal
		Date/Time Received: 31/10 4pm
		Signature: 16.4°C − 0.3°C = 16.1°C
		Sample Custody - Step 2
		Relinqished by: on 1B,
		Date/Time Relinquished:
		Signature:
		Courier and consignment number:
		Received by:
		Date/Time Received:
		Signature:

Tyrone Gowans

From: Tess O Leary <tess.oleary@lbwco.com.au>
Sent: Tuesday, 31 October 2023 5:53 PM
To: #AU_CAU001_EnviroSampleVic; Amy Meunier
Subject: Testing Order for Water Samples - LBWco ref 231445-01
Attachments: LSPECS - Lab Request has been Sent; 231445-01_LTO_231031.pdf

Categories: Incoming Transit

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Amy

Please see attached testing order for water samples dropped with Parimal this afternoon. Please use quote 230303LBWS. Testing order also sent as an eCOC, reference 2023-10-31-Eurofins-AB.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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CELEBRATING 15 YEARS

The last 15 years wouldn't have been possible without our fabulous team, our valued clients, our trusted suppliers, and our support network. We wouldn't be LBWco without you all - thank you!

08 8331 2417
0405 480 106
www.lbwco.com.au

Tyrone Gowans

From:	Tess O Leary <tess.oleary@lbwco.com.au>
Sent:	Wednesday, 1 November 2023 4:36 PM
To:	#AU_CAU001_EnviroSampleVic; Amy Meunier
Subject:	RE: Eurofins Sample Receipt Advice - Report 1040188 : Site RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT (231445-01)
Attachments:	1040188_summary.pdf; 1040188_COC.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Amy

Could sample SLMW12-C please be allocated for the same analysis as SLMW12-A? Apologies, there was a mix up between the sample ID on the bottle and in the eCOC.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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08 8331 2417
0405 480 106
www.lbwco.com.au

From: EnviroSampleVic@eurofins.com <EnviroSampleVic@eurofins.com>
Sent: Wednesday, November 1, 2023 3:41 PM
To: Tess O Leary <tess.oleary@lbwco.com.au>
Cc: Results <results@lbwco.com.au>; lbwco@esdat.com.au
Subject: Eurofins Sample Receipt Advice - Report 1040188 : Site RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT (231445-01)

Dear Valued Client,

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested

Environment Testing

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention:	**TESS O'LEARY**
Report	**1040188-W-V2**
Project name	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID	231445-01
Received Date	Nov 01, 2023

Client Sample ID			**SLMW12-A**	**SLMW12-B**	**DUP-1**	**RINSE--1**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0001794**	**M23-No0001795**	**M23-No0001796**	**M23-No0001797**
Date Sampled			**Oct 31, 2023**	**Oct 31, 2023**	**Oct 31, 2023**	**Oct 31, 2023**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	110	110	109	100
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-

Client Sample ID			SLMW12-A	SLMW12-B	DUP-1	RINSE--1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0001794	M23-No0001795	M23-No0001796	M23-No0001797
Date Sampled			Oct 31, 2023	Oct 31, 2023	Oct 31, 2023	Oct 31, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Dibutylchlorendate (surr.)	1	%	83	75	58	-
Tetrachloro-m-xylene (surr.)	1	%	50	95	68	-
Ammonia (as N)	0.01	mg/L	0.04	0.04	0.03	-
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Nitrate & Nitrite (as N)	0.05	mg/L	1.6	1.7	2.5	-
Nitrate (as N)	0.02	mg/L	1.6	1.7	2.5	-
Nitrite (as N)	0.02	mg/L	< 0.02	0.08	0.06	-
Organic Nitrogen (as N)*	0.2	mg/L	0.96	0.66	0.47	-
pH (at 25 °C)	0.1	pH Units	8.5	7.9	7.8	-
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	-
Sulphate (as SO4)	5	mg/L	1000	1100	1200	-
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
Sulphite (as S)	0.5	mg/L	< 50	< 5	< 5	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	4800	7300	4000	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	0.7	0.5	-
Total Nitrogen (as N)*	0.2	mg/L	2.6	2.4	3.0	-
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	1300	550	280	-
Phosphate total (as P)	0.01	mg/L	0.01	< 0.01	< 0.01	-
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Barium (filtered)	0.02	mg/L	0.03	0.03	0.02	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	7.5	8.3	7.4	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	0.003	0.002	0.002	-
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.001	0.002	0.002	0.035
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.069
Manganese (filtered)	0.005	mg/L	< 0.005	0.014	0.018	< 0.005
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Client Sample ID			SLMW12-A	SLMW12-B	DUP-1	RINSE--1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0001794	M23-No0001795	M23-No0001796	M23-No0001797
Date Sampled			Oct 31, 2023	Oct 31, 2023	Oct 31, 2023	Oct 31, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	< 0.001	0.002	0.025	0.027
Selenium (filtered)	0.001	mg/L	0.058	0.051	0.065	< 0.001
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Zinc (filtered)	0.005	mg/L	0.005	0.011	0.014	0.24

Client Sample ID			TB--1	SLMW12-C
Sample Matrix			Water	Water
Eurofins Sample No.			M23-No0001798	M23-No0001799
Date Sampled			Oct 31, 2023	Oct 31, 2023
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons				
TRH C6-C9	0.02	mg/L	-	< 0.02
TRH C10-C14	0.05	mg/L	-	< 0.05
TRH C15-C28	0.1	mg/L	-	< 0.1
TRH C29-C36	0.1	mg/L	-	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	-	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	-	< 0.02
TRH >C10-C16	0.05	mg/L	-	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	-	< 0.05
TRH >C16-C34	0.1	mg/L	-	< 0.1
TRH >C34-C40	0.1	mg/L	-	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	-	< 0.1
BTEX				
Benzene	0.001	mg/L	-	< 0.001
Toluene	0.001	mg/L	-	< 0.001
Ethylbenzene	0.001	mg/L	-	< 0.001
m&p-Xylenes	0.002	mg/L	-	< 0.002
o-Xylene	0.001	mg/L	-	< 0.001
Xylenes - Total*	0.003	mg/L	-	< 0.003
4-Bromofluorobenzene (surr.)	1	%	-	110
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.01	mg/L	-	< 0.01
Organochlorine Pesticides				
Chlordanes - Total	0.002	mg/L	-	< 0.002
4.4'-DDD	0.0002	mg/L	-	< 0.0002
4.4'-DDE	0.0002	mg/L	-	< 0.0002
4.4'-DDT	0.0002	mg/L	-	< 0.0002
a-HCH	0.0002	mg/L	-	< 0.0002
Aldrin	0.0002	mg/L	-	< 0.0002
b-HCH	0.0002	mg/L	-	< 0.0002
d-HCH	0.0002	mg/L	-	< 0.0002
Dieldrin	0.0002	mg/L	-	< 0.0002
Endosulfan I	0.0002	mg/L	-	< 0.0002
Endosulfan II	0.0002	mg/L	-	< 0.0002
Endosulfan sulphate	0.0002	mg/L	-	< 0.0002

eurofins | Environment Testing

Client Sample ID			TB--1	SLMW12-C
Sample Matrix			Water	Water
Eurofins Sample No.			M23-No0001798	M23-No0001799
Date Sampled			Oct 31, 2023	Oct 31, 2023
Test/Reference	LOR	Unit		
Organochlorine Pesticides				
Endrin	0.0002	mg/L	-	< 0.0002
Endrin aldehyde	0.0002	mg/L	-	< 0.0002
Endrin ketone	0.0002	mg/L	-	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	-	< 0.0002
Heptachlor	0.0002	mg/L	-	< 0.0002
Heptachlor epoxide	0.0002	mg/L	-	< 0.0002
Hexachlorobenzene	0.0002	mg/L	-	< 0.0002
Methoxychlor	0.0002	mg/L	-	< 0.0002
Toxaphene	0.005	mg/L	-	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	-	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	-	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	-	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	-	< 0.002
Dibutylchlorendate (surr.)	1	%	-	50
Tetrachloro-m-xylene (surr.)	1	%	-	60
Ammonia (as N)	0.01	mg/L	-	0.03
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	-	< 5
Chromium (hexavalent)	0.005	mg/L	-	< 0.005
Cyanide (total)	0.005	mg/L	-	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	-	2.5
Nitrate (as N)	0.02	mg/L	-	2.5
Nitrite (as N)	0.02	mg/L	-	0.06
Organic Nitrogen (as N)*	0.2	mg/L	-	0.37
pH (at 25 °C)	0.1	pH Units	-	8.3
Phenolics (total)	0.05	mg/L	-	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	-	< 0.01
Sulphate (as SO4)	5	mg/L	-	1300
Sulphide (as S)	0.1	mg/L	-	< 0.1
Sulphite (as S)	0.5	mg/L	-	< 5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	-	8200
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	-	0.4
Total Nitrogen (as N)*	0.2	mg/L	-	2.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	-	240
Phosphate total (as P)	0.01	mg/L	-	0.01
Heavy Metals				
Aluminium (filtered)	0.05	mg/L	-	< 0.05
Arsenic (filtered)	0.001	mg/L	-	< 0.001
Barium (filtered)	0.02	mg/L	-	0.02
Beryllium (filtered)	0.001	mg/L	-	< 0.001
Boron (filtered)	0.05	mg/L	-	7.6
Cadmium (filtered)	0.0002	mg/L	-	< 0.0002
Chromium (filtered)	0.001	mg/L	-	0.002
Cobalt (filtered)	0.001	mg/L	-	< 0.001
Copper (filtered)	0.001	mg/L	-	0.002
Iron (filtered)	0.05	mg/L	-	< 0.05
Lead (filtered)	0.001	mg/L	-	< 0.001
Manganese (filtered)	0.005	mg/L	-	0.018
Mercury (filtered)	0.0001	mg/L	-	< 0.0001

Client Sample ID			**TB--1**	**SLMW12-C**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M23-No0001798**	**M23-No0001799**
Date Sampled			**Oct 31, 2023**	**Oct 31, 2023**
Test/Reference	LOR	Unit		
Heavy Metals				
Nickel (filtered)	0.001	mg/L	-	0.025
Selenium (filtered)	0.001	mg/L	-	0.065
Silver (filtered)	0.005	mg/L	-	< 0.005
Tin (filtered)	0.005	mg/L	-	< 0.005
Zinc (filtered)	0.005	mg/L	-	0.014

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 03, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Organochlorine Pesticides	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	Nov 03, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	Nov 03, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	Nov 03, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphide (as S)	Melbourne	Nov 10, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as S)	Melbourne	Nov 14, 2023	28 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Nov 14, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 03, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 01, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 03, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 03, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Mobil Metals : Metals M15	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

eurofins

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Company Name:	LBW co Pty Ltd	**Order No.:**	231445-01	**Received:**	Nov 1, 2023 5:53 AM
Address:	184 Magill Road Norwood SA 5069	**Report #:**	1040188	**Due:**	Nov 9, 2023
		Phone:	08 8331 2417	**Priority:**	5 Day
		Fax:	08 8331 2415	**Contact Name:**	TESS O'LEARY
Project Name:	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT				
Project ID:	231445-01				

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	pH (at 25 °C)	Phenolics (total)	Phosphate total (as P)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as S)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B1	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A (filtered metals)	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																					
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
1	SLMW12-A	Oct 31, 2023	1:04PM	Water	M23-No0001794	X	X	X	X	X	X	X	X	X		X			X	X	X
2	SLMW12-B	Oct 31, 2023	2:28PM	Water	M23-No0001795	X	X	X	X	X	X	X	X	X		X			X	X	X
3	DUP-1	Oct 31, 2023	3:00PM	Water	M23-No0001796	X	X	X	X	X	X	X	X	X		X			X	X	X
4	RINSE--1	Oct 31, 2023	4:47PM	Water	M23-No0001797												X	X			
5	TB--1	Oct 31, 2023	4:47PM	Water	M23-No0001798										X						
6	SLMW12-C	Oct 31, 2023		Water	M23-No0001799	X	X	X	X	X	X	X	X	X		X			X	X	X
Test Counts						4	4	4	4	4	4	4	4	4	1	4	1	1	4	4	4

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	98			70-130	Pass	
TRH C10-C14	%	130			70-130	Pass	
TRH C6-C10	%	96			70-130	Pass	
TRH >C10-C16	%	120			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	78			70-130	Pass	
Toluene	%	79			70-130	Pass	
Ethylbenzene	%	81			70-130	Pass	
m&p-Xylenes	%	84			70-130	Pass	
Xylenes - Total*	%	84			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	82			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	97			70-130	Pass	
4.4'-DDD	%	92			70-130	Pass	
4.4'-DDE	%	111			70-130	Pass	
4.4'-DDT	%	104			70-130	Pass	
a-HCH	%	107			70-130	Pass	
Aldrin	%	120			70-130	Pass	
b-HCH	%	123			70-130	Pass	
d-HCH	%	111			70-130	Pass	
Dieldrin	%	104			70-130	Pass	
Endosulfan I	%	112			70-130	Pass	
Endosulfan II	%	109			70-130	Pass	
Endosulfan sulphate	%	95			70-130	Pass	

Eurofins Environment Testing

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin			%	112			70-130	Pass	
Endrin aldehyde			%	96			70-130	Pass	
Endrin ketone			%	110			70-130	Pass	
g-HCH (Lindane)			%	115			70-130	Pass	
Heptachlor			%	124			70-130	Pass	
Heptachlor epoxide			%	89			70-130	Pass	
Hexachlorobenzene			%	109			70-130	Pass	
Methoxychlor			%	104			70-130	Pass	
LCS - % Recovery									
Ammonia (as N)			%	101			70-130	Pass	
Biochemical Oxygen Demand (BOD-5 Day)			%	88			85-115	Pass	
Chromium (hexavalent)			%	112			70-130	Pass	
Nitrate & Nitrite (as N)			%	107			70-130	Pass	
Nitrite (as N)			%	99			70-130	Pass	
Phenolics (total)			%	105			70-130	Pass	
Phosphorus reactive (as P)			%	92			70-130	Pass	
Sulphate (as SO4)			%	107			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C			%	112			70-130	Pass	
Total Kjeldahl Nitrogen (as N)			%	104			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			%	91			70-130	Pass	
Phosphate total (as P)			%	93			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic (filtered)			%	103			80-120	Pass	
Boron (filtered)			%	104			80-120	Pass	
Cadmium (filtered)			%	102			80-120	Pass	
Cobalt (filtered)			%	104			80-120	Pass	
Copper (filtered)			%	104			80-120	Pass	
Lead (filtered)			%	100			80-120	Pass	
Manganese (filtered)			%	104			80-120	Pass	
Mercury (filtered)			%	101			80-120	Pass	
Nickel (filtered)			%	104			80-120	Pass	
Selenium (filtered)			%	102			80-120	Pass	
Zinc (filtered)			%	103			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M23-No0002208	NCP	%	97			70-130	Pass	
TRH C10-C14	M23-No0004088	NCP	%	119			70-130	Pass	
TRH C6-C10	M23-No0002208	NCP	%	93			70-130	Pass	
TRH >C10-C16	M23-No0004088	NCP	%	121			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M23-No0002208	NCP	%	76			70-130	Pass	
Toluene	M23-No0002208	NCP	%	78			70-130	Pass	
Ethylbenzene	M23-No0002208	NCP	%	79			70-130	Pass	
m&p-Xylenes	M23-No0002208	NCP	%	82			70-130	Pass	
o-Xylene	M23-No0002208	NCP	%	82			70-130	Pass	
Xylenes - Total*	M23-No0002208	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M23-No0002208	NCP	%	77			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chlordanes - Total	B23-No0001765	NCP	%	95			70-130	Pass	
4.4'-DDD	B23-No0001765	NCP	%	71			70-130	Pass	
4.4'-DDE	B23-No0001765	NCP	%	84			70-130	Pass	
4.4'-DDT	B23-No0001765	NCP	%	94			70-130	Pass	
a-HCH	B23-No0001765	NCP	%	73			70-130	Pass	
Aldrin	B23-No0001765	NCP	%	77			70-130	Pass	
b-HCH	B23-No0001765	NCP	%	80			70-130	Pass	
d-HCH	B23-No0001765	NCP	%	90			70-130	Pass	
Dieldrin	B23-No0001765	NCP	%	97			70-130	Pass	
Endosulfan I	B23-No0001765	NCP	%	72			70-130	Pass	
Endosulfan II	B23-No0001765	NCP	%	72			70-130	Pass	
Endosulfan sulphate	B23-No0001765	NCP	%	91			70-130	Pass	
Endrin	B23-No0001765	NCP	%	81			70-130	Pass	
Endrin aldehyde	B23-No0001765	NCP	%	76			70-130	Pass	
Endrin ketone	B23-No0001765	NCP	%	77			70-130	Pass	
g-HCH (Lindane)	B23-No0001765	NCP	%	80			70-130	Pass	
Heptachlor	B23-No0001765	NCP	%	90			70-130	Pass	
Heptachlor epoxide	B23-No0001765	NCP	%	101			70-130	Pass	
Hexachlorobenzene	B23-No0001765	NCP	%	85			70-130	Pass	
Methoxychlor	B23-No0001765	NCP	%	95			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M23-No0001385	NCP	%	102			70-130	Pass	
Nitrate & Nitrite (as N)	M23-No0005808	NCP	%	101			70-130	Pass	
Nitrite (as N)	M23-No0005808	NCP	%	86			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-No0000649	NCP	%	84			70-130	Pass	
Phosphate total (as P)	M23-No0008511	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M23-No0002207	NCP	%	105			75-125	Pass	
Beryllium (filtered)	M23-No0002207	NCP	%	107			75-125	Pass	
Boron (filtered)	M23-No0001418	NCP	%	110			75-125	Pass	
Cadmium (filtered)	M23-No0002207	NCP	%	104			75-125	Pass	
Cobalt (filtered)	M23-No0002207	NCP	%	104			75-125	Pass	
Copper (filtered)	M23-No0002207	NCP	%	101			75-125	Pass	
Lead (filtered)	M23-No0002207	NCP	%	101			75-125	Pass	
Manganese (filtered)	M23-No0002207	NCP	%	88			75-125	Pass	
Mercury (filtered)	M23-No0002207	NCP	%	99			75-125	Pass	
Nickel (filtered)	M23-No0002207	NCP	%	104			75-125	Pass	
Selenium (filtered)	M23-No0002207	NCP	%	105			75-125	Pass	
Zinc (filtered)	M23-No0002207	NCP	%	97			75-125	Pass	
Spike - % Recovery									
				Result 1					
Phenolics (total)	M23-No0001795	CP	%	89			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-No0002207	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M23-No0005789	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-No0005789	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M23-No0005789	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C6-C10	M23-No0002207	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M23-No0005789	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M23-No0005789	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M23-No0005789	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-No0002207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-No0002207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-No0002207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-No0002207	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-No0002207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-No0002207	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-No0002207	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-No0009170	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-No0009170	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-No0009170	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0005813	NCP	mg/L	0.03	0.04	18	30%	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	M23-No0001981	NCP	mg/L	10	10	<1	30%	Pass	
Chromium (hexavalent)	M23-No0001362	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Cyanide (total)	M23-No0005806	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0005813	NCP	mg/L	18	18	2.1	30%	Pass	
Nitrite (as N)	M23-No0005813	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M23-No0001794	CP	pH Units	8.5	8.4	pass	30%	Pass	
Phenolics (total)	M23-No0001794	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-No0001794	CP	mg/L	1.0	1.2	21	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-No0005892	NCP	mg/L	310	290	7.1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M23-No0002207	NCP	mg/L	0.003	0.003	1.5	30%	Pass	
Beryllium (filtered)	M23-No0002207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-No0005812	NCP	mg/L	1.9	1.9	1.0	30%	Pass	
Cadmium (filtered)	M23-No0002207	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cobalt (filtered)	M23-No0002207	NCP	mg/L	0.008	0.008	1.5	30%	Pass	
Copper (filtered)	M23-No0002207	NCP	mg/L	0.040	0.039	1.2	30%	Pass	
Lead (filtered)	M23-No0002207	NCP	mg/L	0.018	0.018	4.1	30%	Pass	

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Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Manganese (filtered)	M23-No0002207	NCP	mg/L	0.19	0.19	2.4	30%	Pass	
Mercury (filtered)	M23-No0002207	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-No0002207	NCP	mg/L	0.012	0.012	1.7	30%	Pass	
Selenium (filtered)	M23-No0002207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	M23-No0002207	NCP	mg/L	0.12	0.12	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphate (as SO4)	M23-No0001795	CP	mg/L	1100	1200	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphate (as SO4)	M23-No0001796	CP	mg/L	1200	1200	2.2	30%	Pass	

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Comments

This report has been revised (V2) to include additional metals results (Al, Ba, Cr, Fe, Ag, Sn) for all samples, per COC.

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Amy Meunier	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Harry Bacalis	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Company	LBWco		
Project ID	231445-01		
Project Name	Riverlea Saltwater Lakes Dewatering Assessment		
SDG/COC #	2023-11-01-Eurofins-AB		
Request / Version	1/1		

Laboratory

Destination Lab	Eurofins
Lab Quote No	Q01470
Lab Contact	Sample Receipt Melb (03 8564 5000) envirosamplevic@eurofins.com

Report To

Primary Contact	LBWco Laboratory Results results@lbwco.com.au
Secondary Contact	Tess O'Leary tess.oleary@lbwco.com.au

Billing

Purchase Order #	231445-01
Org to be Billed	LBWco
Bill To	finance@lbwco.com.au
Attention	Tess O'Leary

TURNAROUND REQUEST: 5 DAYS
SPECIAL INSTRUCTIONS: -
SAMPLED BY: LBWCO TAB1

FIELD ID	MATRIX	DATE	Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	Eurofins Suite B1	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	Metals M13	Organic TRH C6-C10	Organochlorine Pesticides	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	HOLD	COMMENTS
SMLW07-Q1	Water	01/11/2023 09:14AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW06-Q1	Water	01/11/2023 09:54AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW05-Q1	Water	01/11/2023 11:03AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW05-P	Water	01/11/2023 11:43AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW02-Q1	Water	01/11/2023 12:45PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW03-Q1	Water	01/11/2023 01:58PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW01-Q1	Water	01/11/2023 02:47PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW01-P	Water	01/11/2023 03:26PM	✓	✓		✓	✓			✓	✓	✓	✓		
RINSE--2	Water	01/11/2023 05:57PM			✓			✓							
TB--1	Water	01/11/2023 05:58PM							✓						

1040740

2/11/23

Turnaround Request: 5 Days
Special Instructions: -
Sampled by: LBWco Tab1

Field ID	Matrix	Date	Sulphide (as S)	Sulphite (as SO3)	Total Dissolved Solids Dried at 180 °C ± 2 °C	Total Suspended Solids Dried at 103 °C to 105 °C	Hold	Comments
SMLW07-Q1	Water	01/11/2023 09:14AM	✓	✓	✓	✓		
SLMW06-Q1	Water	01/11/2023 09:54AM	✓	✓	✓	✓		
SLMW05-Q1	Water	01/11/2023 11:03AM	✓	✓	✓	✓		
SLMW05-P	Water	01/11/2023 11:43AM	✓	✓	✓	✓		
SLMW02-Q1	Water	01/11/2023 12:45PM	✓	✓	✓	✓		
SLMW03-Q1	Water	01/11/2023 01:58PM	✓	✓	✓	✓		
SLMW01-Q1	Water	01/11/2023 02:47PM	✓	✓	✓	✓		
SLMW01-P	Water	01/11/2023 03:26PM	✓	✓	✓	✓		
RINSE--2	Water	01/11/2023 05:57PM						
TB--1	Water	01/11/2023 05:58PM						

Hand Over			Relinquished	Received	Relinquished	Received
# of Delivery Boxes	-	Signature				
Cooled	yes	Name	Antonio Brito	Tyrone		
Con Note	-	Org	-			
		Date	01/11/2023 08:00AM	2/11/23 11:30am 10.6°c ICE		

e-Request Sent

Name -
Org -
Date -

#1040740
2/11/23
T

Tyrone Gowans

From:	Tess O Leary <tess.oleary@lbwco.com.au>
Sent:	Thursday, 2 November 2023 8:26 AM
To:	Amy Meunier; #AU_CAU001_EnviroSampleVic
Subject:	eCOC for Water Samples - LBWco Ref 231445-01
Attachments:	231445-01_LTO_231101.pdf; LSPECS - Lab Request has been Sent
Follow Up Flag:	Follow up
Flag Status:	Completed
Categories:	Incoming Transit

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Amy

Please see attached testing order for water samples sent to Melbourne overnight. Let me know if there are any queries.

This one was also sent to the lab via eCOC as SDG 2023-11-01-Eurofins-AB.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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The last 15 years wouldn't have been possible without our fabulous team, our valued clients, our trusted suppliers, and our support network. We wouldn't be LBWco without you all - thank you!

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2/11/23

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184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes Dewatering
Job Number: 231445-01
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: 230303LBWS

Secondary lab: ALS
ADBQ-001-18_LBWco_SO

COC Reference: (sample delivery group) 231445-01_COC_20231101

Sample Details 1	Sample Details 2
SLMW07-Q1 Project number 231445-01 Matrix: Water Date 1/11/23	**SLMW06-Q1** Project number 231445-01 Matrix: Water Date 1-11-23
SLMW05-Q1 Project number 231445-01 Matrix: Water Date 1-11-23	**SLMW05-P** Project number 231445-01 Matrix: Water Date 1-11-23
DUP-2 Project number 231445-01 Matrix: Water Date 1-11-23	**Rinse-2** Project number 231445-01 Matrix: Water Date 1-11-23
SLMW01-Q1 Project number 231445-01 Matrix: Water Date 1-11-23	**SLMW02-Q1** Project number 231445-01 Matrix: Water Date 1-11-23
SLMW03-Q1 Project number 231445-01 Matrix: Water Date 1-11-23	**SLMW01-P** Project number 231445-01 Matrix: Water Date 1-11-23
TB-01 1-11-23	

Sample Custody - Step 1

Relinqished by: Antonio Brito
Date/Time Relinquished: 11-01-2023
Signature:
Courier and consignment number:
Received by:
Date/Time Received:
Signature:

Sample Custody - Step 2

Relinqished by:
Date/Time Relinquished:
Signature:
Courier and consignment number:
Received by: #1040740 2/11/23
Date/Time Received:
Signature:

Tyrone Gowans

From: Tess O Leary <tess.oleary@lbwco.com.au>
Sent: Thursday, 16 November 2023 12:47 PM
To: Amy Meunier; #AU_CAU001_EnviroSampleVic
Subject: RE: Eurofins Test Results, Invoice - Report 1040740 : Site RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT (231445-01)
Attachments: 1040740_COC.pdf; 1040740-W_report.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Amy

There are some sample IDs that seem to have gotten mixed up between the COC and this lab report. The sample IDs should start with S**LM**W, whereas for most of these samples they have been reported as S**ML**W. Could you ask the lab to update the IDs and reissue, please? Also sample SLMW05-**Q3** should be SLMW05-**Q1**.

