Government of South Australia
Department for Energy and Mining

6 May 2025

Mr Martin Janes
Executive Officer
Terramin Exploration Pty Ltd
2115 Callington Road
STRATHALBYN SA 5255

mjanes@terramin.com.au

Dear Mr Janes,

Approval Notification - Exploration Program for Environment Protection and Rehabilitation (EPEPR2024-042) EL6198

The program for EL6198, final version submitted on 29 April 2025, to conduct the Kapunda Site B Environmental Lixiviant Trial, has been approved in accordance with Section 70B(5) of the *Mining Act, 1971 (the Act)*.

You are reminded that:

1. You must at all times implement and comply with the approved EPEPR.
2. The approved EPEPR will be made publicly available on the Mining Register.
3. Exploration operations on "native title land" (as defined in the *Native Title (South Australia) Act, 1994)* must be conducted in accordance with Part 9B of the Act.
4. In accordance with Section 70C of the Act, the licensee must review the EPEPR on request of the Minister's Delegate within a time specified in the request and submit the revised EPEPR for approval.
5. As the operator for the approved EPEPR you must take all reasonable and practical measures to avoid undue damage to the environment and meet all the approved outcomes (when measured against the approved criteria) listed within the EPEPR.
6. In accordance with regulation 78 of the *Mining Regulations 2020* and Terms of Reference 012 (TOR 012), the licensee must submit an Exploration Compliance Report to the Mineral Exploration Branch each year, within 60 days after the anniversary of the date the licence was granted, and 60 days after the expiry or surrender of the EL, or in accordance with joint reporting requirements agreed to with the Minister.
7. In accordance with regulation 16(4) of the *Mining Regulations 2020*, drillhole and geological samples must be kept in accordance with guidelines issued by the Department for the term of the relevant tenement and for 7 years after the expiry, surrender, cancellation or forfeiture of the tenement to which the sample relates. Furthermore, samples must be retained by the tenement holder, or provided to the Director, in accordance with those guidelines (unless the Minister has authorised, on application by the tenement holder in a manner and form set out in the guidelines, the destruction or disposal of the samples).
8. The EPEPR is approved for a period of twelve months from the date of this letter.

This approval does not constitute endorsement of the systems that you have in place to manage your exploration operations in compliance with the Act and licence conditions. In

granting the approval, the EPEPR and your capacity to undertake the proposed activities have been considered. However, responsibility for compliance with the Act and the licence conditions, remains at all times with the licensee.

This approval relates only to the requirements of the Act. Other legislation relevant to this application includes the *South Australian Work Health and Safety Act, 2012* and Regulations. For example, Chapter 10 of the *Work Health and Safety Regulations, 2012 (SA)* introduced new requirements for mine operators in South Australia. The new requirements include a notification for mining operations and the establishment of a Safety Management System. For further information on your responsibilities, including a guide to Chapter 10 and the Mine Operator Notification Form, contact SafeWork SA on 08 8303 0255 or via its website at www.safework.sa.gov.au.

The proposed program may be subject to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Mineral exploration industry-specific information is contained in an appendix in the EPBC Matters of National Environmental Significance – Significant impact guidelines 1.1. This document is available on the Australian Government's Department for Agriculture, Water and the Environment website at http://www.environment.gov.au/resource/significant-impact-guidelines-11-matters-national-environmental-significance. For further information, contact the Department for Agriculture, Water and the Environment, or visit its website at www.environment.gov.au/.

Proposed changes to exploration operations stated in the approved EPEPR may require a *PEPR review* to be submitted for assessment. Where a *PEPR review* is required, implementation of the operational changes can only occur after the revised EPEPR is approved. Further information on when an exploration PEPR review is required can be found in Departmental guideline *MG22 Conducting mineral exploration.*

If you require any further information, please contact Shelley Rasmussen 0409 797 670 / Jason Perry on 8177 or Simon Constable on 8429 2516 or email DEM.exploration@sa.gov.au.

Yours sincerely

Simon Constable
GENERAL MANAGER MINERAL EXPLORATION
REGULATION & COMPLIANCE
In accordance with delegated
Ministerial powers and functions

CC: Leon Faulkner, Managing Director EnviroCopper Ltd lfaulkner@envirocopper.com.au
CC: DEW Hydrogeologist miningwatersciencereferrals@sa.gov.au
CC. EPA Compliance Branch EPACompliance5@sa.gov.au

The Department's Regulatory Guidelines, Ministerial Determinations and Information Sheets are available at: http://energymining.sa.gov.au/minerals/knowledge_centre

APPLICATION Mining Act 1971 and Mining Regulations 2020

Government of South Australia
Department for Energy and Mining

EXPLORATION PROGRAM FOR ENVIRONMENT PROTECTION AND REHABILITATION (PEPR)

USE THIS TEMPLATE TO: Apply to conduct exploration activities for in situ recovery (ISR) operations on an exploration lease (EL) and Mineral Claim (MC) for a 12 month period of time South Australia..