Apologies for not seeing this on the SRA.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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0405 480 106
www.lbwco.com.au

From: AmyMeunier@eurofins.com <AmyMeunier@eurofins.com>
Sent: Tuesday, November 14, 2023 4:58 PM
To: Tess O Leary <tess.oleary@lbwco.com.au>
Cc: Results <results@lbwco.com.au>; lbwco@esdat.com.au
Subject: Eurofins Test Results, Invoice - Report 1040740 : Site RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT (231445-01)

Hi Tess,

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Certificate of Analysis

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **TESS O'LEARY**

Report **1040740-W-V2**
Project name RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID 231445-01
Received Date Nov 02, 2023

Client Sample ID			**SLMW07-Q1**	**SLMW06-Q2**	**SLMW05-Q1**	**SLMW05-P**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0005806**	**M23-No0005807**	**M23-No0005808**	**M23-No0005809**
Date Sampled			**Nov 01, 2023**	**Nov 01, 2023**	**Nov 01, 2023**	**Nov 01, 2023**
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	98	100	99	99
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Environment Testing

Client Sample ID			SLMW07-Q1	SLMW06-Q2	SLMW05-Q1	SLMW05-P
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0005806	M23-No0005807	M23-No0005808	M23-No0005809
Date Sampled			Nov 01, 2023	Nov 01, 2023	Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	82	81	59	75
Tetrachloro-m-xylene (surr.)	1	%	54	58	84	53
Ammonia (as N)	0.01	mg/L	0.05	0.06	0.07	0.14
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	1.9	1.2	1.4	0.54
Nitrate (as N)	0.02	mg/L	1.9	1.2	1.4	0.54
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2	< 0.2	0.23	< 0.2
pH (at 25 °C)	0.1	pH Units	8.5	8.5	8.3	8.4
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	0.07	0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	980	800	1200	830
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 25	< 12.5	< 2.5	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	10000	1400	6800	860
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	0.2	0.3	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	1.9	1.4	1.7	0.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	1100	350	98	65
Phosphate total (as P)	0.01	mg/L	0.09	0.02	< 0.01	< 0.01
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium (filtered)	0.02	mg/L	0.04	0.03	0.03	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	7.0	5.3	3.1	3.6
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	0.002	0.008	0.008
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.001	0.001	< 0.001	0.001
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	< 0.005	< 0.005	0.021	< 0.005
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Client Sample ID			SLMW07-Q1	SLMW06-Q2	SLMW05-Q1	SLMW05-P
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0005806	M23-No0005807	M23-No0005808	M23-No0005809
Date Sampled			Nov 01, 2023	Nov 01, 2023	Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	< 0.001	0.001	0.011	0.001
Selenium (filtered)	0.001	mg/L	0.075	0.021	0.029	0.054
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005	0.006	0.008	0.008

Client Sample ID			SLMW02-Q1	SLMW03-Q1	SLMW01-Q1	SLMW01-P
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0005810	M23-No0005811	M23-No0005812	M23-No0005813
Date Sampled			Nov 01, 2023	Nov 01, 2023	Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	102	101	100	102
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	0.3	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	0.3	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	0.2	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	0.2	< 0.1	< 0.1
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

eurofins Environment Testing

Client Sample ID			SLMW02-Q1	SLMW03-Q1	SLMW01-Q1	SLMW01-P
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0005810	M23-No0005811	M23-No0005812	M23-No0005813
Date Sampled			Nov 01, 2023	Nov 01, 2023	Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	91	58	80	93
Tetrachloro-m-xylene (surr.)	1	%	83	69	93	106
Ammonia (as N)	0.01	mg/L	0.11	0.12	0.06	0.03
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	18	0.24	19	18
Nitrate (as N)	0.02	mg/L	18	0.24	19	18
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	0.08	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.59	< 0.2	0.74	3.17
pH (at 25 °C)	0.1	pH Units	8.3	8.3	8.2	8.5
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	600	1300	710	630
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 12.5	< 12.5	< 2.5	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	2100	1300	5500	1700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.7	< 0.2	0.8	3.2
Total Nitrogen (as N)*	0.2	mg/L	19	0.2	20	21
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	130	700	110	72
Phosphate total (as P)	0.01	mg/L	0.02	0.01	< 0.01	0.02
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.001
Barium (filtered)	0.02	mg/L	0.06	0.03	0.03	0.04
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	2.4	3.7	1.9	2.6
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.039	0.015	0.093	0.009
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Client Sample ID			SLMW02-Q1	SLMW03-Q1	SLMW01-Q1	SLMW01-P
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0005810	M23-No0005811	M23-No0005812	M23-No0005813
Date Sampled			Nov 01, 2023	Nov 01, 2023	Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	0.008	0.010	0.008	0.007
Selenium (filtered)	0.001	mg/L	0.008	0.002	0.008	0.015
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.007	0.006	0.007	0.005

Client Sample ID			RINSE-2	TB-1
Sample Matrix			Water	Water
Eurofins Sample No.			M23-No0005814	M23-No0005815
Date Sampled			Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit		
BTEX				
Benzene	0.001	mg/L	< 0.001	-
Toluene	0.001	mg/L	< 0.001	-
Ethylbenzene	0.001	mg/L	< 0.001	-
m&p-Xylenes	0.002	mg/L	< 0.002	-
o-Xylene	0.001	mg/L	< 0.001	-
Xylenes - Total*	0.003	mg/L	< 0.003	-
4-Bromofluorobenzene (surr.)	1	%	100	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.01	mg/L	< 0.01	-
Total Recoverable Hydrocarbons				
TRH C6-C9	0.02	mg/L	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	-
Heavy Metals				
Arsenic (filtered)	0.001	mg/L	< 0.001	-
Beryllium (filtered)	0.001	mg/L	< 0.001	-
Boron (filtered)	0.05	mg/L	< 0.5	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-
Cobalt (filtered)	0.001	mg/L	< 0.001	-
Copper (filtered)	0.001	mg/L	0.002	-
Lead (filtered)	0.001	mg/L	< 0.001	-
Manganese (filtered)	0.005	mg/L	< 0.005	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	-
Nickel (filtered)	0.001	mg/L	0.002	-

Client Sample ID			RINSE-2	TB-1
Sample Matrix			Water	Water
Eurofins Sample No.			M23-No0005814	M23-No0005815
Date Sampled			Nov 01, 2023	Nov 01, 2023
Test/Reference	LOR	Unit		
Heavy Metals				
Selenium (filtered)	0.001	mg/L	< 0.001	-
Zinc (filtered)	0.005	mg/L	0.009	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
BTEX	Melbourne	Nov 03, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Total Recoverable Hydrocarbons	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Chromium (hexavalent)	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Organochlorine Pesticides	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	Nov 03, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	Nov 03, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	Nov 03, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphide (as S)	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as SO3)	Melbourne	Nov 03, 2023	2 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 03, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Nov 14, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Nov 16, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 03, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 02, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 03, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 03, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Nov 03, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Mobil Metals : Metals M15	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name:	LBW co Pty Ltd	**Order No.:**	231445-01	**Received:**	Nov 2, 2023 11:30 AM
Address:	184 Magill Road Norwood SA 5069	**Report #:**	1040740	**Due:**	Nov 10, 2023
		Phone:	08 8331 2417	**Priority:**	5 Day
		Fax:	08 8331 2415	**Contact Name:**	TESS O'LEARY
Project Name:	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT				
Project ID:	231445-01				

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	HOLD	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as SO3)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B1	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A (filtered metals)	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																					
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
1	SMLW07-Q1	Nov 01, 2023	9:14AM	Water	M23-No0005806	X	X		X	X	X	X	X	X		X			X	X	X
2	SMLW06-Q2	Nov 01, 2023	9:54AM	Water	M23-No0005807	X	X		X	X	X	X	X	X		X			X	X	X
3	SMLW05-Q3	Nov 01, 2023	11:03AM	Water	M23-No0005808	X	X		X	X	X	X	X	X		X			X	X	X
4	SLMW05-P	Nov 01, 2023	11:43AM	Water	M23-No0005809	X	X		X	X	X	X	X	X		X			X	X	X
5	SMLW02-Q1	Nov 01, 2023	12:45PM	Water	M23-No0005810	X	X		X	X	X	X	X	X		X			X	X	X
6	SMLW03-Q1	Nov 01, 2023	1:58PM	Water	M23-No0005811	X	X		X	X	X	X	X	X		X			X	X	X
7	SMLW01-Q1	Nov 01, 2023	2:47PM	Water	M23-No0005812	X	X		X	X	X	X	X	X		X			X	X	X
8	SMLW01-P	Nov 01, 2023	3:26PM	Water	M23-No0005813	X	X		X	X	X	X	X	X		X			X	X	X
9	RINSE-2	Nov 01, 2023	5:57PM	Water	M23-No0005814												X	X			
10	TB-1	Nov 01, 2023	5:58PM	Water	M23-No0005815										X						
11	DUP2	Nov 01, 2023		Water	M23-No0005816			X													
Test Counts						8	8	1	8	8	8	8	8	8	1	8	1	1	8	8	8

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	-0.00008			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	80			70-130	Pass	
Toluene	%	78			70-130	Pass	
Ethylbenzene	%	77			70-130	Pass	
m&p-Xylenes	%	77			70-130	Pass	
Xylenes - Total*	%	77			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	79			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	95			70-130	Pass	
TRH C10-C14	%	107			70-130	Pass	
TRH C6-C10	%	90			70-130	Pass	
TRH >C10-C16	%	99			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	97			70-130	Pass	
4.4'-DDD	%	89			70-130	Pass	
4.4'-DDE	%	86			70-130	Pass	
4.4'-DDT	%	94			70-130	Pass	
a-HCH	%	93			70-130	Pass	
Aldrin	%	92			70-130	Pass	
b-HCH	%	96			70-130	Pass	
d-HCH	%	96			70-130	Pass	
Dieldrin	%	84			70-130	Pass	
Endosulfan I	%	92			70-130	Pass	
Endosulfan II	%	85			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate			%	91			70-130	Pass	
Endrin			%	101			70-130	Pass	
Endrin aldehyde			%	81			70-130	Pass	
Endrin ketone			%	86			70-130	Pass	
g-HCH (Lindane)			%	94			70-130	Pass	
Heptachlor			%	105			70-130	Pass	
Heptachlor epoxide			%	98			70-130	Pass	
Hexachlorobenzene			%	93			70-130	Pass	
Methoxychlor			%	98			70-130	Pass	
LCS - % Recovery									
Ammonia (as N)			%	107			70-130	Pass	
Biochemical Oxygen Demand (BOD-5 Day)			%	87			85-115	Pass	
Chromium (hexavalent)			%	112			70-130	Pass	
Nitrate & Nitrite (as N)			%	107			70-130	Pass	
Nitrite (as N)			%	98			70-130	Pass	
Phenolics (total)			%	102			70-130	Pass	
Phosphorus reactive (as P)			%	92			70-130	Pass	
Sulphate (as SO4)			%	115			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C			%	82			70-130	Pass	
Total Kjeldahl Nitrogen (as N)			%	84			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			%	84			70-130	Pass	
Phosphate total (as P)			%	93			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic (filtered)			%	100			80-120	Pass	
Boron (filtered)			%	103			80-120	Pass	
Cadmium (filtered)			%	91			80-120	Pass	
Cobalt (filtered)			%	98			80-120	Pass	
Copper (filtered)			%	93			80-120	Pass	
Lead (filtered)			%	82			80-120	Pass	
Manganese (filtered)			%	101			80-120	Pass	
Mercury (filtered)			%	97			80-120	Pass	
Nickel (filtered)			%	95			80-120	Pass	
Selenium (filtered)			%	92			80-120	Pass	
Zinc (filtered)			%	97			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
BTEX				Result 1					
Benzene	M23-No0001282	NCP	%	86			70-130	Pass	
Toluene	M23-No0001282	NCP	%	86			70-130	Pass	
Ethylbenzene	M23-No0001282	NCP	%	85			70-130	Pass	
m&p-Xylenes	M23-No0001282	NCP	%	85			70-130	Pass	
o-Xylene	M23-No0001282	NCP	%	85			70-130	Pass	
Xylenes - Total*	M23-No0001282	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M23-No0001282	NCP	%	88			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M23-No0001282	NCP	%	106			70-130	Pass	
TRH C10-C14	M23-No0010251	NCP	%	116			70-130	Pass	
TRH C6-C10	M23-No0001282	NCP	%	100			70-130	Pass	
TRH >C10-C16	M23-No0010251	NCP	%	113			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-Oc0074478	NCP	%	105			70-130	Pass	
4.4'-DDD	M23-Oc0074478	NCP	%	104			70-130	Pass	
4.4'-DDE	M23-Oc0074478	NCP	%	103			70-130	Pass	
4.4'-DDT	M23-Oc0074478	NCP	%	115			70-130	Pass	
a-HCH	M23-Oc0074478	NCP	%	110			70-130	Pass	
Aldrin	M23-Oc0074478	NCP	%	102			70-130	Pass	
b-HCH	M23-Oc0074478	NCP	%	118			70-130	Pass	
d-HCH	M23-Oc0074478	NCP	%	120			70-130	Pass	
Dieldrin	M23-Oc0074478	NCP	%	97			70-130	Pass	
Endosulfan I	M23-Oc0074478	NCP	%	98			70-130	Pass	
Endosulfan II	M23-Oc0074478	NCP	%	112			70-130	Pass	
Endosulfan sulphate	M23-Oc0074478	NCP	%	106			70-130	Pass	
Endrin	M23-Oc0074478	NCP	%	126			70-130	Pass	
Endrin aldehyde	M23-Oc0074478	NCP	%	102			70-130	Pass	
Endrin ketone	M23-Oc0074478	NCP	%	93			70-130	Pass	
g-HCH (Lindane)	M23-Oc0074478	NCP	%	115			70-130	Pass	
Heptachlor	M23-Oc0074478	NCP	%	121			70-130	Pass	
Heptachlor epoxide	M23-Oc0074478	NCP	%	109			70-130	Pass	
Hexachlorobenzene	M23-Oc0074478	NCP	%	116			70-130	Pass	
Methoxychlor	M23-Oc0074478	NCP	%	109			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M23-No0002208	NCP	%	96			70-130	Pass	
Phosphate total (as P)	M23-No0008511	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Boron (filtered)	M23-No0005794	NCP	%	104			75-125	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-No0005807	CP	%	88			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M23-No0005808	CP	%	101			70-130	Pass	
Nitrite (as N)	M23-No0005808	CP	%	86			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-No0005812	CP	%	102			75-125	Pass	
Arsenic (filtered)	M23-No0005812	CP	%	104			75-125	Pass	
Barium (filtered)	M23-No0005812	CP	%	104			75-125	Pass	
Beryllium (filtered)	M23-No0005812	CP	%	92			75-125	Pass	
Cadmium (filtered)	M23-No0005812	CP	%	89			75-125	Pass	
Chromium (filtered)	M23-No0005812	CP	%	97			75-125	Pass	
Cobalt (filtered)	M23-No0005812	CP	%	94			75-125	Pass	
Copper (filtered)	M23-No0005812	CP	%	88			75-125	Pass	
Iron (filtered)	M23-No0005812	CP	%	88			75-125	Pass	
Lead (filtered)	M23-No0005812	CP	%	80			75-125	Pass	
Manganese (filtered)	M23-No0005812	CP	%	89			75-125	Pass	
Mercury (filtered)	M23-No0005812	CP	%	99			75-125	Pass	
Nickel (filtered)	M23-No0005812	CP	%	89			75-125	Pass	
Selenium (filtered)	M23-No0005812	CP	%	94			75-125	Pass	
Tin (filtered)	M23-No0005812	CP	%	99			75-125	Pass	
Zinc (filtered)	M23-No0005812	CP	%	91			75-125	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
				Result 1					
Phenolics (total)	M23-No0005813	CP	%	111			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-Oc0074113	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-Oc0074113	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-Oc0074113	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-Oc0074113	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-Oc0074113	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-Oc0074113	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-Oc0074113	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-Oc0074113	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M23-Oc0074113	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Cyanide (total)	M23-No0005806	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-No0005874	NCP	mg/L	2900	2900	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Biochemical Oxygen Demand (BOD-5 Day)	M23-No0005807	CP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphate (as SO4)	M23-No0005808	CP	mg/L	1200	1200	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphide (as S)	M23-No0005809	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C10-C14	M23-No0005810	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-No0005810	CP	mg/L	< 0.1	0.2	140	30%	Fail	Q15
TRH C29-C36	M23-No0005810	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C10-C16	M23-No0005810	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M23-No0005810	CP	mg/L	< 0.1	0.2	150	30%	Fail	Q15
TRH >C34-C40	M23-No0005810	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-No0005810	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	

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Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Endosulfan sulphate	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-No0005810	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-No0005810	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M23-No0005810	CP	mg/L	0.7	0.7	1.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M23-No0005812	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
pH (at 25 °C)	M23-No0005812	CP	pH Units	8.2	8.1	pass	30%	Pass	
Phenolics (total)	M23-No0005812	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Sulphite (as SO3)	M23-No0005812	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0005812	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-No0005812	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M23-No0005812	CP	mg/L	0.03	0.03	6.1	30%	Pass	
Beryllium (filtered)	M23-No0005812	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-No0005812	CP	mg/L	1.9	1.9	1.0	30%	Pass	
Cadmium (filtered)	M23-No0005812	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M23-No0005812	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M23-No0005812	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M23-No0005812	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M23-No0005812	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M23-No0005812	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M23-No0005812	CP	mg/L	0.093	0.093	<1	30%	Pass	
Mercury (filtered)	M23-No0005812	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-No0005812	CP	mg/L	0.008	0.008	1.5	30%	Pass	
Selenium (filtered)	M23-No0005812	CP	mg/L	0.008	0.007	8.7	30%	Pass	
Silver (filtered)	M23-No0005812	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	M23-No0005812	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-No0005812	CP	mg/L	0.007	0.007	3.1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0005813	CP	mg/L	0.03	0.04	18	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0005813	CP	mg/L	18	18	2.1	30%	Pass	
Nitrite (as N)	M23-No0005813	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

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Comments

This report has been revised (V2) to include additional metals results per COC and to correct sample names from SMLW to SLMW, per client request, TOL, 16/11/23.

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Amy Meunier	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Caitlin Breeze	Senior Analyst-Metal
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Harry Bacalis	Senior Analyst-Volatile
Joseph Edouard	Senior Analyst-Organic
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Company	LBWco
Project ID	231445-01
Project Name	Riverlea Saltwater Lakes Dewatering Assessment
SDG/COC #	2023-11-02-Eurofins-AB
Request / Version	1/1

Laboratory

Destination Lab	Eurofins
Lab Quote No	Q01470
Lab Contact	Sample Receipt Melb (03 8564 5000) envirosamplevic@eurofins.com

Report To

Primary Contact	LBWco Laboratory Results results@lbwco.com.au
Secondary Contact	Tess O'Leary tess.oleary@lbwco.com.au

Billing

Purchase Order #	231445-01
Org to be Billed	LBWco
Bill To	finance@lbwco.com.au
Attention	Tess O'Leary

TURNAROUND REQUEST: 5 DAYS
SPECIAL INSTRUCTIONS: -
SAMPLED BY: LBWCO TAB1

FIELD ID	MATRIX	DATE	Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	Eurofins Suite B1	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3,	Total P, Reactive P Eurofins Suite B6A	Metals M13	Organic TRH C6-C10	Organochlorine Pesticides	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	HOLD	COMMENTS
SLMW10-C	Water	02/11/2023 08:43AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW10-B	Water	02/11/2023 09:20AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW10-A	Water	02/11/2023 10:30AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW11-C	Water	02/11/2023 11:14AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW11-B	Water	02/11/2023 11:54AM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW13-C	Water	02/11/2023 12:54PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW13-B	Water	02/11/2023 01:25PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW13-A	Water	02/11/2023 01:58PM	✓	✓		✓	✓			✓	✓	✓	✓		
SLMW04-P	Water	02/11/2023 02:51PM	✓	✓		✓	✓			✓	✓	✓	✓		
RINSE-3	Water	02/11/2023 04:39PM			✓			✓							
TB-3	Water	02/11/2023 04:39PM							✓						

3/11/23
#1041695

Turnaround Request: 5 Days
Special Instructions: -
Sampled by: LBWco Tab1

Field ID	Matrix	Date	Sulphide (as S)	Sulphite (as SO3)	Total Dissolved Solids Dried at 180 °C ± 2 °C	Total Suspended Solids Dried at 103 °C to 105 °C							Hold	Comments
SLMW10-C	Water	02/11/2023 08:43AM	✓	✓	✓	✓								
SLMW10-B	Water	02/11/2023 09:20AM	✓	✓	✓	✓								
SLMW10-A	Water	02/11/2023 10:30AM	✓	✓	✓	✓								
SLMW11-C	Water	02/11/2023 11:14AM	✓	✓	✓	✓								
SLMW11-B	Water	02/11/2023 11:54AM	✓	✓	✓	✓								
SLMW13-C	Water	02/11/2023 12:54PM	✓	✓	✓	✓								
SLMW13-B	Water	02/11/2023 01:25PM	✓	✓	✓	✓								
SLMW13-A	Water	02/11/2023 01:58PM	✓	✓	✓	✓								
SLMW04-P	Water	02/11/2023 02:51PM	✓	✓	✓	✓								
RINSE-3	Water	02/11/2023 04:39PM												
TB-3	Water	02/11/2023 04:39PM												

Hand Over

# of Delivery Boxes -
Cooled no
Con Note -

	Relinquished	Received	Relinquished	Received
Signature				
Name	Antonio Brito			
Org	-			
Date	02/11/2023 08:12AM			

e-Request Sent

Name -
Org -
Date -

Tyrone Gowans

From:	Tess O Leary <tess.oleary@lbwco.com.au>
Sent:	Thursday, 2 November 2023 5:40 PM
To:	Amy Meunier; #AU_CAU001_EnviroSampleVic
Subject:	eCOC for LBWco ref 231445-01
Attachments:	LSPECS - Lab Request has been Sent; 231445-01_LTO_231102.pdf
Categories:	Incoming Transit

> **CAUTION:** EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Morning Amy

Please see attached testing order for samples dropped with Parimal this afternoon.

Note quote 230303LBWS (Q01470). Also sent via eCOC as 2023-11-02-Eurofins-AB.

Any queries, please let me know.

Thanks!
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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CELEBRATING 15 YEARS

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0405 480 106
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184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes Dewatering
Job Number: 231445-01
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au, lbwco@esdat.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: 230303LBWS
Secondary lab: ALS
EN/111/23

COC Reference: (sample delivery group) 231445-01_COC_

Sample Details 1	Sample Details 2	Sample Custody - Step 1
SLMW10-C #231445-01 2-11-23	SLMW10-B #231445-01 2-11-23	Relinqished by: Antonio Brito
SLMW10-A #231445-01 2-11-23	SLMW11-C #231445-01 2-11-23	Date/Time Relinquished: 2/11/2023
Rinse-3 #231445-01 2-11-23	SLMW11-B #231445-01 2-11-23	Signature:
		Courier and consignment number:
SLMW13-C #231445-01 2-11-23	SLMW13-B #231445-01 2-11-23	Received by: Pazemal
		Date/Time Received: 02/11 3:50pm
SLMW13-A #231445-01 2-11-23	SLMW04-P #231445-01 2-11-23	Signature:
TB-3 #231445-01 2-11-23		**Sample Custody - Step 2**
		Relinqished by: 12.4°C −0.3°C 12.1°C
		Date/Time Relinquished: on IB.
		Signature:
		Courier and consignment number:
		Received by:
		Date/Time Received:
		Signature:

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Certificate of Analysis

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **TESS O'LEARY**

Report **1041094-W-V3**
Project name RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID 231445-01
Received Date Nov 02, 2023

Client Sample ID			**SLMW10-C**	**SLMW10-B**	**SLMW10-A**	**SLMW11-C**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0008629**	**M23-No0008630**	**M23-No0008631**	**M23-No0008632**
Date Sampled			**Nov 02, 2023**	**Nov 02, 2023**	**Nov 02, 2023**	**Nov 02, 2023**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	112	108	110	111
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Client Sample ID			SLMW10-C	SLMW10-B	SLMW10-A	SLMW11-C
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0008629	M23-No0008630	M23-No0008631	M23-No0008632
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	87	67	62	54
Tetrachloro-m-xylene (surr.)	1	%	92	65	64	56
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	< 0.01	0.04
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	10	0.47	0.25	1.3
Nitrate (as N)	0.02	mg/L	10	0.42	0.24	1.1
Nitrite (as N)	0.02	mg/L	0.20	0.05	< 0.02	0.20
Organic Nitrogen (as N)*	0.2	mg/L	1.2	< 0.2	< 0.2	0.36
pH (at 25 °C)	0.1	pH Units	8.3	7.0	8.5	8.5
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	570	490	560	810
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 12.5	< 2.5	< 2.5	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	1500	2600	7800	5000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.2	< 0.2	< 0.2	0.4
Total Nitrogen (as N)*	0.2	mg/L	11	0.5	0.3	1.7
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	610	52	47	110
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Barium (filtered)	0.02	mg/L	0.02	0.03	0.03	0.06
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	0.8	4.8	2.9	3.0
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	0.002	< 0.001	0.001
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.052	< 0.005	< 0.005	< 0.005
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Client Sample ID			SLMW10-C	SLMW10-B	SLMW10-A	SLMW11-C
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0008629	M23-No0008630	M23-No0008631	M23-No0008632
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	< 0.001	0.007	< 0.001	0.010
Selenium (filtered)	0.001	mg/L	0.030	0.009	0.002	0.015
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			SLMW11-B	SLMW13-C	SLMW13-B	SLMW13-A
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0008633	M23-No0008634	M23-No0008635	M23-No0008636
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	102	99	101	100
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Client Sample ID			SLMW11-B	SLMW13-C	SLMW13-B	SLMW13-A
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0008633	M23-No0008634	M23-No0008635	M23-No0008636
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	56	61	111	54
Tetrachloro-m-xylene (surr.)	1	%	72	77	62	66
Ammonia (as N)	0.01	mg/L	0.02	0.01	0.03	0.02
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	11	2.0	11	18
Nitrate (as N)	0.02	mg/L	11	1.4	10	18
Nitrite (as N)	0.02	mg/L	0.49	0.55	0.69	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.98	< 0.2	< 0.2	1.08
pH (at 25 °C)	0.1	pH Units	8.2	8.1	8.3	8.2
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	470	740	490	520
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 6.5	< 2.5	< 12.5	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	1200	900	4500	1400
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	< 0.2	< 0.2	1.1
Total Nitrogen (as N)*	0.2	mg/L	12	2.0	11	19
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	340	150	84	72
Phosphate total (as P)	0.01	mg/L	0.05	0.03	0.05	0.02
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Barium (filtered)	0.02	mg/L	0.03	0.04	0.05	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	4.3	4.5	5.0	4.5
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	0.004	< 0.001	0.002
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.010	0.13	0.028	0.010
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Client Sample ID			SLMW11-B	SLMW13-C	SLMW13-B	SLMW13-A
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0008633	M23-No0008634	M23-No0008635	M23-No0008636
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel (filtered)	0.001	mg/L	0.001	0.024	0.007	0.003
Selenium (filtered)	0.001	mg/L	0.037	0.030	0.093	0.044
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005	0.018	< 0.005	< 0.005

Client Sample ID			SLMW04-P	RINSE-3	TB-3
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M23-No0008637	M23-No0008638	M23-No0008639
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	-
Toluene	0.001	mg/L	< 0.001	< 0.001	-
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	-
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	-
o-Xylene	0.001	mg/L	< 0.001	< 0.001	-
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	-
4-Bromofluorobenzene (surr.)	1	%	99	106	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	-
Organochlorine Pesticides					
Chlordanes - Total	0.002	mg/L	< 0.002	-	-
4.4'-DDD	0.0002	mg/L	< 0.0002	-	-
4.4'-DDE	0.0002	mg/L	< 0.0002	-	-
4.4'-DDT	0.0002	mg/L	< 0.0002	-	-
a-HCH	0.0002	mg/L	< 0.0002	-	-
Aldrin	0.0002	mg/L	< 0.0002	-	-
b-HCH	0.0002	mg/L	< 0.0002	-	-
d-HCH	0.0002	mg/L	< 0.0002	-	-
Dieldrin	0.0002	mg/L	< 0.0002	-	-
Endosulfan I	0.0002	mg/L	< 0.0002	-	-
Endosulfan II	0.0002	mg/L	< 0.0002	-	-
Endosulfan sulphate	0.0002	mg/L	< 0.0002	-	-

Client Sample ID			SLMW04-P	RINSE-3	TB-3
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M23-No0008637	M23-No0008638	M23-No0008639
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Endrin	0.0002	mg/L	< 0.0002	-	-
Endrin aldehyde	0.0002	mg/L	< 0.0002	-	-
Endrin ketone	0.0002	mg/L	< 0.0002	-	-
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	-	-
Heptachlor	0.0002	mg/L	< 0.0002	-	-
Heptachlor epoxide	0.0002	mg/L	< 0.0002	-	-
Hexachlorobenzene	0.0002	mg/L	< 0.0002	-	-
Methoxychlor	0.0002	mg/L	< 0.0002	-	-
Toxaphene	0.005	mg/L	< 0.005	-	-
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	-	-
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	-	-
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	-	-
Dibutylchlorendate (surr.)	1	%	81	-	-
Tetrachloro-m-xylene (surr.)	1	%	80	-	-
Ammonia (as N)	0.01	mg/L	0.02	-	-
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	-	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	-
Cyanide (total)	0.005	mg/L	< 0.005	-	-
Nitrate & Nitrite (as N)	0.05	mg/L	17	-	-
Nitrate (as N)	0.02	mg/L	17	-	-
Nitrite (as N)	0.02	mg/L	< 0.02	-	-
Organic Nitrogen (as N)*	0.2	mg/L	0.68	-	-
pH (at 25 °C)	0.1	pH Units	8.2	-	-
Phenolics (total)	0.05	mg/L	< 0.05	-	-
Phosphorus reactive (as P)	0.01	mg/L	0.02	-	-
Sulphate (as SO4)	5	mg/L	480	-	-
Sulphide (as S)	0.1	mg/L	< 0.1	-	-
Sulphite (as SO3)	0.5	mg/L	< 2.5	-	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	1400	-	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.7	-	-
Total Nitrogen (as N)*	0.2	mg/L	18	-	-
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	69	-	-
Phosphate total (as P)	0.01	mg/L	< 0.01	-	-
Heavy Metals					
Aluminium (filtered)	0.05	mg/L	< 0.05	-	-
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Barium (filtered)	0.02	mg/L	0.04	-	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Boron (filtered)	0.05	mg/L	4.4	< 0.5	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	-
Chromium (filtered)	0.001	mg/L	< 0.001	-	-
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Copper (filtered)	0.001	mg/L	0.003	< 0.01	-
Iron (filtered)	0.05	mg/L	< 0.05	-	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.01	-
Manganese (filtered)	0.005	mg/L	< 0.005	< 0.005	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-

Client Sample ID			SLMW04-P	RINSE-3	TB-3
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M23-No0008637	M23-No0008638	M23-No0008639
Date Sampled			Nov 02, 2023	Nov 02, 2023	Nov 02, 2023
Test/Reference	LOR	Unit			
Heavy Metals					
Nickel (filtered)	0.001	mg/L	0.001	< 0.01	-
Selenium (filtered)	0.001	mg/L	0.038	< 0.001	-
Silver (filtered)	0.005	mg/L	< 0.005	-	-
Tin (filtered)	0.005	mg/L	< 0.005	-	-
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.05	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 21, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 06, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	Nov 21, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Organochlorine Pesticides	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	Nov 06, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	Nov 06, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	Nov 06, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphide (as S)	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as SO3)	Melbourne	Nov 06, 2023	2 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 06, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Nov 16, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 06, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 03, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 06, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 06, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Mobil Metals : Metals M15	Melbourne	Nov 06, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name: LBW co Pty Ltd
Address: 184 Magill Road
Norwood
SA 5069

Order No.:
Report #: 1041094
Phone: 08 8331 2417
Fax: 08 8331 2415

Received: Nov 2, 2023 3:50 PM
Due: Nov 8, 2023
Priority: 5 Day
Contact Name: TESS O'LEARY

Project Name: RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID: 231445-01

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as SO3)	Total Suspended Solids Dried at 103 °C to 105 °C	TRH C6-C10	Organochlorine Pesticides	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B1	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																				
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**															
1	SLMW10-C	Nov 02, 2023		Water	M23-No0008629	X	X	X	X	X	X	X	X		X			X	X	X
2	SLMW10-B	Nov 02, 2023		Water	M23-No0008630	X	X	X	X	X	X	X	X		X			X	X	X
3	SLMW10-A	Nov 02, 2023		Water	M23-No0008631	X	X	X	X	X	X	X	X		X			X	X	X
4	SLMW11-C	Nov 02, 2023		Water	M23-No0008632	X	X	X	X	X	X	X	X		X			X	X	X
5	SLMW11-B	Nov 02, 2023		Water	M23-No0008633	X	X	X	X	X	X	X	X		X			X	X	X
6	SLMW13-C	Nov 02, 2023		Water	M23-No0008634	X	X	X	X	X	X	X	X		X			X	X	X
7	SLMW13-B	Nov 02, 2023		Water	M23-No0008635	X	X	X	X	X	X	X	X		X			X	X	X
8	SLMW13-A	Nov 02, 2023		Water	M23-No0008636	X	X	X	X	X	X	X	X		X			X	X	X
9	SLMW04-P	Nov 02, 2023		Water	M23-No0008637	X	X	X	X	X	X	X	X		X			X	X	X
10	RINSE-3	Nov 02, 2023		Water	M23-No0008638											X	X			
11	TB-3	Nov 02, 2023		Water	M23-No0008639									X						
Test Counts						9	9	9	9	9	9	9	9	1	9	1	1	9	9	9

Environment Testing

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

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Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	95			70-130	Pass	
TRH C10-C14	%	129			70-130	Pass	
TRH C6-C10	%	92			70-130	Pass	
TRH >C10-C16	%	119			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	80			70-130	Pass	
Toluene	%	78			70-130	Pass	
Ethylbenzene	%	79			70-130	Pass	
m&p-Xylenes	%	83			70-130	Pass	
Xylenes - Total*	%	83			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	84			70-130	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Organochlorine Pesticides							
Chlordanes - Total	%	100			70-130	Pass	
4.4'-DDD	%	103			70-130	Pass	
4.4'-DDE	%	97			70-130	Pass	
4.4'-DDT	%	119			70-130	Pass	
a-HCH	%	101			70-130	Pass	
Aldrin	%	95			70-130	Pass	
b-HCH	%	108			70-130	Pass	
d-HCH	%	107			70-130	Pass	
Dieldrin	%	92			70-130	Pass	
Endosulfan I	%	99			70-130	Pass	
Endosulfan II	%	103			70-130	Pass	
Endosulfan sulphate	%	109			70-130	Pass	
Endrin	%	120			70-130	Pass	
Endrin aldehyde	%	88			70-130	Pass	
Endrin ketone	%	98			70-130	Pass	
g-HCH (Lindane)	%	105			70-130	Pass	
Heptachlor	%	122			70-130	Pass	
Heptachlor epoxide	%	106			70-130	Pass	
Hexachlorobenzene	%	101			70-130	Pass	
Methoxychlor	%	129			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	104			70-130	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	%	90			85-115	Pass	
Chromium (hexavalent)	%	100			70-130	Pass	
Nitrate & Nitrite (as N)	%	107			70-130	Pass	
Nitrite (as N)	%	97			70-130	Pass	
Phenolics (total)	%	114			70-130	Pass	
Phosphorus reactive (as P)	%	83			70-130	Pass	
Sulphate (as SO4)	%	106			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	82			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	76			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	84			70-130	Pass	
Phosphate total (as P)	%	98			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	98			80-120	Pass	
Boron (filtered)	%	109			80-120	Pass	
Cadmium (filtered)	%	99			80-120	Pass	
Cobalt (filtered)	%	100			80-120	Pass	
Copper (filtered)	%	100			80-120	Pass	
Lead (filtered)	%	93			80-120	Pass	
Manganese (filtered)	%	100			80-120	Pass	
Mercury (filtered)	%	91			80-120	Pass	
Nickel (filtered)	%	100			80-120	Pass	
Selenium (filtered)	%	101			80-120	Pass	
Zinc (filtered)	%	100			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M23-No0010604	NCP	%	89			70-130	Pass	
TRH C10-C14	M23-No0012785	NCP	%	116			70-130	Pass	
TRH C6-C10	M23-No0010604	NCP	%	87			70-130	Pass	
TRH >C10-C16	M23-No0012785	NCP	%	107			70-130	Pass	

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Environment Testing

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX				Result 1					
Benzene	M23-No0010604	NCP	%	78			70-130	Pass	
Toluene	M23-No0010604	NCP	%	77			70-130	Pass	
Ethylbenzene	M23-No0010604	NCP	%	78			70-130	Pass	
m&p-Xylenes	M23-No0010604	NCP	%	81			70-130	Pass	
o-Xylene	M23-No0010604	NCP	%	82			70-130	Pass	
Xylenes - Total*	M23-No0010604	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M23-No0010604	NCP	%	88			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-No0008629	CP	%	96			70-130	Pass	
4.4'-DDD	M23-No0008629	CP	%	86			70-130	Pass	
4.4'-DDE	M23-No0008629	CP	%	81			70-130	Pass	
4.4'-DDT	M23-No0008629	CP	%	93			70-130	Pass	
a-HCH	M23-No0008629	CP	%	93			70-130	Pass	
Aldrin	M23-No0008629	CP	%	91			70-130	Pass	
b-HCH	M23-No0008629	CP	%	94			70-130	Pass	
d-HCH	M23-No0008629	CP	%	92			70-130	Pass	
Dieldrin	M23-No0008629	CP	%	73			70-130	Pass	
Endosulfan I	M23-No0008629	CP	%	95			70-130	Pass	
Endosulfan II	M23-No0008629	CP	%	87			70-130	Pass	
Endosulfan sulphate	M23-No0008629	CP	%	92			70-130	Pass	
Endrin	M23-No0008629	CP	%	104			70-130	Pass	
Endrin aldehyde	M23-No0008629	CP	%	81			70-130	Pass	
Endrin ketone	M23-No0008629	CP	%	83			70-130	Pass	
g-HCH (Lindane)	M23-No0008629	CP	%	97			70-130	Pass	
Heptachlor	M23-No0008629	CP	%	108			70-130	Pass	
Heptachlor epoxide	M23-No0008629	CP	%	95			70-130	Pass	
Hexachlorobenzene	M23-No0008629	CP	%	90			70-130	Pass	
Methoxychlor	M23-No0008629	CP	%	96			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M23-No0005789	NCP	%	97			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phenolics (total)	M23-No0008630	CP	%	110			70-130	Pass	
Phosphate total (as P)	M23-No0008630	CP	%	112			70-130	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-No0008632	CP	%	100			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M23-No0008633	CP	%	125			70-130	Pass	
Nitrite (as N)	M23-No0008633	CP	%	91			70-130	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-No0008635	CP	%	88			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-No0008637	CP	%	98			70-130	Pass	
4.4'-DDD	M23-No0008637	CP	%	95			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDE	M23-No0008637	CP	%	90			70-130	Pass	
4.4'-DDT	M23-No0008637	CP	%	112			70-130	Pass	
a-HCH	M23-No0008637	CP	%	95			70-130	Pass	
Aldrin	M23-No0008637	CP	%	94			70-130	Pass	
b-HCH	M23-No0008637	CP	%	98			70-130	Pass	
d-HCH	M23-No0008637	CP	%	96			70-130	Pass	
Dieldrin	M23-No0008637	CP	%	92			70-130	Pass	
Endosulfan I	M23-No0008637	CP	%	97			70-130	Pass	
Endosulfan II	M23-No0008637	CP	%	92			70-130	Pass	
Endosulfan sulphate	M23-No0008637	CP	%	101			70-130	Pass	
Endrin	M23-No0008637	CP	%	108			70-130	Pass	
Endrin aldehyde	M23-No0008637	CP	%	88			70-130	Pass	
Endrin ketone	M23-No0008637	CP	%	89			70-130	Pass	
g-HCH (Lindane)	M23-No0008637	CP	%	99			70-130	Pass	
Heptachlor	M23-No0008637	CP	%	119			70-130	Pass	
Heptachlor epoxide	M23-No0008637	CP	%	101			70-130	Pass	
Hexachlorobenzene	M23-No0008637	CP	%	95			70-130	Pass	
Methoxychlor	M23-No0008637	CP	%	119			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-No0008638	CP	%	98			75-125	Pass	
Arsenic (filtered)	M23-No0008638	CP	%	95			75-125	Pass	
Barium (filtered)	M23-No0008638	CP	%	96			75-125	Pass	
Beryllium (filtered)	M23-No0008638	CP	%	93			75-125	Pass	
Boron (filtered)	M23-No0005794	NCP	%	104			75-125	Pass	
Cadmium (filtered)	M23-No0008638	CP	%	97			75-125	Pass	
Chromium (filtered)	M23-No0008638	CP	%	94			75-125	Pass	
Cobalt (filtered)	M23-No0008638	CP	%	95			75-125	Pass	
Copper (filtered)	M23-No0008638	CP	%	88			75-125	Pass	
Iron (filtered)	M23-No0008638	CP	%	93			75-125	Pass	
Lead (filtered)	M23-No0008638	CP	%	85			75-125	Pass	
Manganese (filtered)	M23-No0008638	CP	%	94			75-125	Pass	
Mercury (filtered)	M23-No0008638	CP	%	90			75-125	Pass	
Nickel (filtered)	M23-No0008638	CP	%	92			75-125	Pass	
Selenium (filtered)	M23-No0008638	CP	%	96			75-125	Pass	
Silver (filtered)	M23-No0008638	CP	%	92			75-125	Pass	
Tin (filtered)	M23-No0008638	CP	%	86			75-125	Pass	
Zinc (filtered)	M23-No0008638	CP	%	80			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-No0010534	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	B23-No0001764	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	B23-No0001764	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	B23-No0001764	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C6-C10	M23-No0010534	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	B23-No0001764	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	B23-No0001764	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	B23-No0001764	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-No0010534	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-No0010534	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-No0010534	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-No0010534	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-No0010534	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-No0010534	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-No0010534	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-No0008542	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-No0008542	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-No0008542	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0008132	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cyanide (total)	M23-No0008629	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0008132	NCP	mg/L	0.38	0.36	7.1	30%	Pass	
Nitrite (as N)	M23-No0008132	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Phenolics (total)	M23-No0008629	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Sulphate (as SO4)	M23-No0005798	NCP	mg/L	43	42	1.2	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-No0005874	NCP	mg/L	2900	2900	1.0	30%	Pass	
Phosphate total (as P)	M23-No0008629	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0008629	CP	mg/L	< 0.05	< 0.5	<1	30%	Pass	
Arsenic (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	
Barium (filtered)	M23-No0008629	CP	mg/L	0.02	< 0.2	<1	30%	Pass	
Beryllium (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-No0008629	CP	mg/L	0.8	< 5	<1	30%	Pass	
Cadmium (filtered)	M23-No0008629	CP	mg/L	< 0.0002	< 0.002	<1	30%	Pass	
Chromium (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	
Cobalt (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	
Copper (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	

eurofins

Environment Testing

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron (filtered)	M23-No0008629	CP	mg/L	< 0.05	< 0.5	<1	30%	Pass	
Lead (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	
Manganese (filtered)	M23-No0008629	CP	mg/L	0.052	0.056	6.2	30%	Pass	
Mercury (filtered)	M23-No0008629	CP	mg/L	< 0.0001	< 0.001	<1	30%	Pass	
Nickel (filtered)	M23-No0008629	CP	mg/L	< 0.001	< 0.01	<1	30%	Pass	
Selenium (filtered)	M23-No0008629	CP	mg/L	0.030	0.032	6.3	30%	Pass	
Silver (filtered)	M23-No0008629	CP	mg/L	< 0.005	< 0.05	<1	30%	Pass	
Tin (filtered)	M23-No0008629	CP	mg/L	< 0.005	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-No0008629	CP	mg/L	< 0.005	< 0.05	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphite (as SO3)	M23-No0008630	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M23-No0008631	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M23-No0008633	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M23-No0008634	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Sulphide (as S)	M23-No0008634	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Biochemical Oxygen Demand (BOD-5 Day)	M23-No0008635	CP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0008638	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-No0008638	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M23-No0008638	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium (filtered)	M23-No0008638	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-No0008638	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Cadmium (filtered)	M23-No0008638	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M23-No0008638	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M23-No0008638	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M23-No0008638	CP	mg/L	< 0.01	0.035	<1	30%	Pass	
Iron (filtered)	M23-No0008638	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M23-No0008638	CP	mg/L	< 0.01	0.043	5.1	30%	Pass	
Manganese (filtered)	M23-No0008638	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury (filtered)	M23-No0008638	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-No0008638	CP	mg/L	< 0.01	0.014	<1	30%	Pass	
Selenium (filtered)	M23-No0008638	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M23-No0008638	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	M23-No0008638	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-No0008638	CP	mg/L	< 0.05	0.11	<1	30%	Pass	

Environment Testing

Comments

This report has been revised (V2) to include additional metals for all samples, per COC.

This report has been revised (V3) following repeat analysis of metals for all samples to acheive lower LOR.

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Amy Meunier	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Caitlin Breeze	Senior Analyst-Metal
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Harry Bacalis	Senior Analyst-Volatile
Joseph Edouard	Senior Analyst-Organic
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal
Mele Singh	Senior Analyst-Organic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Report: 1042654
9/11 BF

Company	LBWco
Project ID	231445-01
Project Name	Riverlea Saltwater Lakes Dewatering Assessment
SDG/COC #	2023-11-07-Eurofins-GG
Request / Version	1/1

Laboratory

Destination Lab	Eurofins
Lab Quote No	Q01470
Lab Contact	Sample Receipt Melb (03 8564 5000) envirosamplevic@eurofins.com

Report To

Primary Contact	LBWco Laboratory Results results@lbwco.com.au
Secondary Contact	Tess O'Leary tess.oleary@lbwco.com.au

Billing

Purchase Order #	231445-01
Org to be Billed	LBWco
Bill To	finance@lbwco.com.au
Attention	Tess O'Leary

Turnaround Request: 5 Days
Special Instructions: Analyse B6A for total metals not dissolved.
Sampled By: Gaetano Garfi

Field ID	Matrix	Date	Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	Metals M13	Organic TRH C6-C10	Organochlorine Pesticides	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Hold	Comments
SW-RINSE-1	Water	07/11/2023 10:12AM					✓								
TB-4	Water	07/11/2023 10:12AM						✓							
SW09	Water	07/11/2023 10:14AM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW08	Water	07/11/2023 10:50AM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW-DUP-1	Water	07/11/2023 10:50AM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW07	Water	07/11/2023 11:23AM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW04	Water	07/11/2023 12:18PM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW03	Water	07/11/2023 12:45PM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW02	Water	07/11/2023 12:59PM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW05	Water	07/11/2023 01:26PM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW06	Water	07/11/2023 01:47PM	✓	✓	✓	✓			✓	✓	✓	✓	✓		
SW01	Water	07/11/2023 02:15PM	✓	✓	✓	✓			✓	✓	✓	✓	✓		

Turnaround Request: 5 Days
Special Instructions: Analyse B6A for total metals not dissolved.
Sampled by: Gaetano Garfi

Field ID	Matrix	Date	Sulphite (as SO3)	Total Dissolved Solids Dried at 180 °C ± 2 °C	Total Suspended Solids Dried at 103 °C to 105 °C									Hold	Comments
SW-RINSE-1	Water	07/11/2023 10:12AM													
TB-4	Water	07/11/2023 10:12AM													
SW09	Water	07/11/2023 10:14AM	✓	✓	✓										
SW08	Water	07/11/2023 10:50AM	✓	✓	✓										
SW-DUP-1	Water	07/11/2023 10:50AM	✓	✓	✓										
SW07	Water	07/11/2023 11:23AM	✓	✓	✓										
SW04	Water	07/11/2023 12:18PM	✓	✓	✓										
SW03	Water	07/11/2023 12:45PM	✓	✓	✓										
SW02	Water	07/11/2023 12:59PM	✓	✓	✓										
SW05	Water	07/11/2023 01:26PM	✓	✓	✓										
SW06	Water	07/11/2023 01:47PM	✓	✓	✓										
SW01	Water	07/11/2023 02:15PM	✓	✓	✓										

Hand Over

# of Delivery Boxes	2
Cooled	yes
Con Note	-

	Relinquished	Received	Relinquished	Received
Signature		[illegible]		
Name	Gaetano Garfi	[illegible]		
Org	-			
Date	07/11/2023 10:12AM	08/11 2:30pm		

e-Request Sent

Name	-
Org	-
Date	-

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes Dewatering
Job Number: 231445-01
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: 230303LBWS

Secondary lab: ALS
ADBQ-001-18_LBWco_SO

COC Reference: 231445-01_COC_20231108
(sample delivery group)

Sample Details 1	Sample Details 2
SW09	SW08
SW07	S~~W~~W04
SW03	SW02
SW05	SW06
SW01	SW-DUP-1
SW-RINSE-1	TB-L

Sample Custody - Step 1

Relinqished by: GAETANO GARFI
Date/Time Relinquished: 8/11/2023
Signature:
Courier and consignment number:
Received by: Pazemal
Date/Time Received: 08/11 2:30pm
Signature:
11.7°C
-0.4°C
11.3°C

Sample Custody - Step 2

Relinqished by:
On ice & IB
Date/Time Relinquished:
Signature:
Courier and consignment number:
Received by:
Date/Time Received:
Signature:

eurofins | Environment Testing

Certificate of Analysis

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention:	**TESS O'LEARY**
Report	**1042654-W**
Project name	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID	231445-01
Received Date	Nov 09, 2023

Client Sample ID			**SW-RINSE-1**	**TB-4**	**SW09**	**SW08**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0021423**	**M23-No0021424**	**M23-No0021425**	**M23-No0021426**
Date Sampled			**Nov 07, 2023**	**Nov 07, 2023**	**Nov 07, 2023**	**Nov 07, 2023**
Test/Reference	LOR	Unit				
Chromium (hexavalent)	0.005	mg/L	< 1	-	< 0.005	< 0.005
Ammonia (as N)	0.01	mg/L	-	-	0.96	0.48
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	-	-	< 5	< 5
Cyanide (total)	0.005	mg/L	-	-	< 0.005	0.005
Nitrate & Nitrite (as N)	0.05	mg/L	-	-	< 0.05	3.0
Nitrate (as N)	0.02	mg/L	-	-	0.03	2.8
Nitrite (as N)	0.02	mg/L	-	-	< 0.02	0.21
Organic Nitrogen (as N)*	0.2	mg/L	-	-	0.24	1.82
pH (at 25 °C)	0.1	pH Units	-	-	8.4	9.2
Phenolics (total)	0.05	mg/L	-	-	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	-	-	< 0.01	0.37
Sulphate (as SO4)	5	mg/L	-	-	4600	1400
Sulphide (as S)	0.1	mg/L	-	-	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	-	-	< 2.5	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	-	-	37000	9900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	-	-	1.2	2.3
Total Nitrogen (as N)*	0.2	mg/L	-	-	1.2	5.3
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	-	-	540	120
Phosphate total (as P)	0.01	mg/L	-	-	0.04	0.62
Heavy Metals						
Aluminium	0.05	mg/L	-	-	0.07	< 0.05
Arsenic	0.001	mg/L	< 0.001	-	0.003	0.004
Barium	0.02	mg/L	-	-	0.03	0.03
Beryllium	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Boron	0.05	mg/L	< 0.05	-	12	7.5
Cadmium	0.0002	mg/L	< 0.0002	-	< 0.0002	< 0.0002
Chromium	0.001	mg/L	-	-	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	-	0.001	0.002
Copper	0.001	mg/L	< 0.001	-	0.001	0.003
Iron	0.05	mg/L	-	-	0.24	0.06
Lead	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Manganese	0.005	mg/L	< 0.005	-	0.025	0.024
Mercury	0.0001	mg/L	< 0.0001	-	< 0.0001	< 0.0001
Nickel	0.001	mg/L	< 0.001	-	0.005	0.007
Selenium	0.001	mg/L	< 0.001	-	0.004	0.012

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Environment Testing

Client Sample ID			SW-RINSE-1	TB-4	SW09	SW08
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021423	M23-No0021424	M23-No0021425	M23-No0021426
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Silver	0.005	mg/L	-	-	< 0.005	< 0.005
Tin	0.005	mg/L	-	-	< 0.005	< 0.005
Zinc	0.005	mg/L	< 0.005	-	< 0.005	0.009
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	-	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	-	-	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	-	-	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	-	-	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	-	-	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	-	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	-	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	-	-	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	-	-	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	-	-	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	-	-	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	-	-	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	-	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	-	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	-	99	95	98
Volatile Organics						
Naphthalene[N02]	0.01	mg/L	-	< 0.01	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	-	-	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	-	-	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	-	-	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	-	-	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	-	-	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	-	-	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	-	-	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Endrin	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	-	-	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	-	-	< 0.0002	< 0.0002

Client Sample ID			SW-RINSE-1	TB-4	SW09	SW08
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021423	M23-No0021424	M23-No0021425	M23-No0021426
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Methoxychlor	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	-	-	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	-	-	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	-	-	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	-	-	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	-	-	92	51
Tetrachloro-m-xylene (surr.)	1	%	-	-	78	91