Refer to the determination for exploration PEPRs Ministerial Determination - Minimum information required to be provided in a program for environment protection and rehabilitation (PEPR) for exploration in situ recovery (ISR) operations on an exploration licence (EL) and mineral Claim (MC) when completing this application.
Further information on exploration requirements in South Australia is available on the Department for Energy and Mining (DEM) Minerals website www.energymining.sa.gov.au.

SECTION A – GENERAL DETAILS

Operational approval period	**12-month approval period, with an additional 3 months to complete all rehabilitation**
Tenement details	EL 6198 (Kapunda)
Tenement holder(s) (for each tenement)	Terramin Exploration Pty Ltd 2115 Callington Road, STRATHALBYN SA 5255
Operating company	Environmental Copper Recovery Pty Ltd (ECR) Suite 4, Level 1, 155 King William Rd UNLEY SA 5061
Agency agreement (if applicable)	Submitted by Environmental Copper Recovery Pty Ltd, in joint venture with Terramin Exploration Pty Ltd, JV Agreement signed April 2, 2019.
PEPR prepared by	Leon Faulkner Managing Director ECL Ltd M: 0409 612 004 lfaulkner@envirocopper.com.au
Project supervisor/contact person(s)	Mr Martin Janes, Terramin Exploration Pty Ltd 2115 Callington Road, STRATHALBYN SA 5255 Mr Leon Faulkner, Managing Director, Environmental Copper Recovery Pty Ltd M: 0409 612 004
Project/prospect name	Kapunda Copper ISR Project (Site B) – Phase 2 - Lixiviant Circulation Trial
Location details	The site (“Site B”) to be investigated as part of the exploration program is on Light Regional Council (Council) owned land to the south of the Kapunda Historic Mine, located in the Township of Kapunda, some 80km northeast of Adelaide. 1:250,000 Map Sheet – Adelaide (SI 5409) 1:100,000 Map Sheet – Kapunda (6629) Specific site location details are shown in Section J – Maps of this application document. The area of the trial is defined as a zone 100 m radius around the test well pattern.
Project description, commodity type and mineralisation model	This PEPRs is purpose to advance the Kapunda B Site Environmental Lixiviant Trial by confirming the baseline Groundwater Monitor and Management Plan, the introduction of a lixiviant, circulation of lixiviant, water treatment, extraction and subsequent rehabilitation. Kapunda B Site Environmental Lixiviant Trial consisting of: 1. Baseline Groundwater Monitor and Management Plan 2. Introduction of a lixiviant 3. Circulation of lixiviant 4. Water treatment 5. Water extraction 6. Subsequent rehabilitation that may include: • Active rehabilitation encompassing: Water extraction, Sample collection for Metallurgical Testing. • If not remediated in 10 days: Pumping from monitoring wells in addition to injection/ extraction well(s) to achieve high flow rates and larger area of extraction until full rehabilitation parameters return to baseline at all wells. • If not remediated in 30 days: Injection of clean (mains) water into observation and/ or monitoring wells while pumping from the extraction well to flush formation until rehabilitation parameters return to baseline at all wells. This proposal follows up program based on infrastructure installed and knowledge gained in Phase 1 – Kapunda B construction PEPR – EPEPR2023-015.

Proposed project schedule	Start date	May 1st 2025	End date	August 2026 (Inclusive of 12 months for SELT, and 3-months for rehabilitation)

DECLARATION

I, the tenement holder, declare under regulation 84 of the Mining Regulations 2020, that I have taken reasonable steps to review the information in this PEPR/revised PEPR to ensure its accuracy.

Name	Mr Martin Janes	Signature (digital allowed)	
Position	Executive Officer	Date	28/04/2025

Copy and paste the above table if there is more than 1 tenement holder.

Note: An authorised representative from each tenement holder must sign the declaration (e.g. in accordance with the Corporations Act 2001).

SECTION B – PROGRAM PREPARATION AND ACCESS TO LAND

Work undertaken in preparing the proposal

Summarise the research and fieldwork undertaken in preparing the proposal including:

- desktop reviews of existing information
- field visits for reconnaissance
- contractor consultation (i.e. equipment scale, type)
- other information used when planning the proposed program.

BACKGROUND

For reader reference, Site A is situated on private farmland 200m southwest of the Kapunda Mine Site. Site B is situated on the Kapunda Mine Site, owned by Light Regional Council. Refer Map B "Exploration Operations Site" in Appendices.

Test work has shown that a number of conclusions can be made regarding Site A and Site B including:

- Transmissivities are similar at Site A and Site B
- Material at Site B is slightly less porous than Site A
- Slight difference in fracture sets as predominately north-south group are not present at Site B therefore unlikely to require 3rd monitor bore along this fracture orientation

By and large, the similarities between the measurements reinforce the view that there is no significant difference in a hydrogeological sense between the 2 sites, and overall, we expect Site B to behave in a hydro geologically similar way to Site A.