Client Sample ID			SW-DUP-1	SW07	SW04	SW03
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021427	M23-No0021428	M23-No0021429	M23-No0021430
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Ammonia (as N)	0.01	mg/L	0.54	0.71	0.31	< 0.01
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	16	7.7
Cyanide (total)	0.005	mg/L	0.008	0.006	0.006	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	3.4	4.2	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	2.9	3.7	< 0.02	< 0.02
Nitrite (as N)	0.02	mg/L	0.44	0.53	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.16	1.89	4.49	2.5
pH (at 25 °C)	0.1	pH Units	9.2	9.1	8.9	8.6
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	0.37	0.67	0.42	1.7
Sulphate (as SO4)	5	mg/L	1400	1200	2300	450
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 2.5	< 2.5	< 2.5	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	10000	8100	16000	4300
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.7	2.6	4.8	2.5
Total Nitrogen (as N)*	0.2	mg/L	5.1	6.8	4.8	2.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	130	140	170	45
Phosphate total (as P)	0.01	mg/L	0.57	0.95	0.69	1.7
Heavy Metals						
Aluminium	0.05	mg/L	0.05	0.32	1.8	0.07
Arsenic	0.001	mg/L	0.004	0.004	0.018	0.009
Barium	0.02	mg/L	0.03	0.04	0.13	0.09
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron	0.05	mg/L	8.1	8.0	8.6	2.4
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	0.001	0.003	< 0.001
Cobalt	0.001	mg/L	0.002	0.002	0.002	0.002
Copper	0.001	mg/L	0.007	0.006	0.002	< 0.001
Iron	0.05	mg/L	0.05	0.31	1.6	0.17
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	0.023	0.034	0.18	0.54

Client Sample ID			SW-DUP-1	SW07	SW04	SW03
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021427	M23-No0021428	M23-No0021429	M23-No0021430
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	0.0003
Nickel	0.001	mg/L	0.006	0.007	0.019	0.034
Selenium	0.001	mg/L	0.011	0.009	0.003	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	< 0.005	0.007	< 0.005	< 0.005
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	0.12	0.31	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	0.3	0.9	0.3
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	0.2	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	0.42	1.41	0.3
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	0.11	0.39	0.06
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	0.11	0.39	0.06
TRH >C16-C34	0.1	mg/L	< 0.1	0.2	0.9	0.3
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	0.31	1.29	0.36
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	95	91	90	92
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Client Sample ID			SW-DUP-1	SW07	SW04	SW03
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021427	M23-No0021428	M23-No0021429	M23-No0021430
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	57	61	115	122
Tetrachloro-m-xylene (surr.)	1	%	87	53	87	80

Client Sample ID			SW02	SW05	SW06	SW01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021431	M23-No0021432	M23-No0021433	M23-No0021434
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Ammonia (as N)	0.01	mg/L	0.39	0.65	0.38	0.60
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
Cyanide (total)	0.005	mg/L	< 0.005	0.005	0.078	0.010
Nitrate & Nitrite (as N)	0.05	mg/L	70	0.75	18	0.15
Nitrate (as N)	0.02	mg/L	70	0.48	17	0.14
Nitrite (as N)	0.02	mg/L	0.07	0.27	0.71	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	2.01	2.95	2.82	0.3
pH (at 25 °C)	0.1	pH Units	8.1	9.3	9.1	9.1
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	4.6	0.78	0.29	< 0.01
Sulphate (as SO4)	5	mg/L	740	1300	1300	1200
Sulphide (as S)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Sulphite (as SO3)	0.5	mg/L	< 2.5	7.5	8.9	< 2.5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	3700	3200	7500	480
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.4	3.6	3.2	0.9
Total Nitrogen (as N)*	0.2	mg/L	72	4.4	21	1.1
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	44	100	150	35
Phosphate total (as P)	0.01	mg/L	4.2	0.96	0.72	< 0.01
Heavy Metals						
Aluminium	0.05	mg/L	0.51	0.35	0.07	0.36
Arsenic	0.001	mg/L	0.006	0.006	0.005	0.003
Barium	0.02	mg/L	0.04	-	0.04	0.05
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron	0.05	mg/L	5.5	8.6	6.1	6.6
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	0.002	0.002	0.001
Copper	0.001	mg/L	0.004	0.002	0.006	0.003
Iron	0.05	mg/L	0.55	0.33	0.08	0.31
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			SW02	SW05	SW06	SW01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021431	M23-No0021432	M23-No0021433	M23-No0021434
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Manganese	0.005	mg/L	0.030	0.023	0.019	0.006
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	0.001	mg/L	0.004	0.008	0.006	0.003
Selenium	0.001	mg/L	0.010	0.007	0.011	0.015
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	0.046	< 0.005	0.011	< 0.005
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	90	92	93	79
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Organochlorine Pesticides						
Chlordanes - Total	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Client Sample ID			SW02	SW05	SW06	SW01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0021431	M23-No0021432	M23-No0021433	M23-No0021434
Date Sampled			Nov 07, 2023	Nov 07, 2023	Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Heptachlor epoxide	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toxaphene	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dibutylchlorendate (surr.)	1	%	101	118	95	104
Tetrachloro-m-xylene (surr.)	1	%	62	87	80	76

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A			
Chromium (hexavalent)	Melbourne	Nov 15, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 13, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 13, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 09, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 13, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	Nov 13, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	Nov 13, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	Nov 13, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphide (as S)	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as SO3)	Melbourne	Nov 13, 2023	2 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals	Melbourne	Nov 16, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Organochlorine Pesticides	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Nov 13, 2023	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Total Recoverable Hydrocarbons	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			

eurofins

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Company Name:	LBW co Pty Ltd	**Order No.:**		**Received:**	Nov 9, 2023 2:30 PM
Address:	184 Magill Road Norwood SA 5069	**Report #:**	1042654	**Due:**	Nov 16, 2023
		Phone:	08 8331 2417	**Priority:**	5 Day
		Fax:	08 8331 2415	**Contact Name:**	TESS O'LEARY
Project Name:	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT				
Project ID:	231445-01				

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	pH (at 25 °C)	Phenolics (total)	Phosphate total (as P)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as SO3)	Total Suspended Solids Dried at 103 °C to 105 °C	Organochlorine Pesticides	NEPM 2013 Metals : Metals M13	BTEXN and Volatile TRH	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																				
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**															
1	SW-RINSE-1	Nov 07, 2023	10:12AM	Water	M23-No0021423											X				
2	TB-4	Nov 07, 2023	10:12AM	Water	M23-No0021424												X			
3	SW09	Nov 07, 2023	10:14AM	Water	M23-No0021425	X	X	X	X	X	X	X	X	X	X			X	X	X
4	SW08	Nov 07, 2023	10:50AM	Water	M23-No0021426	X	X	X	X	X	X	X	X	X	X			X	X	X
5	SW-DUP-1	Nov 07, 2023	10:50AM	Water	M23-No0021427	X	X	X	X	X	X	X	X	X	X			X	X	X
6	SW07	Nov 07, 2023	11:23AM	Water	M23-No0021428	X	X	X	X	X	X	X	X	X	X			X	X	X
7	SW04	Nov 07, 2023	12:18PM	Water	M23-No0021429	X	X	X	X	X	X	X	X	X	X			X	X	X
8	SW03	Nov 07, 2023	12:45PM	Water	M23-No0021430	X	X	X	X	X	X	X	X	X	X			X	X	X
9	SW02	Nov 07, 2023	12:59PM	Water	M23-No0021431	X	X	X	X	X	X	X	X	X	X			X	X	X
10	SW05	Nov 07, 2023	1:26PM	Water	M23-No0021432	X	X	X	X	X	X	X	X	X	X			X	X	X
11	SW06	Nov 07, 2023	1:47PM	Water	M23-No0021433	X	X	X	X	X	X	X	X	X	X			X	X	X
12	SW01	Nov 07, 2023	2:15PM	Water	M23-No0021434	X	X	X	X	X	X	X	X	X	X			X	X	X
Test Counts						10	10	10	10	10	10	10	10	10	10	1	1	10	10	10

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**μg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Silver	mg/L	< 0.005			0.005	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	

Environment Testing

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Volatile Organics							
Naphthalene	mg/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	123			70-130	Pass	
Ammonia (as N)	%	127			70-130	Pass	
Cyanide (total)	%	92			70-130	Pass	
Nitrate & Nitrite (as N)	%	122			70-130	Pass	
Nitrite (as N)	%	102			70-130	Pass	
Phenolics (total)	%	106			70-130	Pass	
Phosphorus reactive (as P)	%	106			70-130	Pass	
Sulphate (as SO4)	%	116			70-130	Pass	
Phosphate total (as P)	%	100			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	108			80-120	Pass	
Arsenic	%	106			80-120	Pass	
Arsenic	%	94			80-120	Pass	
Barium	%	113			80-120	Pass	
Beryllium	%	94			80-120	Pass	
Beryllium	%	114			80-120	Pass	
Cadmium	%	98			80-120	Pass	
Cadmium	%	93			80-120	Pass	
Chromium	%	106			80-120	Pass	
Cobalt	%	104			80-120	Pass	
Cobalt	%	95			80-120	Pass	
Copper	%	98			80-120	Pass	
Copper	%	95			80-120	Pass	
Iron	%	101			80-120	Pass	
Lead	%	90			80-120	Pass	
Lead	%	93			80-120	Pass	
Manganese	%	109			80-120	Pass	
Manganese	%	95			80-120	Pass	
Mercury	%	97			80-120	Pass	
Mercury	%	96			80-120	Pass	
Nickel	%	100			80-120	Pass	
Nickel	%	96			80-120	Pass	
Selenium	%	103			80-120	Pass	
Selenium	%	96			80-120	Pass	
Silver	%	96			80-120	Pass	
Tin	%	118			80-120	Pass	
Zinc	%	106			80-120	Pass	
Zinc	%	95			80-120	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	78			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	83			70-130	Pass	
Toluene	%	87			70-130	Pass	
Ethylbenzene	%	83			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
m&p-Xylenes			%	83			70-130	Pass	
Xylenes - Total*			%	83			70-130	Pass	
LCS - % Recovery									
Volatile Organics									
Naphthalene			%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M23-No0021425	CP	%	102			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	M23-No0021425	CP	%	96			75-125	Pass	
Arsenic	M23-No0021425	CP	%	99			75-125	Pass	
Barium	M23-No0021425	CP	%	101			75-125	Pass	
Cadmium	M23-No0021425	CP	%	79			75-125	Pass	
Chromium	M23-No0021425	CP	%	94			75-125	Pass	
Cobalt	M23-No0021425	CP	%	88			75-125	Pass	
Copper	M23-No0021425	CP	%	78			75-125	Pass	
Iron	M23-No0021425	CP	%	86			75-125	Pass	
Manganese	M23-No0021425	CP	%	94			75-125	Pass	
Mercury	M23-No0021425	CP	%	89			75-125	Pass	
Nickel	M23-No0021425	CP	%	81			75-125	Pass	
Selenium	M23-No0021425	CP	%	84			75-125	Pass	
Tin	M23-No0021425	CP	%	102			75-125	Pass	
Zinc	M23-No0021425	CP	%	83			75-125	Pass	
Spike - % Recovery									
				Result 1					
Phenolics (total)	M23-No0021426	CP	%	77			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-No0021430	CP	%	91			70-130	Pass	
4.4'-DDD	M23-No0021430	CP	%	83			70-130	Pass	
4.4'-DDE	M23-No0021430	CP	%	112			70-130	Pass	
4.4'-DDT	M23-No0021430	CP	%	106			70-130	Pass	
a-HCH	M23-No0021430	CP	%	119			70-130	Pass	
Aldrin	M23-No0021430	CP	%	108			70-130	Pass	
b-HCH	M23-No0021430	CP	%	85			70-130	Pass	
d-HCH	M23-No0021430	CP	%	84			70-130	Pass	
Dieldrin	M23-No0021430	CP	%	81			70-130	Pass	
Endosulfan I	M23-No0021430	CP	%	82			70-130	Pass	
Endosulfan II	M23-No0021430	CP	%	116			70-130	Pass	
Endosulfan sulphate	M23-No0021430	CP	%	84			70-130	Pass	
Endrin	M23-No0021430	CP	%	103			70-130	Pass	
Endrin aldehyde	M23-No0021430	CP	%	95			70-130	Pass	
Endrin ketone	M23-No0021430	CP	%	108			70-130	Pass	
g-HCH (Lindane)	M23-No0021430	CP	%	85			70-130	Pass	
Heptachlor	M23-No0021430	CP	%	110			70-130	Pass	
Heptachlor epoxide	M23-No0021430	CP	%	91			70-130	Pass	
Hexachlorobenzene	M23-No0021430	CP	%	119			70-130	Pass	
Methoxychlor	M23-No0021430	CP	%	112			70-130	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-No0021434	CP	%	73			70-130	Pass	
Phosphate total (as P)	M23-No0021434	CP	%	112			70-130	Pass	

Eurofins Environment Testing

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Biochemical Oxygen Demand (BOD-5 Day)	M23-No0021425	CP	mg/L	< 5	< 5	<1	30%	Pass	
Phenolics (total)	M23-No0021425	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M23-No0021425	CP	mg/L	0.07	0.07	2.6	30%	Pass	
Arsenic	M23-No0021425	CP	mg/L	0.003	0.002	15	30%	Pass	
Barium	M23-No0021425	CP	mg/L	0.03	0.03	2.4	30%	Pass	
Beryllium	M23-No0021425	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	M23-No0021425	CP	mg/L	12	12	2.3	30%	Pass	
Cadmium	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M23-No0021425	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	M23-No0021425	CP	mg/L	0.001	0.001	6.8	30%	Pass	
Copper	M23-No0021425	CP	mg/L	0.001	< 0.001	15	30%	Pass	
Iron	M23-No0021425	CP	mg/L	0.24	0.23	5.6	30%	Pass	
Lead	M23-No0021425	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	M23-No0021425	CP	mg/L	0.025	0.024	3.0	30%	Pass	
Mercury	M23-No0021425	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M23-No0021425	CP	mg/L	0.005	0.005	1.5	30%	Pass	
Selenium	M23-No0021425	CP	mg/L	0.004	0.004	2.8	30%	Pass	
Silver	M23-No0021425	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin	M23-No0021425	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	M23-No0021425	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C10-C14	M23-No0021425	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-No0021425	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M23-No0021425	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C10-C16	M23-No0021425	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M23-No0021425	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M23-No0021425	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-No0021425	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-No0021425	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-No0021425	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Sulphite (as SO3)	M23-No0021426	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH >C16-C34	M23-No0021429	CP	mg/L	0.9	0.7	30	30%	Pass	
TRH >C34-C40	M23-No0021429	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-No0021429	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-No0021429	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-No0021429	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Sulphide (as S)	M23-No0021430	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Nitrate & Nitrite (as N)	M23-No0021431	CP	mg/L	70	69	1.4	30%	Pass	
Nitrite (as N)	M23-No0021431	CP	mg/L	0.07	0.07	1.8	30%	Pass	
Sulphate (as SO4)	M23-No0021431	CP	mg/L	740	750	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0021432	CP	mg/L	0.65	0.67	2.5	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0021432	CP	mg/L	0.75	0.78	3.1	30%	Pass	
Nitrite (as N)	M23-No0021432	CP	mg/L	0.27	0.27	<1	30%	Pass	
Sulphate (as SO4)	M23-No0021432	CP	mg/L	1300	1300	<1	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-No0021432	CP	mg/L	100	130	28	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0021433	CP	mg/L	0.38	0.35	10	30%	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	M23-No0021433	CP	mg/L	< 5	< 5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0021433	CP	mg/L	18	18	<1	30%	Pass	
Nitrite (as N)	M23-No0021433	CP	mg/L	0.71	0.68	4.1	30%	Pass	
Phosphate total (as P)	M23-No0021433	CP	mg/L	0.72	0.69	4.7	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M23-No0021434	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Sulphate (as SO4)	M23-No0021434	CP	mg/L	1200	1100	6.3	30%	Pass	

eurofins | Environment Testing

Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Amy Meunier	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Edward Lee	Senior Analyst-Organic
Joseph Edouard	Senior Analyst-Organic
Joseph Edouard	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

11/8/23, 8:27 AM

FS 1042 675 9111 27

LSPECS Lab Submission

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

Company	LBWco	**Laboratory**		**Report To**		**Billing**	
Project ID	231445-01	**Destination Lab**	Eurofins	**Primary Contact**	LBWco Laboratory Results results@lbwco.com.au	**Purchase Order #**	231445-01
Project Name	Riverlea Saltwater Lakes Dewatering Assessment	**Lab Quote No**	Q01470	**Secondary Contact**	Tess O'Leary tess.oleary@lbwco.com.au	**Org to be Billed**	LBWco
SDG/COC #	2023-11-07-Eurofins-TO	**Lab Contact**	Sample Receipt Melb (03 8564 5000) envirosamplevic@eurofins.com			**Bill To**	finance@lbwco.com.au
Request / Version	1/1					**Attention**	Tess O'Leary

TURNAROUND REQUEST: 5 DAYS
SPECIAL INSTRUCTIONS: -
SAMPLED BY: GAETANO GARFI

FIELD ID	MATRIX	DATE	Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3,	Total P, Reactive P - Eurofins Suite B6A	Organochlorine Pesticides	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as SO3)	HOLD	COMMENTS
6628-23298	Water	07/11/2023 02:56PM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415
E: admin@lbwco.com.au
ABN: 58 126 992 274

FS 1042 673
9/11/23

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes Dewatering
Job Number: 231445-01
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: 230303LBWS

Secondary lab: ALS
ADBQ-001-18_LBWco_SO

COC Reference: (sample delivery group) 231445-01_COC_20231108

Sample Details 1	Sample Details 2
6628-23298	

Sample Custody - Step 1

Relinqished by: GAETANO GARFI
Date/Time Relinquished: 8/11/23
Signature: [signature]
Courier and consignment number:
Received by: Pazgmal
Date/Time Received: 08/11 2:30pm
Signature: [signature] 11.7°C −0.4°C = 11.3°C

Sample Custody - Step 2

Relinqished by: on ice/IB.
Date/Time Relinquished:
Signature:
Courier and consignment number:
Received by:
Date/Time Received:
Signature:

Certificate of Analysis

Environment Testing

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention: **TESS O'LEARY**

Report	**1042675-W**
Project name	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID	231445-01
Received Date	Nov 08, 2023

Client Sample ID			**6628-23298**
Sample Matrix			**Water**
Eurofins Sample No.			**M23-No0021422**
Date Sampled			**Nov 07, 2023**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	98
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
Organochlorine Pesticides			
Chlordanes - Total	0.002	mg/L	< 0.002
4.4'-DDD	0.0002	mg/L	< 0.0002
4.4'-DDE	0.0002	mg/L	< 0.0002
4.4'-DDT	0.0002	mg/L	< 0.0002
a-HCH	0.0002	mg/L	< 0.0002
Aldrin	0.0002	mg/L	< 0.0002
b-HCH	0.0002	mg/L	< 0.0002
d-HCH	0.0002	mg/L	< 0.0002
Dieldrin	0.0002	mg/L	< 0.0002
Endosulfan I	0.0002	mg/L	< 0.0002
Endosulfan II	0.0002	mg/L	< 0.0002
Endosulfan sulphate	0.0002	mg/L	< 0.0002

eurofins

Environment Testing

Client Sample ID			6628-23298
Sample Matrix			**Water**
Eurofins Sample No.			**M23-No0021422**
Date Sampled			**Nov 07, 2023**
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
Endrin	0.0002	mg/L	< 0.0002
Endrin aldehyde	0.0002	mg/L	< 0.0002
Endrin ketone	0.0002	mg/L	< 0.0002
g-HCH (Lindane)	0.0002	mg/L	< 0.0002
Heptachlor	0.0002	mg/L	< 0.0002
Heptachlor epoxide	0.0002	mg/L	< 0.0002
Hexachlorobenzene	0.0002	mg/L	< 0.0002
Methoxychlor	0.0002	mg/L	< 0.0002
Toxaphene	0.005	mg/L	< 0.005
Aldrin and Dieldrin (Total)*	0.0002	mg/L	< 0.0002
DDT + DDE + DDD (Total)*	0.0002	mg/L	< 0.0002
Vic EPA IWRG 621 OCP (Total)*	0.002	mg/L	< 0.002
Vic EPA IWRG 621 Other OCP (Total)*	0.002	mg/L	< 0.002
Dibutylchlorendate (surr.)	1	%	104
Tetrachloro-m-xylene (surr.)	1	%	87
Ammonia (as N)	0.01	mg/L	2.0
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5
Chromium (hexavalent)	0.005	mg/L	< 0.005
Cyanide (total)	0.005	mg/L	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	0.36
Nitrate (as N)	0.02	mg/L	0.35
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1
pH (at 25 °C)	0.1	pH Units	7.5
Phenolics (total)	0.05	mg/L	< 0.05
Phosphorus reactive (as P)	0.01	mg/L	0.04
Sulphate (as SO4)	5	mg/L	890
Sulphide (as S)	0.1	mg/L	< 0.1
Sulphite (as S)	0.5	mg/L	< 1
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.0
Total Nitrogen (as N)*	0.2	mg/L	3.4
Phosphate total (as P)	0.01	mg/L	0.07
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	0.001
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	0.40
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.44
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.005
Selenium (filtered)	0.001	mg/L	0.002
Zinc (filtered)	0.005	mg/L	0.006

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B6A (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 13, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Chromium (hexavalent)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
NEPM 2013 Metals : Metals M12 (filtered)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Organochlorine Pesticides	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Biochemical Oxygen Demand (BOD-5 Day)	Melbourne	Nov 13, 2023	2 Days
- Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water			
Cyanide (total)	Melbourne	Nov 13, 2023	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
pH (at 25 °C)	Melbourne	Nov 13, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4050 Total Phenolics in Waters and solids by CFA			
Sulphate (as SO4)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphide (as S)	Melbourne	Nov 13, 2023	7 Days
- Method: LTM-INO-4011 Suphide			
Sulphite (as S)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4240 Sulfite & Thiosulfate in Water			
Phosphate total (as P)	Melbourne	Nov 14, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 13, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 09, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 13, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 13, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			

Company Name:	LBW co Pty Ltd	**Order No.:**	231445-01	**Received:**	Nov 8, 2023 2:30 PM
Address:	184 Magill Road Norwood SA 5069	**Report #:**	1042675	**Due:**	Nov 15, 2023
		Phone:	08 8331 2417	**Priority:**	5 Day
		Fax:	08 8331 2415	**Contact Name:**	TESS O'LEARY
Project Name:	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT				
Project ID:	231445-01				

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as S)	Organochlorine Pesticides	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A (filtered metals)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	6628-23298	Nov 07, 2023		Water	M23-No0021422	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.002			0.002	Pass	
4.4'-DDD	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDE	mg/L	< 0.0002			0.0002	Pass	
4.4'-DDT	mg/L	< 0.0002			0.0002	Pass	
a-HCH	mg/L	< 0.0002			0.0002	Pass	
Aldrin	mg/L	< 0.0002			0.0002	Pass	
b-HCH	mg/L	< 0.0002			0.0002	Pass	
d-HCH	mg/L	< 0.0002			0.0002	Pass	
Dieldrin	mg/L	< 0.0002			0.0002	Pass	
Endosulfan I	mg/L	< 0.0002			0.0002	Pass	
Endosulfan II	mg/L	< 0.0002			0.0002	Pass	
Endosulfan sulphate	mg/L	< 0.0002			0.0002	Pass	
Endrin	mg/L	< 0.0002			0.0002	Pass	
Endrin aldehyde	mg/L	< 0.0002			0.0002	Pass	
Endrin ketone	mg/L	< 0.0002			0.0002	Pass	
g-HCH (Lindane)	mg/L	< 0.0002			0.0002	Pass	
Heptachlor	mg/L	< 0.0002			0.0002	Pass	
Heptachlor epoxide	mg/L	< 0.0002			0.0002	Pass	
Hexachlorobenzene	mg/L	< 0.0002			0.0002	Pass	
Methoxychlor	mg/L	< 0.0002			0.0002	Pass	
Toxaphene	mg/L	< 0.005			0.005	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.1			0.1	Pass	
Sulphite (as S)	mg/L	< 0.5			0.5	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C10-C14	%	123			70-130	Pass	
TRH >C10-C16	%	118			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	109			70-130	Pass	
4.4'-DDD	%	101			70-130	Pass	
4.4'-DDE	%	127			70-130	Pass	
4.4'-DDT	%	92			70-130	Pass	
a-HCH	%	92			70-130	Pass	
Aldrin	%	114			70-130	Pass	
b-HCH	%	100			70-130	Pass	
d-HCH	%	99			70-130	Pass	
Dieldrin	%	124			70-130	Pass	
Endosulfan I	%	99			70-130	Pass	
Endosulfan II	%	94			70-130	Pass	
Endosulfan sulphate	%	105			70-130	Pass	
Endrin	%	119			70-130	Pass	
Endrin aldehyde	%	115			70-130	Pass	
Endrin ketone	%	122			70-130	Pass	
g-HCH (Lindane)	%	101			70-130	Pass	
Heptachlor	%	126			70-130	Pass	
Heptachlor epoxide	%	106			70-130	Pass	
Hexachlorobenzene	%	93			70-130	Pass	
Methoxychlor	%	98			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	128			70-130	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	%	105			85-115	Pass	
Chromium (hexavalent)	%	119			70-130	Pass	
Cyanide (total)	%	92			70-130	Pass	
Nitrate & Nitrite (as N)	%	124			70-130	Pass	
Nitrite (as N)	%	100			70-130	Pass	
Phenolics (total)	%	98			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)			%	98			70-130	Pass	
Sulphate (as SO4)			%	115			70-130	Pass	
Total Kjeldahl Nitrogen (as N)			%	76			70-130	Pass	
Phosphate total (as P)			%	99			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C10-C14	M23-No0021514	NCP	%	116			70-130	Pass	
TRH >C10-C16	M23-No0021514	NCP	%	128			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M23-No0021430	NCP	%	91			70-130	Pass	
4.4'-DDD	M23-No0021430	NCP	%	83			70-130	Pass	
4.4'-DDE	M23-No0021430	NCP	%	112			70-130	Pass	
4.4'-DDT	M23-No0021430	NCP	%	106			70-130	Pass	
a-HCH	M23-No0021430	NCP	%	119			70-130	Pass	
Aldrin	M23-No0021430	NCP	%	108			70-130	Pass	
b-HCH	M23-No0021430	NCP	%	85			70-130	Pass	
d-HCH	M23-No0021430	NCP	%	84			70-130	Pass	
Dieldrin	M23-No0021430	NCP	%	81			70-130	Pass	
Endosulfan I	M23-No0021430	NCP	%	82			70-130	Pass	
Endosulfan II	M23-No0021430	NCP	%	116			70-130	Pass	
Endosulfan sulphate	M23-No0021430	NCP	%	84			70-130	Pass	
Endrin	M23-No0021430	NCP	%	103			70-130	Pass	
Endrin aldehyde	M23-No0021430	NCP	%	95			70-130	Pass	
Endrin ketone	M23-No0021430	NCP	%	108			70-130	Pass	
g-HCH (Lindane)	M23-No0021430	NCP	%	85			70-130	Pass	
Heptachlor	M23-No0021430	NCP	%	110			70-130	Pass	
Heptachlor epoxide	M23-No0021430	NCP	%	91			70-130	Pass	
Hexachlorobenzene	M23-No0021430	NCP	%	119			70-130	Pass	
Methoxychlor	M23-No0021430	NCP	%	112			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M23-No0021425	NCP	%	102			70-130	Pass	
Phenolics (total)	M23-No0022290	NCP	%	127			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-No0021434	NCP	%	73			70-130	Pass	
Phosphate total (as P)	M23-No0021434	NCP	%	112			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M23-No0026735	NCP	%	106			75-125	Pass	
Beryllium (filtered)	M23-No0026735	NCP	%	91			75-125	Pass	
Cadmium (filtered)	M23-No0026735	NCP	%	91			75-125	Pass	
Cobalt (filtered)	M23-No0026735	NCP	%	96			75-125	Pass	
Copper (filtered)	M23-No0026735	NCP	%	87			75-125	Pass	
Lead (filtered)	M23-No0026735	NCP	%	83			75-125	Pass	
Manganese (filtered)	M23-No0026735	NCP	%	102			75-125	Pass	
Mercury (filtered)	M23-No0026735	NCP	%	93			75-125	Pass	
Nickel (filtered)	M23-No0026735	NCP	%	88			75-125	Pass	
Selenium (filtered)	M23-No0026735	NCP	%	96			75-125	Pass	
Zinc (filtered)	M23-No0026735	NCP	%	93			75-125	Pass	

Environment Testing

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-No0023140	NCP	mg/L	0.04	0.04	7.5	30%	Pass	
TRH C10-C14	M23-No0021422	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-No0021422	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M23-No0021422	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C6-C10	M23-No0023140	NCP	mg/L	0.04	0.04	7.5	30%	Pass	
TRH >C10-C16	M23-No0021422	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M23-No0021422	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M23-No0021422	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-No0023140	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-No0023140	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-No0023140	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-No0023140	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-No0023140	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-No0023140	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-No0023140	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M23-No0021422	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
4.4'-DDD	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDE	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
4.4'-DDT	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
a-HCH	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Aldrin	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
b-HCH	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
d-HCH	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Dieldrin	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan I	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan II	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endosulfan sulphate	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin aldehyde	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Endrin ketone	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
g-HCH (Lindane)	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Heptachlor epoxide	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Hexachlorobenzene	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Methoxychlor	M23-No0021422	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Toxaphene	M23-No0021422	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0021433	NCP	mg/L	0.38	0.35	10	30%	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	M23-No0022098	NCP	mg/L	67	67	<1	30%	Pass	
Chromium (hexavalent)	M23-No0024176	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Cyanide (total)	M23-No0024262	NCP	mg/L	0.005	< 0.005	14	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0021433	NCP	mg/L	18	18	<1	30%	Pass	
Nitrite (as N)	M23-No0021433	NCP	mg/L	0.71	0.68	4.1	30%	Pass	
Phenolics (total)	M23-No0021422	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Sulphate (as SO4)	M23-No0021434	NCP	mg/L	1200	1100	6.3	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Sulphide (as S)	M23-No0021430	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Sulphite (as S)	M23-No0021422	CP	mg/L	< 1	< 1	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-No0028084	NCP	mg/L	0.7	0.6	18	30%	Pass	
Phosphate total (as P)	M23-No0023308	NCP	mg/L	0.13	0.11	15	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M23-No0026735	NCP	mg/L	0.002	0.002	9.6	30%	Pass	
Beryllium (filtered)	M23-No0026735	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-No0026735	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Cadmium (filtered)	M23-No0026735	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cobalt (filtered)	M23-No0026735	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M23-No0026735	NCP	mg/L	0.007	0.007	7.3	30%	Pass	
Lead (filtered)	M23-No0026735	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M23-No0026735	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury (filtered)	M23-No0026735	NCP	mg/L	0.0002	0.0002	4.0	30%	Pass	
Nickel (filtered)	M23-No0026735	NCP	mg/L	0.019	0.018	4.0	30%	Pass	
Selenium (filtered)	M23-No0026735	NCP	mg/L	0.009	0.010	7.1	30%	Pass	
Zinc (filtered)	M23-No0026735	NCP	mg/L	0.017	0.016	5.7	30%	Pass	

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Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Amy Meunier	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Joseph Edouard	Senior Analyst-Organic
Joseph Edouard	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Tyrone Gowans

From:	Amy Meunier
Sent:	Thursday, 16 November 2023 5:43 PM
To:	Tess O Leary
Cc:	#AU_CAU001_EnviroSampleVic
Subject:	RE: Additional Analysis - 1042654 & 1040740
Follow Up Flag:	Follow up
Flag Status:	Flagged
Categories:	ADDITIONALS

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

Hi Tess,

No worries, we will get this organised.

Tyrone- 3 day TAT below thanks.

Kind regards,

Amy Meunier

16/11/23
[illegible]

Analytical Services Manager
Mobile : +61 477 574 867
Email : AmyMeunier@eurofins.com

Eurofins
6 Monterey Road,
Dandenong VIC 3175
Australia

My office hours are 9am to 5:30pm (Monday to Friday)
If you require sample receipt outside these hours please email envirosamplevic@eurofins.com

From: Tess O Leary <tess.oleary@lbwco.com.au>
Sent: Thursday, 16 November 2023 5:38 PM
To: Amy Meunier <AmyMeunier@eurofins.com>
Subject: Additional Analysis - 1042654 & 1040740

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Amy

Could we please order silica gel clean up analysis on the following samples:

- 1040740
    - SLMW03-Q1
- 1042654
    - SW03
    - SW04
    - SW07

On three-day turnaround please.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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15
YEARS

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08 8331 2417
0405 480 106
www.lbwco.com.au

Certificate of Analysis

Environment Testing

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention: **TESS O'LEARY**

Report	**1044954-W**
Project name	RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID	231445-01
Received Date	Nov 16, 2023

Client Sample ID			**SLMW03-Q1**	**SW03**	**SW04**	**SW07**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0039863**	**M23-No0039864**	**M23-No0039865**	**M23-No0039866**
Date Sampled			**Nov 01, 2023**	**Nov 07, 2023**	**Nov 07, 2023**	**Nov 07, 2023**
Test/Reference	LOR	Unit				
TRH - 2013 NEPM Fractions (after silica gel clean-up)						
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total) (after silica-gel clean up)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)						
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Nov 16, 2023	7 Days
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: TRH C6-C36 (Silica Gel Cleanup) - MGT 100A	Melbourne	Nov 16, 2023	7 Days

Company Name: LBW co Pty Ltd
Address: 184 Magill Road
Norwood
SA 5069

Order No.:
Report #: 1044954
Phone: 08 8331 2417
Fax: 08 8331 2415

Received: Nov 16, 2023 5:43 PM
Due: Nov 22, 2023
Priority: 3 Day
Contact Name: TESS O'LEARY

Project Name: RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID: 231445-01

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA # 1261 Site # 1254						X
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	SLMW03-Q1	Nov 01, 2023		Water	M23-No0039863	X
2	SW03	Nov 07, 2023		Water	M23-No0039864	X
3	SW04	Nov 07, 2023		Water	M23-No0039865	X
4	SW07	Nov 07, 2023		Water	M23-No0039866	X
Test Counts						4

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
TRH - 2013 NEPM Fractions (after silica gel clean-up)									
TRH >C10-C16 (after silica gel clean-up)			mg/L	< 0.05			0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)			mg/L	< 0.1			0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)			mg/L	< 0.1			0.1	Pass	
Method Blank									
TRH - 1999 NEPM Fractions (after silica gel clean-up)									
TRH C10-C14 (after silica gel clean-up)			mg/L	< 0.05			0.05	Pass	
TRH C15-C28 (after silica gel clean-up)			mg/L	< 0.1			0.1	Pass	
TRH C29-C36 (after silica gel clean-up)			mg/L	< 0.1			0.1	Pass	
LCS - % Recovery									
TRH - 2013 NEPM Fractions (after silica gel clean-up)									
TRH >C10-C16 (after silica gel clean-up)			%	123			70-130	Pass	
LCS - % Recovery									
TRH - 1999 NEPM Fractions (after silica gel clean-up)									
TRH C10-C14 (after silica gel clean-up)			%	130			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
TRH - 2013 NEPM Fractions (after silica gel clean-up)				Result 1					
TRH >C10-C16 (after silica gel clean-up)	M23-No0030695	NCP	%	76			70-130	Pass	
Spike - % Recovery									
TRH - 1999 NEPM Fractions (after silica gel clean-up)				Result 1					
TRH C10-C14 (after silica gel clean-up)	M23-No0030695	NCP	%	79			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
TRH - 2013 NEPM Fractions (after silica gel clean-up)				Result 1	Result 2	RPD			
TRH >C10-C16 (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34 (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40 (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
TRH - 1999 NEPM Fractions (after silica gel clean-up)				Result 1	Result 2	RPD			
TRH C10-C14 (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28 (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36 (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C10-C36 (Total) (after silica gel clean-up)	M23-No0029367	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

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Comments

Sample Integrity

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

Authorised by:

Amy Meunier	Analytical Services Manager
Edward Lee	Senior Analyst-Organic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Company	LBWco
Project ID	231445-01
Project Name	Riverlea Saltwater Lakes Dewatering Assessment
SDG/COC #	2023-11-07-Eurofins-TO
Request / Version	1/1

Laboratory

Destination Lab	Eurofins
Lab Quote No	Q01470
Lab Contact	Sample Receipt Melb (03 8564 5000) envirosamplevic@eurofins.com

Report To

Primary Contact	LBWco Laboratory Results results@lbwco.com.au
Secondary Contact	Tess O'Leary tess.oleary@lbwco.com.au

Billing

Purchase Order #	231445-01
Org to be Billed	LBWco
Bill To	finance@lbwco.com.au
Attention	Tess O'Leary

TURNAROUND REQUEST: 5 DAYS
SPECIAL INSTRUCTIONS: -
SAMPLED BY: GAETANO GARFI

FIELD ID	MATRIX	DATE	Biochemical Oxygen Demand (BOD-5 Day)	Cyanide (total)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B6A	Organochlorine Pesticides	pH (at 25 °C)	Phenolics (total)	Sulphate (as SO4)	Sulphide (as S)	Sulphite (as SO3)	HOLD	COMMENTS
6628-23298	Water	07/11/2023 02:56PM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

20/11/23
JS

1045817
20/11/23
JS

Turnaround Request: 5 Days
Special Instructions: -
Sampled by: Gaetano Garfi

Field ID	Matrix	Date	Total Dissolved Solids Dried at 180 °C ± 2 °C	Total Suspended Solids Dried at 103 °C to 105 °C	Hold	Comments
6628-23298	Water	07/11/2023 02:56PM	✓	✓		

Hand Over			Relinquished	Received	Relinquished	Received	e-Request Sent	
# of Delivery Boxes	1	Signature					Name	-
Cooled	no	Name	Tess O'Leary				Org	-
Con Note	-	Org	-				Date	-
		Date	07/11/2023 02:52PM					

#1045817
20/11/23
JS

Tyrone Gowans

From:	Tess O Leary <tess.oleary@lbwco.com.au>
Sent:	Monday, 20 November 2023 6:40 PM
To:	Amy Meunier; #AU_CAU001_EnviroSampleVic
Subject:	RE: Eurofins Test Results, Invoice - Report 1044954 : Site RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT (231445-01)
Attachments:	231445-01_LTO_231108_GW.pdf
Importance:	High

Hi Amy

Sorry to do this again, but it looks like the additional metals weren't included with these results?

Also, the TDS and TSS analysis that was on the second page of the testing order has been missed off the SRA and therefore not analysed. Do you still have enough of the sample to complete this? If so, could we please get that data ASAP?

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

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0405 480 106
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#1045817
20/11/23
SS

From: AmyMeunier@eurofins.com <AmyMeunier@eurofins.com>
Sent: Monday, November 20, 2023 3:46 PM
To: Tess O Leary <tess.oleary@lbwco.com.au>
Cc: Results <results@lbwco.com.au>; lbwco@esdat.com.au
Subject: Eurofins Test Results, Invoice - Report 1044954 : Site RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT (231445-01)

Hi Tess,

Please find attached results for your project in the subject header.

Kind regards,

Amy Meunier
Analytical Services Manager
Mobile : +61 477 574 867

Eurofins Environment Testing
6 Monterey Rd
Dandenong South VIC 3175
AUSTRALIA
Email : AmyMeunier@eurofins.com
Website : www.eurofins.com.au/environmental-testing
View our latest EnviroNotes

#045 817
20/11/27
JS

Certificate of Analysis

Environment Testing

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention: **TESS O'LEARY**

Report **1045817-W**
Project name RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID 231445-01
Received Date Nov 20, 2023

Client Sample ID			**6628-23298**
Sample Matrix			**Water**
Eurofins Sample No.			**M23-No0048029**
Date Sampled			**Nov 07, 2023**
Test/Reference	LOR	Unit	
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	4500
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	130

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Nov 21, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 21, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			

Company Name: LBW co Pty Ltd
Address: 184 Magill Road
Norwood
SA 5069

Order No.:
Report #: 1045817
Phone: 08 8331 2417
Fax: 08 8331 2415

Received: Nov 20, 2023 5:29 PM
Due: Nov 21, 2023
Priority: 1 Day
Contact Name: TESS O'LEARY

Project Name: RIVERLEA SALTWATER LAKES DEWATERING ASSESSMENT
Project ID: 231445-01

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Total Suspended Solids Dried at 103 °C to 105 °C	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	6628-23298	Nov 07, 2023		Water	M23-No0048029	X	X
Test Counts						1	1

eurofins | Environment Testing

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**μg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

applicable: Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported, have been reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Comments

Sample Integrity

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

Authorised by:

Amy Meunier	Analytical Services Manager
Mary Makarios	Senior Analyst-Inorganic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

FS|052236 8|12|23

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

LABORATORY TESTING ORDER

Project Title : Riverlea Saltwater Lakes Dewatering
Job Number/ Project ID : 231445-01
Project Manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: Price Book 2023
Secondary Laboratory: Laboratory
Laboratory Quote Ref: Lab Quote Reference

LBW co's COC REFERENCE (sample delivery group)
231445-01_COC_20231207

Turnaround Required
Standard 5 Day

SAMPLE DETAILS				CHEMICAL TESTING REQUIRED												
Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	TDS	M13	B19E	Additional Metals - Al, Ba, Cr (Total), Fe, Ag, Sn									HOLD
06-Dec-23	EX10	Water		X	X	X	X									
LBW co AUTHORISATION		LABORATORY RECEIPT		1	1	1	1	0	0	0	0	0	0	0	0	0

LBW co AUTHORISATION	LABORATORY RECEIPT	Additional Comments
Requested by: T O'Leary	Received by:	
Date\time requested: 08-Dec-23	Date\time received:	
Signature:	Signature:	

FS1052236 8/12/23

Tyrone Gowans

From: Tess O Leary <tess.oleary@lbwco.com.au>
Sent: Friday, 8 December 2023 12:03 PM
To: Amy Meunier; #AU_CAU001_EnviroSampleVic
Subject: Testing Order for Water Sample
Attachments: 231445-01_LTO_20231208.pdf

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Amy

Please see attached testing order for the water sample we sent off yesterday.

Let me know if you have any questions.

Thanks
Tess

Tess O'Leary
Senior Environmental Advisor | Team Leader

DELIVERING
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SOLUTIONS

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Norwood SA 5067
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0405 480 106
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FS 1052236 8/12/23
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P: 08 8331 2417 F: 08 8331 2415
E: admin@lbwco.com.au
ABN: 58 126 992 274

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: 231445-01
Job Number:
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au, lbwco@esdat.com
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref:
Secondary lab:

COC Reference: 231445-01_COC-20231207
(sample delivery group)

Sample Details 1	Sample Details 2
EX10	

Sample Custody - Step 1

Relinqished by: Jade C
Date/Time Relinquished: 7/12/23 13:32
Signature: [signature]
Courier and consignment number: pickup
Received by: Pasemal
Date/Time Received: 07/12 2pm
Signature: [signature] 15.6°C − 0.3°C = 15.3°C on IB

Sample Custody - Step 2

Relinqished by:
Date/Time Relinquished:
Signature:
Courier and consignment number:
Received by:
Date/Time Received:
Signature:

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **TESS O'LEARY**

Report	**1052236-W**
Project name	RIVERSEA SALTWATER LAKES DEWATERING
Project ID	231445-01
Received Date	Dec 08, 2023

Client Sample ID			**EX10**
Sample Matrix			**Water**
Eurofins Sample No.			**M23-De0020088**
Date Sampled			**Dec 06, 2023**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.05
Chromium (hexavalent)	0.005	mg/L	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	2.8
Nitrate (as N)	0.02	mg/L	2.8
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.15
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	6000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.2
Total Nitrogen (as N)*	0.2	mg/L	4.0
Phosphate total (as P)	0.01	mg/L	< 0.01
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	7.1
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.048
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Selenium (filtered)	0.001	mg/L	0.013
Silver (filtered)	0.005	mg/L	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Dec 08, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Dec 08, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Dec 08, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Chromium (hexavalent)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
Heavy Metals (filtered)	Melbourne	Dec 08, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Phosphate total (as P)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name:	LBW co Pty Ltd	**Order No.:**		**Received:**	Dec 8, 2023 12:03 PM
Address:	184 Magill Road	**Report #:**	1052236	**Due:**	Dec 15, 2023
	Norwood	**Phone:**	08 8331 2417	**Priority:**	5 Day
	SA 5069	**Fax:**	08 8331 2415	**Contact Name:**	TESS O'LEARY

Project Name: RIVERSEA SALTWATER LAKES DEWATERING
Project ID: 231445-01

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Barium (filtered)	Chromium (filtered)	Iron (filtered)	Phosphate total (as P)	Silver (filtered)	Tin (filtered)	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	EX10	Dec 06, 2023		Water	M23-De0020088	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1

Environment Testing

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit	**Colour:** Pt-Co Units	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Ammonia (as N)	%	103			70-130	Pass	
Chromium (hexavalent)	%	110			70-130	Pass	
Nitrate & Nitrite (as N)	%	106			70-130	Pass	
Nitrite (as N)	%	98			70-130	Pass	
Phosphorus reactive (as P)	%	111			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	93			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	108			70-130	Pass	
Phosphate total (as P)	%	100			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	119			80-120	Pass	
Arsenic (filtered)	%	105			80-120	Pass	
Boron (filtered)	%	110			80-120	Pass	
Cadmium (filtered)	%	105			80-120	Pass	
Chromium (filtered)	%	107			80-120	Pass	
Cobalt (filtered)	%	105			80-120	Pass	
Copper (filtered)	%	100			80-120	Pass	
Iron (filtered)	%	108			80-120	Pass	
Lead (filtered)	%	98			80-120	Pass	
Manganese (filtered)	%	112			80-120	Pass	
Mercury (filtered)	%	86			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel (filtered)			%	102			80-120	Pass	
Selenium (filtered)			%	94			80-120	Pass	
Silver (filtered)			%	101			80-120	Pass	
Tin (filtered)			%	114			80-120	Pass	
Zinc (filtered)			%	105			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M23-De0021381	NCP	%	113			70-130	Pass	
Nitrite (as N)	M23-De0021381	NCP	%	106			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0018918	NCP	%	95			70-130	Pass	
Phosphate total (as P)	B23-De0020196	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-De0019585	NCP	%	101			75-125	Pass	
Arsenic (filtered)	M23-De0019585	NCP	%	96			75-125	Pass	
Barium (filtered)	M23-De0019585	NCP	%	92			75-125	Pass	
Beryllium (filtered)	M23-De0019585	NCP	%	84			75-125	Pass	
Cadmium (filtered)	M23-De0019585	NCP	%	92			75-125	Pass	
Chromium (filtered)	M23-De0019585	NCP	%	99			75-125	Pass	
Cobalt (filtered)	M23-De0019585	NCP	%	92			75-125	Pass	
Copper (filtered)	M23-De0019585	NCP	%	87			75-125	Pass	
Iron (filtered)	M23-De0019585	NCP	%	91			75-125	Pass	
Lead (filtered)	M23-De0019585	NCP	%	79			75-125	Pass	
Manganese (filtered)	M23-De0019585	NCP	%	98			75-125	Pass	
Mercury (filtered)	M23-De0019585	NCP	%	62			75-125	Fail	Q08
Nickel (filtered)	M23-De0019585	NCP	%	89			75-125	Pass	
Selenium (filtered)	M23-De0019585	NCP	%	87			75-125	Pass	
Silver (filtered)	M23-De0019585	NCP	%	83			75-125	Pass	
Tin (filtered)	M23-De0019585	NCP	%	95			75-125	Pass	
Zinc (filtered)	M23-De0019585	NCP	%	115			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0020939	NCP	mg/L	0.02	0.02	19	30%	Pass	
Chromium (hexavalent)	M23-De0015133	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0020939	NCP	mg/L	0.34	0.34	<1	30%	Pass	
Nitrite (as N)	M23-De0020939	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-De0015137	NCP	mg/L	3900	3800	2.9	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0018922	NCP	mg/L	11	11	<1	30%	Pass	
Phosphate total (as P)	M23-De0016345	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0019585	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-De0019585	NCP	mg/L	0.004	0.004	3.8	30%	Pass	
Barium (filtered)	M23-De0019585	NCP	mg/L	0.10	0.10	<1	30%	Pass	
Beryllium (filtered)	M23-De0019585	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	M23-De0019585	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M23-De0019585	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M23-De0019585	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M23-De0019585	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M23-De0019585	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead (filtered)	M23-De0019585	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M23-De0019585	NCP	mg/L	0.008	0.008	1.4	30%	Pass	
Mercury (filtered)	M23-De0019585	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-De0019585	NCP	mg/L	0.005	0.005	<1	30%	Pass	
Selenium (filtered)	M23-De0019585	NCP	mg/L	0.002	0.002	8.3	30%	Pass	
Silver (filtered)	M23-De0019585	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	M23-De0019585	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-De0019585	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Environment Testing

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised by:

Harry Bacalis	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

#1056259
WE
21/12/23

lbw co
DELIVERING ENVIRONMENTAL SOLUTIONS

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

LABORATORY TESTING ORDER

Project Title : Riverlea Saltwater Lakes Dewatering
Job Number/ Project ID : 231445-01
Project Manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au, lbwco@esdat.com.au
Invoice to: finance@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: Price Book 2023
Secondary Laboratory:
Laboratory Quote Ref:

LBW co's COC REFERENCE (sample delivery group)
231445-01_LTO_20231219

Turnaround Required
Standard 5 Day

SAMPLE DETAILS				CHEMICAL TESTING REQUIRED												
Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	TDS	M13	B19E	Additional Metals - Al, Ba, Cr (Total), Fe, Ag, Sn									HOLD
15-Dec-23	EX12	Water		X	X	X	X									
19-Dec-23	EX13	Water		x	x	x	x									
				2	2	2	2	0	0	0	0	0	0	0	0	0

LBW co AUTHORISATION	LABORATORY RECEIPT	Additional Comments
Requested by: J Creber	Received by: Michael Young	On FB
Date\time requested: 19-Dec-23	Date\time received: 20/12/23	10.4
Signature: Creber	Signature: MY	0.3 10.1°C

LBW co Pty Ltd
184 Magill Road
Norwood
SA 5069

Attention: **TESS O'LEARY**

Report **1056259-W**
Project name RIVERLEA SALTWATER LAKES DEWATERING
Project ID 231445-01
Received Date Dec 20, 2023

Client Sample ID			**EX12**	**EX13**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M23-De0051351**	**M23-De0051352**
Date Sampled			**Dec 15, 2023**	**Dec 19, 2023**
Test/Reference	LOR	Unit		
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005
Nitrate & Nitrite (as N)	0.05	mg/L	2.3	19
Nitrate (as N)	0.02	mg/L	2.3	19
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.6	1.1
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	0.02
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	8100	4700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.6	1.1
Total Nitrogen (as N)*	0.2	mg/L	2.9	20
Phosphate total (as P)	0.01	mg/L	< 0.01	0.02
Heavy Metals				
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001
Barium (filtered)	0.02	mg/L	0.02	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	9.7	4.8
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	0.002	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.007	0.008
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	0.052	0.037
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.008	0.008

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P			
Ammonia (as N)	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Dec 22, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Dec 21, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Dec 22, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Dec 22, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Chromium (hexavalent)	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-INO-4100 Hexavalent Chromium by Spectrometric detection			
Heavy Metals (filtered)	Melbourne	Dec 22, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Phosphate total (as P)	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name:	LBW co Pty Ltd	**Order No.:**		**Received:**	Dec 20, 2023 12:00 PM
Address:	184 Magill Road Norwood SA 5069	**Report #:**	1056259	**Due:**	Jan 8, 2024
		Phone:	08 8331 2417	**Priority:**	10 Day
		Fax:	08 8331 2415	**Contact Name:**	TESS O'LEARY
Project Name:	RIVERLEA SALTWATER LAKES DEWATERING				
Project ID:	231445-01				

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Barium (filtered)	Chromium (filtered)	Iron (filtered)	Phosphate total (as P)	Silver (filtered)	Tin (filtered)	NEPM 2013 Metals : Metals M13 filtered	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	EX12	Dec 15, 2023		Water	M23-De0051351	X	X	X	X	X	X	X	X	X	X
2	EX13	Dec 19, 2023		Water	M23-De0051352	X	X	X	X	X	X	X	X	X	X
Test Counts						2	2	2	2	2	2	2	2	2	2

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit	**Colour:** Pt-Co Units	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Ammonia (as N)	%	106			70-130	Pass	
Chromium (hexavalent)	%	95			70-130	Pass	
Nitrate & Nitrite (as N)	%	109			70-130	Pass	
Nitrite (as N)	%	95			70-130	Pass	
Phosphorus reactive (as P)	%	91			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	89			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	94			70-130	Pass	
Phosphate total (as P)	%	99			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	89			80-120	Pass	
Arsenic (filtered)	%	86			80-120	Pass	
Boron (filtered)	%	95			80-120	Pass	
Cadmium (filtered)	%	85			80-120	Pass	
Chromium (filtered)	%	85			80-120	Pass	
Cobalt (filtered)	%	84			80-120	Pass	
Copper (filtered)	%	85			80-120	Pass	
Iron (filtered)	%	90			80-120	Pass	
Lead (filtered)	%	83			80-120	Pass	
Manganese (filtered)	%	89			80-120	Pass	
Mercury (filtered)	%	89			80-120	Pass	
Nickel (filtered)	%	85			80-120	Pass	
Selenium (filtered)	%	88			80-120	Pass	

eurofins

Environment Testing

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Silver (filtered)			%	84			80-120	Pass	
Tin (filtered)			%	90			80-120	Pass	
Zinc (filtered)			%	91			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M23-De0048464	NCP	%	97			70-130	Pass	
Nitrite (as N)	M23-De0048464	NCP	%	100			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B23-De0051482	NCP	%	95			70-130	Pass	
Phosphate total (as P)	B23-De0051126	NCP	%	104			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-De0047764	NCP	%	93			75-125	Pass	
Arsenic (filtered)	M23-De0047764	NCP	%	89			75-125	Pass	
Beryllium (filtered)	M23-De0047764	NCP	%	88			75-125	Pass	
Boron (filtered)	M23-De0030425	NCP	%	58			75-125	Fail	Q08
Cadmium (filtered)	M23-De0047764	NCP	%	75			75-125	Pass	
Chromium (filtered)	M23-De0047764	NCP	%	82			75-125	Pass	
Cobalt (filtered)	M23-De0047764	NCP	%	77			75-125	Pass	
Copper (filtered)	M23-De0047764	NCP	%	75			75-125	Pass	
Iron (filtered)	M23-De0047764	NCP	%	85			75-125	Pass	
Lead (filtered)	M23-De0047764	NCP	%	68			75-125	Fail	Q08
Manganese (filtered)	M23-De0047764	NCP	%	44			75-125	Fail	Q08
Mercury (filtered)	M23-De0047764	NCP	%	98			75-125	Pass	
Nickel (filtered)	M23-De0047764	NCP	%	75			75-125	Pass	
Selenium (filtered)	M23-De0047764	NCP	%	86			75-125	Pass	
Silver (filtered)	M23-De0047764	NCP	%	60			75-125	Fail	Q08
Tin (filtered)	M23-De0047764	NCP	%	86			75-125	Pass	
Zinc (filtered)	M23-De0047764	NCP	%	84			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0051351	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0051351	CP	mg/L	2.3	2.3	1.2	30%	Pass	
Nitrite (as N)	M23-De0051351	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0051369	NCP	mg/L	2.7	2.7	2.6	30%	Pass	
Phosphate total (as P)	M23-De0051351	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0047764	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-De0047764	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M23-De0047764	NCP	mg/L	0.43	0.38	12	30%	Pass	
Beryllium (filtered)	M23-De0047764	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-De0030425	NCP	mg/L	0.53	0.55	4.3	30%	Pass	
Cadmium (filtered)	M23-De0047764	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M23-De0047764	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M23-De0047764	NCP	mg/L	0.006	0.006	14	30%	Pass	
Copper (filtered)	M23-De0047764	NCP	mg/L	0.009	0.007	17	30%	Pass	
Iron (filtered)	M23-De0047764	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M23-De0047764	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M23-De0047764	NCP	mg/L	0.32	0.28	13	30%	Pass	
Mercury (filtered)	M23-De0047764	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M23-De0047764	NCP	mg/L	0.010	0.008	16	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Selenium (filtered)	M23-De0047764	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M23-De0047764	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	M23-De0047764	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-De0047764	NCP	mg/L	0.061	0.050	19	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids Dried at 180 °C ± 2 °C	M23-De0051352	CP	mg/L	4700	4400	7.3	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised by:

Catherine Wilson	Analytical Services Manager
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

CERTIFICATE OF ANALYSIS

Work Order	: **EM2307883**	Page	: 1 of 7
Client	: **LBW CO PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: TESS O'LEARY	Contact	: Kieren Burns
Address	: 184 MAGILL ROAD NORWOOD SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61881625130
Project	: 231445-01	Date Samples Received	: 05-May-2023 10:55
Order number	: ----	Date Analysis Commenced	: 05-May-2023
C-O-C number	: 231445-01_COC_20230503	Issue Date	: 12-May-2023 22:23
Sampler	: ----		
Site	: ----		
Quote number	: ADBQ-001-18 Seconday Work only		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Andrew Lu	VOC Section Supervisor	Melbourne Organics, Springvale, VIC
Arenie Vijayaratnam	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- EP075: Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EK085: (EM2307720#1) Poor matrix spike recovery for sulfide due to matrix effects.
- Samples have been conducted outside of the recommended analytical holding times for sulfite. Results should be scrutinised accordingly.
- EP075: Where reported, 'Sum of PAH' is the sum of the USEPA 16 priority PAHs

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	DUP-1	----	----	----	----
			Sampling date / time	03-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2307883-001	--------	--------	--------	--------
				Result	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**6360**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**542**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**801**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.18**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.021**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.002**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.034**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	**0.03**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	**0.01**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.008**	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	0.004	mg/L	<0.004	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**1.22**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**1.22**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	DUP-1	----	----	----	----
			Sampling date / time	03-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2307883-001	--------	--------	--------	--------
				Result	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.6**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.8**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.16**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.01**	----	----	----	----
EK085M: Sulfide as S2-								
Sulfide as S2-	18496-25-8	0.1	mg/L	**0.2**	----	----	----	----
EK086: Sulfite as SO3 2-								
Sulfite as SO3 2-	14265-45-3	2	mg/L	<2	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	<2	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	----	----	----	----
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	----	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	----	----	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	----	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	2	µg/L	<2	----	----	----	----
beta-BHC	319-85-7	2	µg/L	<2	----	----	----	----
gamma-BHC	58-89-9	2	µg/L	<2	----	----	----	----
delta-BHC	319-86-8	2	µg/L	<2	----	----	----	----
Heptachlor	76-44-8	2	µg/L	<2	----	----	----	----
Aldrin	309-00-2	2	µg/L	<2	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	DUP-1	----	----	----	----
			Sampling date / time	03-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2307883-001	--------	--------	--------	--------
				Result	----	----	----	----
EP075I: Organochlorine Pesticides - Continued								
Heptachlor epoxide	1024-57-3	2	µg/L	<2	----	----	----	----
alpha-Endosulfan	959-98-8	2	µg/L	<2	----	----	----	----
4.4`-DDE	72-55-9	2	µg/L	<2	----	----	----	----
Dieldrin	60-57-1	2	µg/L	<2	----	----	----	----
Endrin	72-20-8	2	µg/L	<2	----	----	----	----
beta-Endosulfan	33213-65-9	2	µg/L	<2	----	----	----	----
4.4`-DDD	72-54-8	2	µg/L	<2	----	----	----	----
Endosulfan sulfate	1031-07-8	2	µg/L	<2	----	----	----	----
4.4`-DDT	50-29-3	4	µg/L	<4	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L	<4	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	4	µg/L	<4	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	DUP-1	----	----	----	----
			Sampling date / time	03-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2307883-001	--------	--------	--------	--------
				Result	----	----	----	----
EP080: BTEXN - Continued								
^ Total Xylenes	----	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	29.3	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	57.0	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	80.6	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	74.4	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	82.9	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	83.2	----	----	----	----
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	2	%	38.8	----	----	----	----
Phenol-d6	13127-88-3	2	%	28.0	----	----	----	----
2-Chlorophenol-D4	93951-73-6	2	%	66.5	----	----	----	----
2.4.6-Tribromophenol	118-79-6	2	%	67.8	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates								
Nitrobenzene-D5	4165-60-0	2	%	74.0	----	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	2	%	55.8	----	----	----	----
2-Fluorobiphenyl	321-60-8	2	%	72.1	----	----	----	----
Anthracene-d10	1719-06-8	2	%	82.6	----	----	----	----
4-Terphenyl-d14	1718-51-0	2	%	78.1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	103	----	----	----	----
Toluene-D8	2037-26-5	2	%	87.3	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	97.2	----	----	----	----

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	51
2-Chlorophenol-D4	93951-73-6	30	114
2.4.6-Tribromophenol	118-79-6	26	133
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	35	127
Anthracene-d10	1719-06-8	44	122
4-Terphenyl-d14	1718-51-0	44	124
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	6	83
Phenol-d6	13127-88-3	10	65
2-Chlorophenol-D4	93951-73-6	22	112
2.4.6-Tribromophenol	118-79-6	22	125
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	37	115
1.2-Dichlorobenzene-D4	2199-69-1	32	99
2-Fluorobiphenyl	321-60-8	39	116
Anthracene-d10	1719-06-8	49	123
4-Terphenyl-d14	1718-51-0	47	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

QUALITY CONTROL REPORT

Work Order	: **EM2307883**	Page	: 1 of 10
Client	: **LBW CO PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: TESS O'LEARY	Contact	: Kieren Burns
Address	: 184 MAGILL ROAD NORWOOD SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61881625130
Project	: 231445-01	Date Samples Received	: 05-May-2023
Order number	: ----	Date Analysis Commenced	: 05-May-2023
C-O-C number	: 231445-01_COC_20230503	Issue Date	: 12-May-2023
Sampler	: ----		
Site	: ----		
Quote number	: ADBQ-001-18 Seconday Work only		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Andrew Lu	VOC Section Supervisor	Melbourne Organics, Springvale, VIC
Arenie Vijayaratnam	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 5038518)									
EM2307791-016	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	604	592	2.0	0% - 20%
EM2307792-006	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3360	3520	4.6	0% - 20%
EM2307797-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2960	3340	12.1	0% - 20%
EM2307829-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	32	44	30.5	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 5038519)									
EM2307829-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	16	16	0.0	No Limit
EM2307883-001	DUP-1	EA025H: Suspended Solids (SS)	----	5	mg/L	542	512	5.9	0% - 20%
EM2308002-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	46	62	28.2	0% - 50%
EM2308002-013	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	7	15.9	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5031886)									
EM2307910-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	46	46	0.0	0% - 20%
EM2307834-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5040243)									
EM2307792-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.105	0.100	4.8	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5040243) - continued									
EM2307792-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.007	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EM2307830-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.045	0.044	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.14	0.14	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5040245)									
EM2307822-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EM2308041-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 5037509)									
EM2307901-006	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5035821)									
EM2307153-029	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	7.52	6.54	13.9	0% - 20%
EM2307875-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.35	0.36	0.0	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5031888)									
EM2307910-007	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EM2307834-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.02	<0.02	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5035820)									
EM2307879-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.20	0.19	0.0	0% - 50%
EM2307153-029	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.04	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5036228)									
EM2307883-001	DUP-1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.4	53.8	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5036227)									
EM2307832-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.18	0.22	19.3	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5031887)									
EM2307910-007	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5031887) - continued									
EM2307834-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.0	No Limit
EK085M: Sulfide as S2- (QC Lot: 5040239)									
EM2307701-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	0.7	0.8	0.0	No Limit
EM2307740-002	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK086: Sulfite as SO3 2- (QC Lot: 5043296)									
EM2307883-001	DUP-1	EK086: Sulfite as SO3 2-	14265-45-3	2	mg/L	<2	<2	0.0	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 5031980)									
EM2307792-013	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	<2	0.0	No Limit
EM2307910-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<12	<12	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 5033104)									
EM2307751-001	Anonymous	EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5032992)									
EM2307801-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EM2307958-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	270	220	18.0	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5033105)									
EM2307957-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EM2307751-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5032992)									
EM2307801-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EM2307958-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	710	590	18.3	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5033105)									
EM2307957-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5033105) - continued									
EM2307957-001	Anonymous	EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EM2307751-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080: BTEXN (QC Lot: 5032992)									
EM2307801-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EM2307958-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	32	28	10.8	0% - 50%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	54	48	12.0	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	10	9	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	37	46	20.7	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (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 (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 5038518)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	103	91.0	110
				<10	2440 mg/L	108	81.6	118
				<10	293 mg/L	96.2	91.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 5038519)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	100	91.0	109
				<5	836 mg/L	109	84.8	115
				<5	1000 mg/L	101	90.3	109
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5031886)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	90.0	110
				<1	500 mg/L	103	90.0	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 5040243)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.1	89.0	111
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	101	85.0	112
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.6	83.6	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	83.5	111
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.1	83.2	109
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.4	84.3	110
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.6	83.1	107
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.3	84.6	108
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.0	84.8	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.6	84.3	110
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	82.3	113
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.5	83.7	110
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	106	86.3	112
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	101	85.4	115
EG035F: Dissolved Mercury by FIMS (QCLot: 5040245)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	109	71.6	116
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5037509)								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	98.4	77.7	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5035821)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5035821) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	93.1	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5031888)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5035820)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	90.0	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5036228)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	71.2	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5036227)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	72.5	71.9	114
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5031887)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	102	90.0	110
EK085M: Sulfide as S2- (QCLot: 5040239)								
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	94.9	81.9	116
EK086: Sulfite as SO3 2- (QCLot: 5043296)								
EK086: Sulfite as SO3 2-	14265-45-3	2	mg/L	<2	100 mg/L	95.0	91.8	101
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 5031980)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	112	79.5	122
EP075(SIM)A: Phenolic Compounds (QCLot: 5033104)								
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	30.0	17.8	51.1
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	75.5	43.2	107
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	64.3	39.2	98.7
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	60.6	35.5	91.3
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	81.7	34.4	124
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	73.2	44.4	112
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	81.4	45.3	115
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	82.5	44.3	116
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	81.1	46.6	117
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	80.1	38.2	122
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	76.6	43.2	123
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	60.1	48.1	130
EP075I: Organochlorine Pesticides (QCLot: 5033107)								
EP075: alpha-BHC	319-84-6	2	µg/L	<2	10 µg/L	76.0	56.2	112
EP075: beta-BHC	319-85-7	2	µg/L	<2	10 µg/L	79.3	56.2	113
EP075: gamma-BHC	58-89-9	2	µg/L	<2	10 µg/L	82.0	55.2	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP075I: Organochlorine Pesticides (QCLot: 5033107) - continued								
EP075: delta-BHC	319-86-8	2	µg/L	<2	10 µg/L	81.4	52.6	117
EP075: Heptachlor	76-44-8	2	µg/L	<2	10 µg/L	77.3	53.4	111
EP075: Aldrin	309-00-2	2	µg/L	<2	10 µg/L	72.4	54.0	112
EP075: Heptachlor epoxide	1024-57-3	2	µg/L	<2	10 µg/L	81.0	54.2	113
EP075: alpha-Endosulfan	959-98-8	2	µg/L	<2	10 µg/L	77.8	49.3	122
EP075: 4.4`-DDE	72-55-9	2	µg/L	<2	10 µg/L	77.2	56.0	121
EP075: Dieldrin	60-57-1	2	µg/L	<2	10 µg/L	71.0	55.2	118
EP075: Endrin	72-20-8	2	µg/L	<2	10 µg/L	78.8	52.7	121
EP075: beta-Endosulfan	33213-65-9	2	µg/L	<2	10 µg/L	77.9	55.1	119
EP075: 4.4`-DDD	72-54-8	2	µg/L	<2	10 µg/L	77.9	55.4	120
EP075: Endosulfan sulfate	1031-07-8	2	µg/L	<2	10 µg/L	84.8	49.6	123
EP075: 4.4`-DDT	50-29-3	4	µg/L	<4	10 µg/L	69.6	47.8	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5032992)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	76.0	66.2	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5033105)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4560 µg/L	61.5	47.2	122
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16200 µg/L	79.0	52.9	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8650 µg/L	76.3	50.4	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5032992)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	80.1	66.2	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5033105)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6190 µg/L	65.6	49.1	125
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22200 µg/L	77.2	51.6	128
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1520 µg/L	72.1	47.2	130
EP080: BTEXN (QCLot: 5032992)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	83.9	68.8	127
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	83.7	72.9	129
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	85.1	71.7	130
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	82.1	72.3	136
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	87.4	75.9	134
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	101	68.3	131

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5031886)							
EM2307897-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	94.2	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 5040243)							
EM2307792-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	92.1	76.6	124
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	83.6	73.0	120
		EG020A-F: Barium	7440-39-3	0.2 mg/L	84.5	75.0	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	90.7	74.6	118
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	80.9	71.0	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	87.3	78.0	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	84.5	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	80.7	75.0	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	81.2	64.0	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	84.0	73.0	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	83.2	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	86.8	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 5040245)							
EM2307830-006	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	105	70.0	120
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5037509)							
EM2307883-001	DUP-1	EK026SF: Total Cyanide	57-12-5	0.2 mg/L	109	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5035821)							
EM2307701-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	76.2	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5031888)							
EM2307883-001	DUP-1	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5035820)							
EM2307744-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	86.3	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5036228)							
EM2307892-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	75.0	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5036227)							
EM2307832-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	119	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5031887)							
EM2307883-001	DUP-1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	# Not Determined	79.0	123
EK085M: Sulfide as S2- (QCLot: 5040239)							
EM2307720-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.5 mg/L	# 40.3	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 5033104)							
EM2307751-002	Anonymous	EP075(SIM): Phenol	108-95-2	5 µg/L	17.3	15.0	61.0
		EP075(SIM): 2-Chlorophenol	95-57-8	5 µg/L	44.1	35.0	131
		EP075(SIM): 2-Nitrophenol	88-75-5	5 µg/L	50.8	39.0	121
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	5 µg/L	47.9	32.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	5 µg/L	11.9	11.0	147
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5032992)							
EM2307816-136	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	72.9	33.9	126
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5033105)							
EM2307751-003	Anonymous	EP071: C10 - C14 Fraction	----	4460 µg/L	61.2	48.0	126
		EP071: C15 - C28 Fraction	----	14300 µg/L	85.6	51.7	132
		EP071: C29 - C36 Fraction	----	7300 µg/L	86.0	50.5	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5032992)							
EM2307816-136	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	68.2	34.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5033105)							
EM2307751-003	Anonymous	EP071: >C10 - C16 Fraction	----	6090 µg/L	64.0	48.0	128
		EP071: >C16 - C34 Fraction	----	19400 µg/L	84.2	50.4	130
		EP071: >C34 - C40 Fraction	----	1300 µg/L	81.0	47.4	131
EP080: BTEXN (QCLot: 5032992)							
EM2307816-136	Anonymous	EP080: Benzene	71-43-2	20 µg/L	94.4	56.3	133
		EP080: Toluene	108-88-3	20 µg/L	94.0	60.4	132

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2307883**	Page	
Client	: **LBW CO PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: TESS O'LEARY	Telephone	: +61881625130
Project	: 231445-01	Date Samples Received	: 05-May-2023
Site	: ----	Issue Date	: 12-May-2023
Sampler	: ----	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK085M: Sulfide as S2-	EM2307720--001	Anonymous	**Sulfide as S2-**	18496-25-8	40.3 %	70.0-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)	*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EK086: Sulfite as SO3 2-						
Clear Plastic Bottle - EDTA/Zinc Acetate DUP-1	----	----	----	11-May-2023	05-May-2023	**6**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
	0				
Laboratory Duplicates (DUP)					
Semivolatile Organic Compounds	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Semivolatile Organic Compounds	0	1	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	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container */ Client Sample ID(s)*		***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) DUP-1	**03-May-2023**	**----**	----	----	**10-May-2023**	10-May-2023	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) DUP-1	**03-May-2023**	**----**	----	----	**10-May-2023**	10-May-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) DUP-1	**03-May-2023**	----	----	----	**09-May-2023**	31-May-2023	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) DUP-1	**03-May-2023**	----	----	----	**10-May-2023**	30-Oct-2023	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) DUP-1	**03-May-2023**	----	----	----	**11-May-2023**	31-May-2023	✓
EK026SF: Total CN by Segmented Flow Analyser							
Opaque plastic bottle - NaOH (EK026SF) DUP-1	**03-May-2023**	----	----	----	**10-May-2023**	17-May-2023	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) DUP-1	**03-May-2023**	----	----	----	**09-May-2023**	31-May-2023	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) DUP-1	**03-May-2023**	----	----	----	**05-May-2023**	05-May-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) DUP-1	**03-May-2023**	----	----	----	**10-May-2023**	31-May-2023	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) DUP-1	**03-May-2023**	**10-May-2023**	31-May-2023	✓	**10-May-2023**	31-May-2023	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) DUP-1	**03-May-2023**	**10-May-2023**	31-May-2023	✓	**10-May-2023**	31-May-2023	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) DUP-1	**03-May-2023**	----	----	----	**05-May-2023**	05-May-2023	✓
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) DUP-1	**03-May-2023**	----	----	----	**10-May-2023**	10-May-2023	✓
EK086: Sulfite as SO3 2-							
Clear Plastic Bottle - EDTA/Zinc Acetate (EK086) DUP-1	**03-May-2023**	----	----	----	**11-May-2023**	05-May-2023	×
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural (EP030) DUP-1	**03-May-2023**	----	----	----	**05-May-2023**	05-May-2023	✓

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) DUP-1	**03-May-2023**	**08-May-2023**	10-May-2023	✓	**09-May-2023**	17-Jun-2023	✓
EP075I: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP075) DUP-1	**03-May-2023**	**08-May-2023**	10-May-2023	✓	**09-May-2023**	17-Jun-2023	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) DUP-1	**03-May-2023**	**08-May-2023**	10-May-2023	✓	**09-May-2023**	17-Jun-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) DUP-1	**03-May-2023**	**08-May-2023**	17-May-2023	✓	**09-May-2023**	17-May-2023	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) DUP-1	**03-May-2023**	**08-May-2023**	10-May-2023	✓	**09-May-2023**	17-Jun-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) DUP-1	**03-May-2023**	**08-May-2023**	17-May-2023	✓	**09-May-2023**	17-May-2023	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) DUP-1	**03-May-2023**	**08-May-2023**	17-May-2023	✓	**09-May-2023**	17-May-2023	✓

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)							
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**10.00**	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfite as SO3 2-	EK086	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**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)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfite as SO3 2-	EK086	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	35	**8.57**	**7.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	39	**7.69**	**7.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfite as SO3 2-	EK086	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**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 Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM 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 Mercury by FIMS	EG035F	WATER	In house: Referenced to 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 Schedule B(3).
Total Cyanide by Segmented Flow Analyser	EK026SF	WATER	In house: Referenced to APHA 4500-CN C&O / ASTM D7511 / ISO 14403. Sodium hydroxide preserved samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM 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 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 Schedule B(3)

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
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 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 Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM Schedule B(3)
Sulfite as SO3 2-	EK086	WATER	In house: Referenced to APHA 4500-SO32- B. Sulfite is determined by standardised Iodate / Iodide titration.
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 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 Schedule B(3)
Semivolatile Organic Compounds	EP075	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 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 Schedule B(3)

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 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 Schedule B(3)

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM 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 purging.

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ABN: 38 128 9__ 274

(12)

COPY

Environmental Division
Melbourne
Work Order Reference
EM2307883

Telephone : + 61-3-8549 9600

LABORATORY TESTING ORDER

Project Title: Riverlea Dewatering Assessment
Job Number: 231445-01
Project Manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 08 8331 2417
Results to: results@lbwco.com.au; lbwco@esdat.com.au
Invoice to: invoice@lbwco.com.au

Primary Laboratory: Eurofins
Laboratory Quote Ref: 230303LBWS
Secondary Laboratory: ALS
Laboratory Quote Ref: ADBQ-001-18_LBWco_SO

LBW co's COC REFERENCE (sample delivery group)	Turnaround Required
231445-01_COC_20230503	Standard (5 Day)

SAMPLE DETAILS / **CHEMICAL TESTING REQUIRED**

	Date Sampled	Sample ID	Sample Matrix	Additional Information / Comments	BOD 5 Day	pH	TSS	TDS	8A (plus additional metals)	BTEX	OCP	Sulfate as S	Sulfide as S	Sulfite as S	Cyanide	Phenolics (total) - Spectrophotometric technique	M13	TRH C6-C10	
	03-May-23	SLMW03-Q1	Water		x	x	x	x	x	x	x	x	x	x	x	x			
	03-May-23	SLMW04-Q1	Water		x	x	x	x	x	x	x	x	x	x	x	x			
	03-May-23	SLMW07-Q1	Water		x	x	x	x	x	x	x	x	x	x	x	x			
1	03-May-23	DUP-1	Water	Forward to ALS															
	03-May-23	RINSE-1	Water														x		
	03-May-23	TB-1	Water															x	
	LBW co AUTHORISATION		LABORATORY RECEIPT		3	3	3	3	3	3	3	3	3	3	3	3	1	1	0

Sample ID	W-2 (13 Metals)	W-4 (TRH/BTEX)	EP075I (OCP)	EP075A (Phenols)	EP030 (BOD 5 day)	ED041 (sulfate)	ED085 (sulfide)	Total Suspended Solids	Total Dissolved Solids	Cyanide (total)	EK026 (sulfite)	NT-4A	HOLD
SLMW03-Q1													
SLMW04-Q1													
SLMW07-Q1													
DUP-1	x	x	x	x	x	x	x	x	x	x	x	x	
RINSE-1													x
TB-1													x
	1	1	1	1	1	1	1	1	1	1	1	1	22

LBW co AUTHORISATION	LABORATORY RECEIPT
Requested by: T O'Leary	Received by:
Date\time requested: 03-May-23	Date\time received:
Signature:	Signature:

Additional Comments

Please forward sample DUP-1 to ALS for analysis

Analysis as per quote 230303LBWS

Received Kg 5/5/23
10.55

Relinquished by Jessica
8am of 5/5/15

CERTIFICATE OF ANALYSIS

Work Order	: **EM2319725**	Page	: 1 of 7
Client	: **LBW CO PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: Results Lbw	Contact	: Kieren Burns
Address	: 184 MAGILL ROAD NORWOOD SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61881625130
Project	: 231445-01	Date Samples Received	: 03-Nov-2023 12:40
Order number	: 231445-01	Date Analysis Commenced	: 06-Nov-2023
C-O-C number	: 2023-11-01-ALS-AB	Issue Date	: 13-Nov-2023 13:05
Sampler	: ----		
Site	: ----		
Quote number	: EM2023LBWENV0007		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- EP075: Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG020F: EM2319506 #1 Poor matrix spike recovery for metals due to sample matrix. Confirmed by re-extraction and re-analysis.
- EP075: Where reported, 'Sum of PAH' is the sum of the USEPA 16 priority PAHs

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Dup-2	----	----	----	----
			Sampling date / time	01-Nov-2023 10:33	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	EM2319725-001	--------	--------	--------	--------
				Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**3.05**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.021**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.009**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.022**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.013**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	**0.03**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.011**	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	0.004	mg/L	<0.004	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**1.50**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.3**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.8**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.02**	----	----	----	----
EK085M: Sulfide as S2-								
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	----	----	----	----
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Dup-2	----	----	----	----
			Sampling date / time	01-Nov-2023 10:33	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2319725-001	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued								
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	----	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	----	----	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	----	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	2	µg/L	<2	----	----	----	----
beta-BHC	319-85-7	2	µg/L	<2	----	----	----	----
gamma-BHC	58-89-9	2	µg/L	<2	----	----	----	----
delta-BHC	319-86-8	2	µg/L	<2	----	----	----	----
Heptachlor	76-44-8	2	µg/L	<2	----	----	----	----
Aldrin	309-00-2	2	µg/L	<2	----	----	----	----
Heptachlor epoxide	1024-57-3	2	µg/L	<2	----	----	----	----
alpha-Endosulfan	959-98-8	2	µg/L	<2	----	----	----	----
4.4`-DDE	72-55-9	2	µg/L	<2	----	----	----	----
Dieldrin	60-57-1	2	µg/L	<2	----	----	----	----
Endrin	72-20-8	2	µg/L	<2	----	----	----	----
beta-Endosulfan	33213-65-9	2	µg/L	<2	----	----	----	----
4.4`-DDD	72-54-8	2	µg/L	<2	----	----	----	----
Endosulfan sulfate	1031-07-8	2	µg/L	<2	----	----	----	----
4.4`-DDT	50-29-3	4	µg/L	<4	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L	<4	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	4	µg/L	<4	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Dup-2	----	----	----	----
			Sampling date / time	01-Nov-2023 10:33	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2319725-001	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	----	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**10.4**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**59.7**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**94.0**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**91.6**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**94.7**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**94.9**	----	----	----	----
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	2	%	**11.4**	----	----	----	----
Phenol-d6	13127-88-3	2	%	**10.1**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	2	%	**43.4**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	2	%	**78.7**	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Dup-2	----	----	----	----
			Sampling date / time	01-Nov-2023 10:33	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2319725-001	--------	--------	--------	--------
				Result	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates - Continued								
Nitrobenzene-D5	4165-60-0	2	%	83.4	----	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	2	%	68.8	----	----	----	----
2-Fluorobiphenyl	321-60-8	2	%	87.7	----	----	----	----
Anthracene-d10	1719-06-8	2	%	94.8	----	----	----	----
4-Terphenyl-d14	1718-51-0	2	%	93.9	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	102	----	----	----	----
Toluene-D8	2037-26-5	2	%	99.1	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	102	----	----	----	----

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	51
2-Chlorophenol-D4	93951-73-6	30	114
2.4.6-Tribromophenol	118-79-6	26	133
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	35	127
Anthracene-d10	1719-06-8	44	122
4-Terphenyl-d14	1718-51-0	44	124
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	6	83
Phenol-d6	13127-88-3	10	65
2-Chlorophenol-D4	93951-73-6	22	112
2.4.6-Tribromophenol	118-79-6	22	125
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	37	115
1.2-Dichlorobenzene-D4	2199-69-1	32	99
2-Fluorobiphenyl	321-60-8	39	116
Anthracene-d10	1719-06-8	49	123
4-Terphenyl-d14	1718-51-0	47	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

QUALITY CONTROL REPORT

Work Order	: **EM2319725**	Page	: 1 of 8
Client	: **LBW CO PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: Results Lbw	Contact	: Kieren Burns
Address	: 184 MAGILL ROAD NORWOOD SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61881625130
Project	: 231445-01	Date Samples Received	: 03-Nov-2023
Order number	: 231445-01	Date Analysis Commenced	: 06-Nov-2023
C-O-C number	: 2023-11-01-ALS-AB	Issue Date	: 13-Nov-2023
Sampler	: ----		
Site	: ----		
Quote number	: EM2023LBWENV0007		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	***Sample ID***	***Method: Compound***	***CAS Number***	***LOR***	***Unit***	***Original Result***	***Duplicate Result***	***RPD (%)***	***Acceptable RPD (%)***
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5413243)									
EM2319506-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.412	0.424	2.8	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.033	0.034	0.0	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	4.65	4.68	0.7	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.078	0.080	2.3	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.037	0.036	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.19	0.18	0.0	No Limit
EM2319721-009	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.012	0.012	0.0	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.031	0.032	4.5	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5413243) - continued									
EM2319721-009	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5413246)									
EM2319725-001	Dup-2	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EM2319778-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 5405289)									
EM2319601-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EM2319697-002	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5413355)									
EM2319744-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.49	1.48	0.0	0% - 20%
EM2319659-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5413354)									
EM2319701-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.11	0.10	0.0	0% - 50%
EM2319659-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.71	4.88	3.7	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5414322)									
EM2319722-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	57.6	61.9	7.2	0% - 20%
EM2319724-007	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5414321)									
EM2319674-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.10	34.8	No Limit
EM2319724-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.10	28.6	No Limit
EK085M: Sulfide as S2- (QC Lot: 5411535)									
EM2319565-002	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EM2319768-002	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	1.1	1.1	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5405084)									
EM2319793-004	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	120	270	75.7	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	230	129	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	140	92.7	No Limit
EM2319792-005	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	180	150	19.7	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5410324)									
EM2319674-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EM2319721-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5405084)									
EM2319793-004	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	220	76.4	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	100	290	95.0	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5405084) - continued									
EM2319793-004	Anonymous	EP071: >C34 - C40 Fraction	----	100	µg/L	<100	120	19.1	No Limit
EM2319792-005	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	220	170	24.8	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	140	120	12.5	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5410324)									
EM2319674-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EM2319721-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 5410324)									
EM2319674-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EM2319721-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	9	8	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (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 (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5413243)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.8	89.0	111
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.2	85.0	112
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.7	83.6	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.6	83.5	111
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.1	83.2	109
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.8	84.3	110
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.6	83.1	107
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	84.6	108
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.2	84.8	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.0	84.3	110
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.3	82.3	113
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	99.0	83.7	110
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.6	86.3	112
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.0	85.4	115
EG035F: Dissolved Mercury by FIMS (QCLot: 5413246)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	103	71.6	116
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5405289)								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	104	77.7	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5413355)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5413354)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	90.0	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5414322)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	98.4	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5414321)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	94.0	71.9	114
EK085M: Sulfide as S2- (QCLot: 5411535)								
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	99.5	81.9	116
EP075(SIM)A: Phenolic Compounds (QCLot: 5405086)								
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	41.5	17.8	51.1

Sub-Matrix: **WATER**

Method: Compound	*CAS Number*	*LOR*	*Unit*	*Method Blank (MB) Report*	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Acceptable Limits (%)*	
				Result	*Concentration*	*LCS*	*Low*	*High*
EP075(SIM)A: Phenolic Compounds (QCLot: 5405086) - continued								
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	86.5	43.2	107
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	78.5	39.2	98.7
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	74.5	35.5	91.3
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	79.8	34.4	124
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	86.9	44.4	112
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	88.1	45.3	115
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	88.0	44.3	116
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	93.2	46.6	117
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	88.4	38.2	122
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	94.4	43.2	123
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	48.5	48.1	130
EP075I: Organochlorine Pesticides (QCLot: 5405088)								
EP075: alpha-BHC	319-84-6	2	µg/L	<2	10 µg/L	80.8	56.2	112
EP075: beta-BHC	319-85-7	2	µg/L	<2	10 µg/L	83.7	56.2	113
EP075: gamma-BHC	58-89-9	2	µg/L	<2	10 µg/L	86.0	55.2	113
EP075: delta-BHC	319-86-8	2	µg/L	<2	10 µg/L	86.4	52.6	117
EP075: Heptachlor	76-44-8	2	µg/L	<2	10 µg/L	84.3	53.4	111
EP075: Aldrin	309-00-2	2	µg/L	<2	10 µg/L	88.7	54.0	112
EP075: Heptachlor epoxide	1024-57-3	2	µg/L	<2	10 µg/L	81.8	54.2	113
EP075: alpha-Endosulfan	959-98-8	2	µg/L	<2	10 µg/L	108	49.3	122
EP075: 4.4`-DDE	72-55-9	2	µg/L	<2	10 µg/L	82.2	56.0	121
EP075: Dieldrin	60-57-1	2	µg/L	<2	10 µg/L	88.5	55.2	118
EP075: Endrin	72-20-8	2	µg/L	<2	10 µg/L	84.1	52.7	121
EP075: beta-Endosulfan	33213-65-9	2	µg/L	<2	10 µg/L	86.1	55.1	119
EP075: 4.4`-DDD	72-54-8	2	µg/L	<2	10 µg/L	86.3	55.4	120
EP075: Endosulfan sulfate	1031-07-8	2	µg/L	<2	10 µg/L	85.2	49.6	123
EP075: 4.4`-DDT	50-29-3	4	µg/L	<4	10 µg/L	92.4	47.8	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5405084)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4560 µg/L	66.6	47.2	122
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16200 µg/L	70.7	52.9	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8650 µg/L	80.3	50.4	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5410324)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	71.8	66.2	134
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5405084)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5405084) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6190 µg/L	78.5	49.1	125
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22200 µg/L	68.9	51.6	128
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1520 µg/L	88.0	47.2	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5410324)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	77.8	66.2	132
EP080: BTEXN (QCLot: 5410324)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	73.8	68.8	127
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	77.2	72.9	129
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	77.4	71.7	130
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	79.4	72.3	136
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	82.7	75.9	134
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	78.9	68.3	131

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5413243)							
EM2319506-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	115	76.6	124
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	76.9	73.0	120
		EG020A-F: Barium	7440-39-3	0.2 mg/L	94.8	75.0	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	# 54.9	74.6	118
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	82.1	71.0	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	90.6	78.0	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	# 36.2	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	# 34.1	75.0	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	64.0	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	86.9	73.0	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	# 57.2	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	# 66.8	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 5413246)							
EM2319769-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	96.8	70.0	120

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5405289)							
EM2319601-002	Anonymous	EK026SF: Total Cyanide	57-12-5	0.4 mg/L	80.7	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5413355)							
EM2319659-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	104	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5413354)							
EM2319659-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5414322)							
EM2319722-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	77.9	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5414321)							
EM2319674-017	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70.0	130
EK085M: Sulfide as S2- (QCLot: 5411535)							
EM2319601-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.5 mg/L	94.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5405084)							
EM2319792-005	Anonymous	EP071: C10 - C14 Fraction	----	4460 µg/L	88.7	48.0	126
		EP071: C15 - C28 Fraction	----	14300 µg/L	99.2	51.7	132
		EP071: C29 - C36 Fraction	----	7300 µg/L	118	50.5	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5410324)							
EM2319674-017	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	78.3	33.9	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5405084)							
EM2319792-005	Anonymous	EP071: >C10 - C16 Fraction	----	6090 µg/L	101	48.0	128
		EP071: >C16 - C34 Fraction	----	19400 µg/L	97.5	50.4	130
		EP071: >C34 - C40 Fraction	----	1300 µg/L	128	47.4	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5410324)							
EM2319674-017	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	77.2	34.0	122
EP080: BTEXN (QCLot: 5410324)							
EM2319674-017	Anonymous	EP080: Benzene	71-43-2	20 µg/L	85.5	56.3	133
		EP080: Toluene	108-88-3	20 µg/L	88.9	60.4	132

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2319725**		
Client	: **LBW CO PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: Results Lbw	Telephone	: +61881625130
Project	: 231445-01	Date Samples Received	: 03-Nov-2023
Site	: ----	Issue Date	: 13-Nov-2023
Sampler	: ----	No. of samples received	: 1
Order number	: 231445-01	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

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							
EG020F: Dissolved Metals by ICP-MS	EM2319506--001	Anonymous	**Cadmium**	7440-43-9	54.9 %	74.6-118%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2319506--001	Anonymous	**Copper**	7440-50-8	36.2 %	76.0-130%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2319506--001	Anonymous	**Lead**	7439-92-1	34.1 %	75.0-133%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2319506--001	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	EM2319506--001	Anonymous	**Vanadium**	7440-62-2	57.2 %	73.0-131%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2319506--001	Anonymous	**Zinc**	7440-66-6	66.8 %	75.0-131%	**Recovery less than lower data quality objective**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EM2319659--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
	0				
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	1	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	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) Dup-2	**01-Nov-2023**	**----**	----	----	**09-Nov-2023**	29-Apr-2024	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) Dup-2	**01-Nov-2023**	**----**	----	----	**10-Nov-2023**	29-Nov-2023	✓
EK026SF: Total CN by Segmented Flow Analyser							
Black Opaque Plastic Bottle - NaOH (EK026SF) Dup-2	**01-Nov-2023**	**----**	----	----	**08-Nov-2023**	15-Nov-2023	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) Dup-2	**01-Nov-2023**	**----**	----	----	**11-Nov-2023**	29-Nov-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) Dup-2	**01-Nov-2023**	**----**	----	----	**11-Nov-2023**	29-Nov-2023	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) Dup-2	**01-Nov-2023**	**10-Nov-2023**	29-Nov-2023	✓	**11-Nov-2023**	29-Nov-2023	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) Dup-2	**01-Nov-2023**	**10-Nov-2023**	29-Nov-2023	✓	**11-Nov-2023**	29-Nov-2023	✓
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) Dup-2	**01-Nov-2023**	**----**	----	----	**08-Nov-2023**	08-Nov-2023	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) Dup-2	**01-Nov-2023**	**08-Nov-2023**	08-Nov-2023	✓	**08-Nov-2023**	18-Dec-2023	✓
EP075I: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP075) Dup-2	**01-Nov-2023**	**08-Nov-2023**	08-Nov-2023	✓	**08-Nov-2023**	18-Dec-2023	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) Dup-2	**01-Nov-2023**	**08-Nov-2023**	08-Nov-2023	✓	**08-Nov-2023**	18-Dec-2023	✓
Clear glass VOC vial - HCl (EP080) Dup-2	**01-Nov-2023**	**09-Nov-2023**	15-Nov-2023	✓	**09-Nov-2023**	15-Nov-2023	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) Dup-2	**01-Nov-2023**	**08-Nov-2023**	08-Nov-2023	✓	**08-Nov-2023**	18-Dec-2023	✓
Clear glass VOC vial - HCl (EP080) Dup-2	**01-Nov-2023**	**09-Nov-2023**	15-Nov-2023	✓	**09-Nov-2023**	15-Nov-2023	✓

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Clear glass VOC vial - HCl (EP080) Dup-2	**01-Nov-2023**	**09-Nov-2023**	15-Nov-2023	✓	**09-Nov-2023**	15-Nov-2023	✓

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)							
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	7	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	7	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**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
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 Mercury by FIMS	EG035F	WATER	In house: Referenced to 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 Schedule B(3).
Total Cyanide by Segmented Flow Analyser	EK026SF	WATER	In house: Referenced to APHA 4500-CN C&O / ASTM D7511 / ISO 14403. Sodium hydroxide preserved samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM 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 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 Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 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 Schedule B(3)
Semivolatile Organic Compounds	EP075	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 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 Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 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 Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM 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 purging.

FREIGHT

Company	LBWco		
Project ID	231445-01		
Project Name	Riverlea Saltwater Lakes Dewatering Assessment		
SDG/COC #	2023-11-01-ALS-AB		
Request / Version	1/1		

Laboratory

Destination Lab	ALS
Lab Quote No	EM2023LBWENV0007
Lab Contact	ALS Melbourne (0385499600) samples.melbourne@alsglobal.com

Report To

Primary Contact	LBWco Laboratory Results results@lbwco.com.au
Secondary Contact	Tess O'Leary tess.oleary@lbwco.com.au

Billing

Purchase Order #	231445-01
Org to be Billed	LBWco
Bill To	finance@lbwco.com.au
Attention	Tess O'Leary

Turnaround Request: 5 Days
Special Instructions: Please also assign analysis for EK026 Cyanide (total) and EK086 Sulfite.
Sampled by: LBWco Tab1

Field ID	Matrix	Date	ED041G:Sulfate (Turbidimetric) as SO4 2 by Discrete Analyser	EK085M:Sulfide as S 2-	EP030:BOD	EP075 SIM Phenols only:SIM - Phenols only	EP075I:SVOC - Organochlorine Pesticides	NT-08A:Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	W-03:15 Metals (NEPM Suite)	W-04:TRH/BTEXN		Hold	Comments
Dup-2	Water	01/11/2023 11:03AM	✓	✓	✓	✓	✓	✓	✓	✓			Ref Comment

Environmental Division
Melbourne
Work Order Reference
EM2319725

Telephone : + 61-3-8549 9600

Hand Over

# of Delivery Boxes	1
Cooled	no
Con Note	-

	Relinquished	Received	Relinquished	Received
Signature				
Name	Antonio Brito			
Org	-			
Date	01/11/2023 11:03AM			

e-Reque

Name	-
Org	-
Date	-

Comments Details

Samples	Comments
Dup-2	Also analyse for EK026 and EK086

Hoorn (ALT) 3/11, 12:00

184 Magill Road, Norwood SA 5067
PO Box 225 Stepney SA 5069
P: 08 8331 2417 F: 08 8331 2415

E: admin@lbwco.com.au
ABN: 58 126 992 274

DELIVERING ENVIRONMENTAL SOLUTIONS

SAMPLE REGISTER & CHAIN OF CUSTODY

Project Title: Riverlea Saltwater Lakes Dewatering
Job Number: 231445-01
Project manager: Tess O'Leary
Email: tess.oleary@lbwco.com.au
Phone: 8331 2417
Send results to: results@lbwco.com.au, lbwco@esdat.com.au
Send invoice to: finance@lbwco.com.au

Primary Lab: Eurofins
Lab Quote Ref: 230303LBWS

Secondary lab: ALS
EN/111/23

COC Reference: (sample delivery group) 231445-01_COC_20231102

Sample Details 1	Sample Details 2
Dup-2	

Sample Custody - Step 1

Relinqished by: T O'Leary
Date/Time Relinquished: 2 NOV. 2023
Signature:
Courier and consignment number:
Received by:
Date/Time Received:
Signature:

Sample Custody - Step 2

Relinqished by:
Date/Time Relinquished:
Signature:
Courier and consignment number:
Received by: [illegible]
Date/Time Received: 3/11 1240
Signature:

Appendix L

Dewatering Storage Modelling

Calculations - Construction program, dewatering time period, dewatering flows per day, dewatering volumes, evaporation losses, period to fill lined bays

SWL1 Bay	Excavation Volume (exc batters) (m^3)	Excavation Timeframe (Days, @ 5,400 m^3/day)	Excavation Timeframe (weeks, @ 6-days/wk)	Dewatering Period for Excavation (Days)	Liner area (m^2)	Liner Installation (Days, @1500 m^2/Day)	Liner Installation Period (weeks, @ 6-days/wk)	Dewatering Period for Liner Install (Days)	SWL1 Lined Storage Capacity - ~Liner Area x 3 m depth (m^3)	SWL1 Lined Bay Balance Water Fill Volume (% at E40) (m^3)
1	91320	16.91	2.8	20	20760	13.84	2.3	16	62,280	43,596
2	93900	17.39	2.9	20	22740	15.16	2.5	18	68,220	47,754
3	112935	20.91	3.5	24	29280	19.52	3.3	23	87,840	61,488
4	78900	14.61	2.4	17	17880	11.92	2.0	14	53,640	37,548
5	87150	16.14	2.7	19	19980	13.32	2.2	16	59,940	41,958
6	38640	7.16	1.2	8	13200	8.8	1.5	10.3	39,600	27,720
Total			**15.5**	**109**			**13.8**	**96**	**371,520**	**260,064**

Bay	Dewatering On	Dewatering to 0.5 mAHD Complete	Excavation Start	Excavation Finish	Liner Install Start	Liner Install Finish	Dewatering Off
1	0	30	30	50	45	61	65
2	0	30	30	50	62	80	84
3	20	50	51	75	81	104	109
4	50	80	76	93	105	119	123
5	80	110	111	130	120	135	139
6	100	130	131	139	136	146	147

Day From	Day To	Flow Rate Per Day (m^3)						Flow Rate (m^3/Day)	Dewatering Volume (m^3)	Cumulative Volume (m^3)
		Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6			
0	10	5747						5,747	57,466	57,466
10	21	3424	3424					6,847	75,321	75,321
21	51	1119	1119	1119				3,356	100,684	158,149
51	65	970	970	970	970			3,879	54,299	212,448
65	81		573	573	573			1,719	27,510	239,958
81	84		1505	1505	1505	1505		6,020	18,059	258,017
84	101			764	764	764		2,291	38,947	296,964
101	109			673	673	673	673	2,694	21,552	318,516
109	123				520	520	520	1,559	21,821	340,338
123	139					532	532	1,065	17,038	357,376
139	147						393	393	3,147	360,522
								TOTAL	**435,844**	

Day From	Day To	Action
63	64	Fill Aquadam to Bay 1
65	70	Fill Bay 1 with groundwater
-	65	Turn off Bay 1
82	83	Fill Aquadam to Bay 2
83	85	Remove Aquadam 1
84	89	Fill Bay 2 with groundwater
-	84	Turn off Bay 2
106	107	Fill Aquadam to Bay 3
107	109	Remove Aquadam 2
108	114	Fill Bay 3 with groundwater
-	109	Turn off Bay 3
121	122	Fill Aquadam to Bay 4
122	124	Remove Aquadam 3
123	127	Fill Bay 4 with groundwater
-	123	Turn off Bay 4
137	139	Remove Aquadam 4
139	144	Fill Bay 5 with groundwater
-	139	Turn off Bay 5
147	151	Fill Bay 6 with groundwater
-	147	Turn off Bay 6

Dewatering On
Dewatering Off

Filling of Lined Bays

70%		% of bay to fill with groundwater
10000	m^3/Day	Flow rate to fill bay with groundwater

Filling of Aquadam (Coffer dam)

21000	L/m	3.7m tall Aquadam - Volume
128	m	Aquadam 1 length
2688	m^3	Aquadam 1 volume
2	Days	Av time to fill Aquadam
1500	m^3/Day	Flow rate to fill Aquadam
2	Days	Av time to remove Aquadam

Earthworks Demand for Dewatered Groundwater

2	Moxies/Day
40	m^3/load
8	loads/Day
640	m^3

SWL 2 Evaporation Losses

Area	103000	m2	
Filled surface area	51500	m2	50%
Spring pan evap	500	mm	
Summer pan evap	800	mm	
Autumn pan evap	400	mm	
Correction factor	0.75	Pan evap to pond evap	
Spring vol. loss	19312.5	m3/90 days	
	220	**m3/day**	
Summer vol. loss	30900	m3/90 days	
	350	**m3/day**	
Autumn vol. loss	15450	m3/90 days	
	180	**m3/day**	

http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation/index.jsp?period=an#maps

Calculations - Daily dewatering flows in/out of SWL2 + Channels storage, Filling of lined bays

Days	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6		
	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay
1	5747																	
2	5747																	
3	5747																	
4	5747																	
5	5747																	
6	5747																	
7	5747																	
8	5747																	
9	5747																	
10	5747																	
11	3424			3424														
12	3424			3424														
13	3424			3424														
14	3424			3424														
15	3424			3424														
16	3424			3424														
17	3424			3424														
18	3424			3424														
19	3424			3424														
20	3424			3424														
21	3424			3424														
22	1119			1119			1119											
23	1119			1119			1119											
24	1119			1119			1119											
25	1119			1119			1119											
26	1119			1119			1119											
27	1119			1119			1119											
28	1119			1119			1119											
29	1119			1119			1119											
30	1119			1119			1119											
31	1119			1119			1119											
32	1119			1119			1119											
33	1119			1119			1119											
34	1119			1119			1119											
35	1119			1119			1119											
36	1119			1119			1119											
37	1119			1119			1119											
38	1119			1119			1119											
39	1119			1119			1119											
40	1119			1119			1119											
41	1119			1119			1119											
42	1119			1119			1119											
43	1119			1119			1119											
44	1119			1119			1119											
45	1119			1119			1119											
46	1119			1119			1119											
47	1119			1119			1119											
48	1119			1119			1119											
49	1119			1119			1119											
50	1119			1119			1119											
51	1119			1119			1119											
52	970			970			970			970								
53	970			970			970			970								
54	970			970			970			970								
55	970			970			970			970								
56	970			970			970			970								
57	970			970			970			970								

Days	SWL2 + Channels Storage				Capacity	
	Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	300000	Comment
1	5747	-220	-640	4887	295113	Spring pan evaporation
2	5747	-220	-640	9773	290227	500mm/day for 90 days
3	5747	-220	-640	14660	285340	
4	5747	-220	-640	19546	280454	
5	5747	-220	-640	24433	275567	
6	5747	-220	-640	29319	270681	
7	5747	-220	-640	34206	265794	
8	5747	-220	-640	39093	260907	
9	5747	-220	-640	43979	256021	
10	5747	-220	-640	48866	251134	
11	6847	-220	-640	54853	245147	
12	6847	-220	-640	60840	239160	
13	6847	-220	-640	66828	233172	
14	6847	-220	-640	72815	227185	
15	6847	-220	-640	78803	221197	
16	6847	-220	-640	84790	215210	
17	6847	-220	-640	90777	209223	
18	6847	-220	-640	96765	203235	
19	6847	-220	-640	102752	197248	
20	6847	-220	-640	108739	191261	
21	6847	-220	-640	114727	185273	
22	3356	-220	-640	117223	182777	
23	3356	-220	-640	119719	180281	
24	3356	-220	-640	122215	177785	
25	3356	-220	-640	124711	175289	
26	3356	-220	-640	127207	172793	
27	3356	-220	-640	129704	170296	
28	3356	-220	-640	132200	167800	
29	3356	-220	-640	134696	165304	
30	3356	-220	-640	137192	162808	
31	3356	-220	-640	139688	160312	
32	3356	-220	-640	142184	157816	
33	3356	-220	-640	144680	155320	
34	3356	-220	-640	147176	152824	
35	3356	-220	-640	149673	150327	
36	3356	-220	-640	152169	147831	
37	3356	-220	-640	154665	145335	
38	3356	-220	-640	157161	142839	
39	3356	-220	-640	159657	140343	
40	3356	-220	-640	162153	137847	
41	3356	-220	-640	164649	135351	
42	3356	-220	-640	167145	132855	
43	3356	-220	-640	169641	130359	
44	3356	-220	-640	172138	127862	
45	3356	-220	-640	174634	125366	
46	3356	-220	-640	177130	122870	
47	3356	-220	-640	179626	120374	
48	3356	-220	-640	182122	117878	
49	3356	-220	-640	184618	115382	
50	3356	-220	-640	187114	112886	
51	3356	-220	-640	189610	110390	
52	3879	-220	-640	192629	107371	
53	3879	-220	-640	195647	104353	
54	3879	-220	-640	198666	101334	
55	3879	-220	-640	201684	98316	
56	3879	-220	-640	204703	95297	
57	3879	-220	-640	207721	92279	

	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6			SWL2 + Channels Storage				Capacity	
Days	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	300000	Comment
58	970			970			970			970									3879	-220	-640	210740	89260	
59	970			970			970			970									3879	-220	-640	213759	86241	
60	970			970			970			970									3879	-220	-640	216777	83223	
61	970			970			970			970									3879	-220	-640	219796	80204	
62	970			970			970			970									3879	-220	-640	222814	77186	
63	970	-1500		970			970			970									2379	-220	-640	224333	75667	
64	970	-1500		970			970			970									2379	-220	-640	225851	74149	
65	970		-10000	970			970			970									-6121	-220	-640	218870	81130	
66			-10000	573			573			573									-8281	-220	-640	209729	90271	
67			-10000	573			573			573									-8281	-220	-640	200588	99412	
68			-10000	573			573			573									-8281	-220	-640	191448	108552	
69			-5000	573			573			573									-3281	-220	-640	187307	112693	
70				573			573			573									1719	-220	-640	188166	111834	
71				573			573			573									1719	-220	-640	189026	110974	
72				573			573			573									1719	-220	-640	189885	110115	
73				573			573			573									1719	-220	-640	190745	109255	
74				573			573			573									1719	-220	-640	191604	108396	
75				573			573			573									1719	-220	-640	192463	107537	
76				573			573			573									1719	-220	-640	193323	106677	
77				573			573			573									1719	-220	-640	194182	105818	
78				573			573			573									1719	-220	-640	195041	104959	
79				573			573			573									1719	-220	-640	195901	104099	
80				573			573			573									1719	-220	-640	196760	103240	
81				573			573			573									1719	-220	-640	197619	102381	
82				1505	-1500		1505			1505			1505						4520	-220	-640	201279	98721	
83				1505	-1500		1505			1505			1505						4520	-220	-640	204939	95061	
84				1505		-10000	1505			1505			1505						-3980	-220	-640	200099	99901	
85						-10000	764			764			764						-7709	-220	-640	191530	108470	
86						-10000	764			764			764						-7709	-220	-640	182961	117039	
87						-10000	764			764			764						-7709	-220	-640	174392	125608	
88						-10000	764			764			764						-7709	-220	-640	165823	134177	
89							764			764			764						2291	-220	-640	167254	132746	
90							764			764			764						2291	-220	-640	168685	131315	
91							764			764			764						2291	-350	-640	169986	130014	Summer pan evaporation
92							764			764			764						2291	-350	-640	171287	128713	800 mm/day for 90 days
93							764			764			764						2291	-350	-640	172588	127412	
94							764			764			764						2291	-350	-640	173889	126111	
95							764			764			764						2291	-350	-640	175190	124810	
96							764			764			764						2291	-350	-640	176491	123509	
97							764			764			764						2291	-350	-640	177792	122208	
98							764			764			764						2291	-350	-640	179093	120907	
99							764			764			764						2291	-350	-640	180394	119606	
100							764			764			764						2291	-350	-640	181695	118305	
101							764			764			764						2291	-350	-640	182996	117004	
102							673			673			673			673			2694	-350	-640	184700	115300	
103							673			673			673			673			2694	-350	-640	186403	113597	
104							673			673			673			673			2694	-350	-640	188107	111893	
105							673			673			673			673			2694	-350	-640	189811	110189	
106							673	-1500		673			673			673			1194	-350	-640	190015	109985	
107							673	-1500		673			673			673			1194	-350	-640	190219	109781	
108							673		-10000	673			673			673			-7306	-350	-640	181923	118077	
109							673		-10000	673			673			673			-7306	-350	-640	173627	126373	
110									-10000	520			520			520			-8441	-350	-640	164196	135804	
111									-10000	520			520			520			-8441	-350	-640	154765	145235	
112									-10000	520			520			520			-8441	-350	-640	145333	154667	
113									-10000	520			520			520			-8441	-350	-640	135902	164098	
114										520			520			520			1559	-350	-640	136471	163529	
115										520			520			520			1559	-350	-640	137039	162961	

Days	Bay 1 Dewater	Bay 1 Fill Aquadam	Bay 1 Fill Bay	Bay 2 Dewater	Bay 2 Fill Aquadam	Bay 2 Fill Bay	Bay 3 Dewater	Bay 3 Fill Aquadam	Bay 3 Fill Bay	Bay 4 Dewater	Bay 4 Fill Aquadam	Bay 4 Fill Bay	Bay 5 Dewater	Bay 5 Fill Aquadam	Bay 5 Fill Bay	Bay 6 Dewater	Bay 6 Fill Aquadam	Bay 6 Fill Bay
116										520			520			520		
117										520			520			520		
118										520			520			520		
119										520			520			520		
120										520			520			520		
121										520			520			520		
122										520	-1500		520			520		
123										520	-1500		520			520		
124												-10000	532			532		
125												-10000	532			532		
126												-10000	532			532		
127												-10000	532			532		
128													532			532		
129													532			532		
130													532			532		
131													532			532		
132													532			532		
133													532			532		
134													532			532		
135													532			532		
136													532			532		
137													532			532		
138													532			532		
139													532		-10000	532		
140															-10000	393		
141															-10000	393		
142															-10000	393		
143																393		
144																393		
145																393		
146																393		
147																393		-10000
148																		-10000
149																		-10000
150																		
151																		

Days	SWL2 + Channels Storage: Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	Capacity 300000	Comment
116	1559	-350	-640	137608	162392	
117	1559	-350	-640	138177	161823	
118	1559	-350	-640	138745	161255	
119	1559	-350	-640	139314	160686	
120	1559	-350	-640	139883	160117	
121	1559	-350	-640	140451	159549	
122	59	-350	-640	139520	160480	
123	59	-350	-640	138589	161411	
124	-8935	-350	-640	128664	171336	
125	-8935	-350	-640	118739	181261	
126	-8935	-350	-640	108813	191187	
127	-8935	-350	-640	98888	201112	
128	1065	-350	-640	98963	201037	
129	1065	-350	-640	99038	200962	
130	1065	-350	-640	99113	200887	
131	1065	-350	-640	99188	200812	
132	1065	-350	-640	99263	200737	
133	1065	-350	-640	99338	200662	
134	1065	-350	-640	99413	200587	
135	1065	-350	-640	99487	200513	
136	1065	-350	-640	99562	200438	
137	1065	-350	-640	99637	200363	
138	1065	-350	-640	99712	200288	
139	-8935	-350	-640	89787	210213	
140	-9607	-350	-640	79190	220810	
141	-9607	-350	-640	68594	231406	
142	-9607	-350	-640	57997	242003	
143	393	-350	-640	57400	242600	
144	393	-350	-640	56804	243196	
145	393	-350	-640	56207	243793	
146	393	-350	-640	55610	244390	
147	-9607	-350	-640	45014	254986	
148	-10000	-350	-640	34024	265976	
149	-10000	-350	-640	23034	276966	
150						
151						

Calculations - Construction program, dewatering time period, dewatering flows per day, dewatering volumes, evaporation losses, period to fill lined bays

SWL1 Bay	Excavation Volume (exc batters) (m^3)	Excavation Timeframe (Days, @ 5,400 m^3/day)	Excavation Timeframe (weeks, @ 6-days/wk)	Dewatering Period for Excavation (Days)	Liner area (m^2)	Liner Installation (Days, @1500 m^2/Day)	Liner Installation Period (weeks, @ 6-days/wk)	Dewatering Period for Liner Install (Days)	SWL1 Lined Storage Capacity - ~Liner Area x 3 m depth (m^3)	SWL1 Lined Bay Balance Water Fill Volume (% at E40) (m^3)
1	91320	16.91	2.8	20	20760	13.84	2.3	16	62,280	43,596
2	93900	17.39	2.9	20	22740	15.16	2.5	18	68,220	47,754
3	112935	20.91	3.5	24	29280	19.52	3.3	23	87,840	61,488
4	78900	14.61	2.4	17	17880	11.92	2.0	14	53,640	37,548
5	87150	16.14	2.7	19	19980	13.32	2.2	16	59,940	41,958
6	38640	7.16	1.2	8	13200	8.8	1.5	10.3	39,600	27,720
Total			**15.5**	**109**			**13.8**	**96**	**371,520**	**260,064**

Bay	Dewatering On	Dewatering to 0.5 mAHD Complete	Excavation Start	Excavation Finish	Liner Install Start	Liner Install Finish	Dewatering Off
1	0	30	30	50	45	61	155
2	0	30	30	50	62	80	173
3	20	50	51	75	81	104	197
4	50	80	76	93	105	119	213
5	80	110	111	130	120	135	231
6	100	130	131	139	136	146	#REF!

Day From	Day To	Flow Rate Per Day (m^3) Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Flow Rate (m^3/Day)	Dewatering Volume (m^3)	Cumulative Volume (m^3)	
0	10	5747						5,747	57,466	57,466	
10	21	3424	3424					6,847	75,321	75,321	
21	51	1119	1119	1119				3,356	100,684	158,149	
51	65	970	970	970	970			3,879	54,299	212,448	
65	155	350	350	350	350			1,400	126,000	338,448	90 day construction delay
155	171		573	573	573			1,719	27,510	365,958	
171	174		1505	1505	1505	1505		6,020	18,059	384,017	
174	191			764	764	764		2,291	38,947	422,964	
191	199			673	673	673	673	2,694	21,552	444,516	
199	213				520	520	520	1,559	21,821	466,338	
213	229					532	532	1,065	17,038	483,376	
229	237						393	393	3,147	486,522	
								TOTAL	**561,844**		

Day From	Day To	Action
63	64	Fill Aquadam to Bay 1
65	70	Fill Bay 1 with groundwater
65	155	90 day construction delay
-	155	Turn off Bay 1
153	154	Fill Aquadam to Bay 2
154	156	Remove Aquadam 1
155	160	Fill Bay 2 with groundwater
-	174	Turn off Bay 2
172	173	Fill Aquadam to Bay 3
173	175	Remove Aquadam 2
174	179	Fill Bay 3 with groundwater
-	199	Turn off Bay 3
196	197	Fill Aquadam to Bay 4
197	199	Remove Aquadam 3
198	204	Fill Bay 4 with groundwater
-	213	Turn off Bay 4
211	213	Remove Aquadam 4
213	217	Fill Bay 5 with groundwater
-	229	Turn off Bay 5
226	231	Fill Bay 6 with groundwater
-	237	Turn off Bay 6

Dewatering On
Dewatering Off

Filling of Lined Bays

70%		% of bay to fill with groundwater
10000	m^3/Day	Flow rate to fill bay with groundwater

Filling of Aquadam (Coffer dam)

21000	L/m	3.7m tall Aquadam - Volume
128	m	Aquadam 1 length
2688	m^3	Aquadam 1 volume
2	Days	Av time to fill Aquadam
1500	m^3/Day	Flow rate to fill Aquadam
2	Days	Av time to remove Aquadam

Earthworks Demand for Dewatered Groundwater

2	Moxies/Day
40	m^3/load
8	loads/Day
640	m^3

SWL 2 Evaporation Losses

Area	103000	m2	
Filled surface area	51500	m2	50%
Spring pan evap	500	mm	
Summer pan evap	800	mm	
Autumn pan evap	400	mm	
Correction factor	0.75	Pan evap to pond evap	
Spring vol. loss	19312.5	m3/90 days	
	220	**m3/day**	
Summer vol. loss	30900	m3/90 days	
	350	**m3/day**	
Autumn vol. loss	15450	m3/90 days	
	180	**m3/day**	

http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation/index_.jsp?period=an#maps

Calculations - Daily dewatering flows in/out of SWL2 + Channels storage, Filling of lined bays

Days	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6			SWL2 + Channels Storage				Capacity	
	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	300000	Comment
1	5747																		5747	-220	-640	4887	295113	Spring pan evaporation
2	5747																		5747	-220	-640	9773	290227	500mm/day for 90 days
3	5747																		5747	-220	-640	14660	285340	
4	5747																		5747	-220	-640	19546	280454	
5	5747																		5747	-220	-640	24433	275567	
6	5747																		5747	-220	-640	29319	270681	
7	5747																		5747	-220	-640	34206	265794	
8	5747																		5747	-220	-640	39093	260907	
9	5747																		5747	-220	-640	43979	256021	
10	5747																		5747	-220	-640	48866	251134	
11	3424			3424															6847	-220	-640	54853	245147	
12	3424			3424															6847	-220	-640	60840	239160	
13	3424			3424															6847	-220	-640	66828	233172	
14	3424			3424															6847	-220	-640	72815	227185	
15	3424			3424															6847	-220	-640	78803	221197	
16	3424			3424															6847	-220	-640	84790	215210	
17	3424			3424															6847	-220	-640	90777	209223	
18	3424			3424															6847	-220	-640	96765	203235	
19	3424			3424															6847	-220	-640	102752	197248	
20	3424			3424															6847	-220	-640	108739	191261	
21	3424			3424															6847	-220	-640	114727	185273	
22	1119			1119			1119												3356	-220	-640	117223	182777	
23	1119			1119			1119												3356	-220	-640	119719	180281	
24	1119			1119			1119												3356	-220	-640	122215	177785	
25	1119			1119			1119												3356	-220	-640	124711	175289	
26	1119			1119			1119												3356	-220	-640	127207	172793	
27	1119			1119			1119												3356	-220	-640	129704	170296	
28	1119			1119			1119												3356	-220	-640	132200	167800	
29	1119			1119			1119												3356	-220	-640	134696	165304	
30	1119			1119			1119												3356	-220	-640	137192	162808	
31	1119			1119			1119												3356	-220	-640	139688	160312	
32	1119			1119			1119												3356	-220	-640	142184	157816	
33	1119			1119			1119												3356	-220	-640	144680	155320	
34	1119			1119			1119												3356	-220	-640	147176	152824	
35	1119			1119			1119												3356	-220	-640	149673	150327	
36	1119			1119			1119												3356	-220	-640	152169	147831	
37	1119			1119			1119												3356	-220	-640	154665	145335	
38	1119			1119			1119												3356	-220	-640	157161	142839	
39	1119			1119			1119												3356	-220	-640	159657	140343	
40	1119			1119			1119												3356	-220	-640	162153	137847	
41	1119			1119			1119												3356	-220	-640	164649	135351	
42	1119			1119			1119												3356	-220	-640	167145	132855	
43	1119			1119			1119												3356	-220	-640	169641	130359	
44	1119			1119			1119												3356	-220	-640	172138	127862	
45	1119			1119			1119												3356	-220	-640	174634	125366	
46	1119			1119			1119												3356	-220	-640	177130	122870	
47	1119			1119			1119												3356	-220	-640	179626	120374	
48	1119			1119			1119												3356	-220	-640	182122	117878	
49	1119			1119			1119												3356	-220	-640	184618	115382	
50	1119			1119			1119												3356	-220	-640	187114	112886	
51	1119			1119			1119												3356	-220	-640	189610	110390	
52	970			970			970			970									3879	-220	-640	192629	107371	
53	970			970			970			970									3879	-220	-640	195647	104353	
54	970			970			970			970									3879	-220	-640	198666	101334	
55	970			970			970			970									3879	-220	-640	201684	98316	
56	970			970			970			970									3879	-220	-640	204703	95297	
57	970			970			970			970									3879	-220	-640	207721	92279	

	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6			SWL2 + Channels Storage				Capacity	
Days	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	300000	Comment
58	970			970			970			970									3879	-220	-640	210740	89260	
59	970			970			970			970									3879	-220	-640	213759	86241	
60	970			970			970			970									3879	-220	-640	216777	83223	
61	970			970			970			970									3879	-220	-640	219796	80204	
62	970			970			970			970									3879	-220	-640	222814	77186	
63	970			970			970			970									3879	-220	-640	225833	74167	
64	970			970			970			970									3879	-220	-640	228851	71149	
65	970			970			970			970									3879	-220	-640	231870	68130	
1	350			350			350			350									1400	-220	-640	232410	67590	Construction delay for 90 days
2	350			350			350			350									1400	-220	-640	232950	67050	
3	350			350			350			350									1400	-220	-640	233490	66510	
4	350			350			350			350									1400	-220	-640	234030	65970	
5	350			350			350			350									1400	-220	-640	234570	65430	
6	350			350			350			350									1400	-220	-640	235110	64890	
7	350			350			350			350									1400	-220	-640	235650	64350	
8	350			350			350			350									1400	-220	-640	236190	63810	
9	350			350			350			350									1400	-220	-640	236730	63270	
10	350			350			350			350									1400	-220	-640	237270	62730	
11	350			350			350			350									1400	-220	-640	237810	62190	
12	350			350			350			350									1400	-220	-640	238350	61650	
13	350			350			350			350									1400	-220	-640	238890	61110	
14	350			350			350			350									1400	-220	-640	239430	60570	
15	350			350			350			350									1400	-220	-640	239970	60030	
16	350			350			350			350									1400	-220	-640	240510	59490	
17	350			350			350			350									1400	-220	-640	241050	58950	
18	350			350			350			350									1400	-220	-640	241590	58410	
19	350			350			350			350									1400	-220	-640	242130	57870	
20	350			350			350			350									1400	-220	-640	242670	57330	
21	350			350			350			350									1400	-220	-640	243210	56790	
22	350			350			350			350									1400	-220	-640	243750	56250	
23	350			350			350			350									1400	-220	-640	244290	55710	
24	350			350			350			350									1400	-220	-640	244830	55170	
25	350			350			350			350									1400	-220	-640	245370	54630	
26	350			350			350			350									1400	-350	-640	245780	54220	Summer pan evaporation
27	350			350			350			350									1400	-350	-640	246190	53810	800 mm/day for 90 days
28	350			350			350			350									1400	-350	-640	246600	53400	
29	350			350			350			350									1400	-350	-640	247010	52990	
30	350			350			350			350									1400	-350	-640	247420	52580	
31	350			350			350			350									1400	-350	-640	247830	52170	
32	350			350			350			350									1400	-350	-640	248240	51760	
33	350			350			350			350									1400	-350	-640	248650	51350	
34	350			350			350			350									1400	-350	-640	249060	50940	
35	350			350			350			350									1400	-350	-640	249470	50530	
36	350			350			350			350									1400	-350	-640	249880	50120	
37	350			350			350			350									1400	-350	-640	250290	49710	
38	350			350			350			350									1400	-350	-640	250700	49300	
39	350			350			350			350									1400	-350	-640	251110	48890	
40	350			350			350			350									1400	-350	-640	251520	48480	
41	350			350			350			350									1400	-350	-640	251930	48070	
42	350			350			350			350									1400	-350	-640	252340	47660	
43	350			350			350			350									1400	-350	-640	252750	47250	
44	350			350			350			350									1400	-350	-640	253160	46840	
45	350			350			350			350									1400	-350	-640	253570	46430	
46	350			350			350			350									1400	-350	-640	253980	46020	
47	350			350			350			350									1400	-350	-640	254390	45610	
48	350			350			350			350									1400	-350	-640	254800	45200	
49	350			350			350			350									1400	-350	-640	255210	44790	
50	350			350			350			350									1400	-350	-640	255620	44380	

	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6			SWL2 + Channels Storage				Capacity	
Days	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	300000	Comment
51	350			350			350			350									1400	-350	-640	256030	43970	
52	350			350			350			350									1400	-350	-640	256440	43560	
53	350			350			350			350									1400	-350	-640	256850	43150	
54	350			350			350			350									1400	-350	-640	257260	42740	
55	350			350			350			350									1400	-350	-640	257670	42330	
56	350			350			350			350									1400	-350	-640	258080	41920	
57	350			350			350			350									1400	-350	-640	258490	41510	
58	350			350			350			350									1400	-350	-640	258900	41100	
59	350			350			350			350									1400	-350	-640	259310	40690	
60	350			350			350			350									1400	-350	-640	259720	40280	
61	350			350			350			350									1400	-350	-640	260130	39870	
62	350			350			350			350									1400	-350	-640	260540	39460	
63	350			350			350			350									1400	-350	-640	260950	39050	
64	350			350			350			350									1400	-350	-640	261360	38640	
65	350			350			350			350									1400	-350	-640	261770	38230	
66	350			350			350			350									1400	-350	-640	262180	37820	
67	350			350			350			350									1400	-350	-640	262590	37410	
68	350			350			350			350									1400	-350	-640	263000	37000	
69	350			350			350			350									1400	-350	-640	263410	36590	
70	350			350			350			350									1400	-350	-640	263820	36180	
71	350			350			350			350									1400	-350	-640	264230	35770	
72	350			350			350			350									1400	-350	-640	264640	35360	
73	350			350			350			350									1400	-350	-640	265050	34950	
74	350			350			350			350									1400	-350	-640	265460	34540	
75	350			350			350			350									1400	-350	-640	265870	34130	
76	350			350			350			350									1400	-350	-640	266280	33720	
77	350			350			350			350									1400	-350	-640	266690	33310	
78	350			350			350			350									1400	-350	-640	267100	32900	
79	350			350			350			350									1400	-350	-640	267510	32490	
80	350			350			350			350									1400	-350	-640	267920	32080	
81	350			350			350			350									1400	-350	-640	268330	31670	
82	350			350			350			350									1400	-350	-640	268740	31260	
83	350			350			350			350									1400	-350	-640	269150	30850	
84	350			350			350			350									1400	-350	-640	269560	30440	
85	350			350			350			350									1400	-350	-640	269970	30030	
86	350			350			350			350									1400	-350	-640	270380	29620	
87	350			350			350			350									1400	-350	-640	270790	29210	
88	350	-1500		350			350			350									-100	-350	-640	269700	30300	
89	350	-1500		350			350			350									-100	-350	-640	268610	31390	
90	350		-10000	350			350			350									-8600	-350	-640	259020	40980	
66			-10000	573			573			573									-8281	-350	-640	249749	50251	
67			-10000	573			573			573									-8281	-350	-640	240478	59522	
68			-10000	573			573			573									-8281	-350	-640	231208	68792	
69			-5000	573			573			573									-3281	-350	-640	226937	73063	
70				573			573			573									1719	-350	-640	227666	72334	
71				573			573			573									1719	-350	-640	228396	71604	
72				573			573			573									1719	-350	-640	229125	70875	
73				573			573			573									1719	-350	-640	229855	70145	
74				573			573			573									1719	-350	-640	230584	69416	
75				573			573			573									1719	-350	-640	231313	68687	
76				573			573			573									1719	-350	-640	232043	67957	
77				573			573			573									1719	-350	-640	232772	67228	
78				573			573			573									1719	-350	-640	233501	66499	
79				573			573			573									1719	-350	-640	234231	65769	
80				573			573			573									1719	-350	-640	234960	65040	
81				573			573			573									1719	-350	-640	235689	64311	
82				1505	-1500		1505			1505			1505						4520	-350	-640	239219	60781	
83				1505	-1500		1505			1505			1505						4520	-350	-640	242749	57251	

	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6			SWL2 + Channels Storage				Capacity	
Days	**Dewater**	**Fill Aquadam**	**Fill Bay**	**Dewater**	**Fill Aquadam**	**Fill Bay**	**Dewater**	**Fill Aquadam**	**Fill Bay**	**Dewater**	**Fill Aquadam**	**Fill Bay**	**Dewater**	**Fill Aquadam**	**Fill Bay**	**Dewater**	**Fill Aquadam**	**Fill Bay**	**Daily Volume Stored (m^3)**	**Less Evaporation (m3)**	**Less Earthworks Demand (m3)**	**Cumulative Volume (m3)**	**300000**	**Comment**
84				1505		-10000	1505			1505			1505						-3980	-350	-640	237779	62221	
85						-10000	764			764			764						-7709	-350	-640	229080	70920	
86						-10000	764			764			764						-7709	-350	-640	220381	79619	
87						-10000	764			764			764						-7709	-350	-640	211682	88318	
88						-10000	764			764			764						-7709	-350	-640	202983	97017	
89							764			764			764						2291	-350	-640	204284	95716	
90							764			764			764						2291	-350	-640	205585	94415	
91							764			764			764						2291	-180	-640	207056	92944	Autumn pan evaporation
92							764			764			764						2291	-180	-640	208527	91473	400 mm/day for 90 days
93							764			764			764						2291	-180	-640	209998	90002	
94							764			764			764						2291	-180	-640	211469	88531	
95							764			764			764						2291	-180	-640	212940	87060	
96							764			764			764						2291	-180	-640	214411	85589	
97							764			764			764						2291	-180	-640	215882	84118	
98							764			764			764						2291	-180	-640	217353	82647	
99							764			764			764						2291	-180	-640	218824	81176	
100							764			764			764						2291	-180	-640	220295	79705	
101							764			764			764						2291	-180	-640	221766	78234	
102							673			673			673			673			2694	-180	-640	223640	76360	
103							673			673			673			673			2694	-180	-640	225513	74487	
104							673			673			673			673			2694	-180	-640	227387	72613	
105							673			673			673			673			2694	-180	-640	229261	70739	
106							673	-1500		673			673			673			1194	-180	-640	229635	70365	
107							673	-1500		673			673			673			1194	-180	-640	230009	69991	
108							673		-10000	673			673			673			-7306	-180	-640	221883	78117	
109							673		-10000	673			673			673			-7306	-180	-640	213757	86243	
110									-10000	520			520			520			-8441	-180	-640	204496	95504	
111									-10000	520			520			520			-8441	-180	-640	195235	104765	
112									-10000	520			520			520			-8441	-180	-640	185973	114027	
113									-10000	520			520			520			-8441	-180	-640	176712	123288	
114										520			520			520			1559	-180	-640	177451	122549	
115										520			520			520			1559	-180	-640	178189	121811	
116										520			520			520			1559	-180	-640	178928	121072	
117										520			520			520			1559	-180	-640	179667	120333	
118										520			520			520			1559	-180	-640	180405	119595	
119										520			520			520			1559	-180	-640	181144	118856	
120										520			520			520			1559	-180	-640	181883	118117	
121										520			520			520			1559	-180	-640	182621	117379	
122										520	-1500		520			520			59	-180	-640	181860	118140	
123										520	-1500		520			520			59	-180	-640	181099	118901	
124												-10000	532			532			-8935	-180	-640	171344	128656	
125												-10000	532			532			-8935	-180	-640	161589	138411	
126												-10000	532			532			-8935	-180	-640	151833	148167	
127												-10000	532			532			-8935	-180	-640	142078	157922	
128													532			532			1065	-180	-640	142323	157677	
129													532			532			1065	-180	-640	142568	157432	
130													532			532			1065	-180	-640	142813	157187	
131													532			532			1065	-180	-640	143058	156942	
132													532			532			1065	-180	-640	143303	156697	
133													532			532			1065	-180	-640	143548	156452	
134													532			532			1065	-180	-640	143793	156207	
135													532			532			1065	-180	-640	144037	155963	
136													532			532			1065	-180	-640	144282	155718	
137													532			532			1065	-180	-640	144527	155473	
138													532			532			1065	-180	-640	144772	155228	
139													532		-10000	532			-8935	-180	-640	135017	164983	
140															-10000	393			-9607	-180	-640	124590	175410	
141															-10000	393			-9607	-180	-640	114164	185836	

Days	Bay 1			Bay 2			Bay 3			Bay 4			Bay 5			Bay 6		
	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay	Dewater	Fill Aquadam	Fill Bay
142															-10000	393		
143																393		
144																393		
145																393		
146																393		
147																393		-10000
148																		-10000
149																		-10000
150																		
151																		

Days	SWL2 + Channels Storage				Capacity	
	Daily Volume Stored (m^3)	Less Evaporation (m3)	Less Earthworks Demand (m3)	Cumulative Volume (m3)	300000	Comment
142	-9607	-180	-640	103737	196263	
143	393	-180	-640	103310	196690	
144	393	-180	-640	102884	197116	
145	393	-180	-640	102457	197543	
146	393	-180	-640	102030	197970	
147	-9607	-180	-640	91604	208396	
148	-10000	-180	-640	80784	219216	
149	-10000	-180	-640	69964	230036	
150						
151						