Test work carried out includes:

Pump Test

A pump test was conducted in March 2024 by Land & Water Consulting (LWC). The water level responses from the pump test indicate that the bores are hydraulically connected as a response was seen in each bore and a recovery response was observed after cessation of pumping. The drawdown and recovery data were analysed and indicate that the formations tested are of low average hydraulic conductivity and specific yield of 0.003 m/d and 1.7% respectively. When compared to previous test work the hydrologic properties are similar to Site A, focusing on average specific yield with Site B showing 1.7% and Site A 1.5%. Summary of results are shown below:

Pumped Bore	Observation Bore	Aquifer Thickness	Analytical Solution	Transmissivity (m2/day)	Hydraulic conductivity (m/d)	Storage 5 co-efficient (-)	Specific yield (%)
KPSELTI01	KPSELTI01	18	Moench	0.050	0.003	0.00023	1.7
	KPSELTX01	15	Moench	0.061	0.004	0.00010	2.0
KPSELTX01	KPSELTI01	14	Neuman	0.042	0.002	0.00041	1.6
	KPSELTX01	15	Moench	0.057	0.004	0.00054	1.6
Average of all results				**0.053**	**0.003**	**0.00032**	**1.7**

For more information refer to Attachment 5 "Kapunda Site B Hydrogeological Pump Testing."

Tracer Test

A tracer test was conducted in August 2024 by LWC. The test comprised of 500L of Sodium Bromide solution was injected into KPSELTX01. All injection wells (KPSELTI01, I02, I03 & I04) were continuously sampled with low flow pumps during the injection testing and regular sampling for laboratory analysis of Br concentration. Refer Attachment 6 for all results.

Initial results suggested there is limited connectivity between the extractor and KPSELTI02 & I04. The wells were re inspected and KPSELTI02 and KPSELTI04 were found to have significantly silted up blocking off >50% of the screen, once these wells were cleaned out, a subsequent pump test showed the expected connectivity between these wells and the injector.

For more information refer to Attachment 6 "Kapunda Site B Hydrogeological Tracer Testing."

Additional Pump Test

A second pump test was conducted by ECL in October 2024 and data reported by LWC in November 2024. It comprised a 5-hour test pumping from the central extraction well, and monitoring water levels at all 4 surrounding injection wells. Water levels in all monitored well decreased in response to pumping, giving an un-ambiguous demonstration of hydraulic connection between the wells. See Figure 9 Second Drawdown Pump test demonstrating hydraulic connection.

For more information refer to Attachment 24 "Kapunda Site B Additional Hydrogeological Pump Testing"

Electro Seismic Survey

Electro Seismic surveys have been carried out over both Site A and Site B, a comparison of hydraulic parameters indicates little difference between the 2 sites, pore space yield being the only significant difference.

For more information refer to Attachment 8 "Kapunda Site A & Site B Comparison.

Structural Mapping

ECL carried out structural mapping of the closest exposure to the site B location. The area was a road cutting exposed when the Light Regional Council widened the Thiele Highway. The road cutting is an effective geological snapshot as most of the vein sets can be seen including those mineralised with Malachite and sooty Chalcocite. Most of the veins/fracture sets trend roughly Northeast - Southwest with almost no evidence of the conjugate set that we see quite strongly at site A. There is also an apparent lack of the (roughly) North/South vein set seen at site A.

For more information refer to Attachment 8 "Kapunda Site A & Site B Comparison."

Whole Core Tomographic Imaging

This imaging process allows structures within the core to be seen in 3D and measurements to be taken on planar features. The structural data was transferred to a spreadsheet for analysis and then loaded into Stereonet. The major fracture orientations are around 75/250 and 290/110 degrees which agrees roughly with the surface structural mapping. It is noticeable that the north south trending set (5/355) prominent at site A is not readily visible

For more information refer to Attachment 8 "Kapunda Site A & Site B Comparison."

Push Pull Trial Findings

The trial was completed with copper effectively going into solution at a rate consistent with the large particle column leach work carried out by CSIRO Perth. Methanesulphonic Acid (MSA) was used as the lixiviant.

No lixiviant excursions occurred, no breakthrough was seen at the monitoring array (approx. 25m down gradient) or observation array (approx. 10m down gradient). Therefore, the solution migration was in line with the geochemical fate transport modelling carried out by James Fox (refer attachment 10) and the COMSOL Multiphysics modelling carried out in-house (refer attachment 7).

The Pregnant Leach Solution (PLS) contained slightly more iron than expected, which indicated the presence of secondary sulphides. Gravity draining was slightly slower than expected.

Ion exchange test work has shown that resin concentration of the resulting solution produces a concentrate suitable to produce copper cathode or crystalline copper sulphate.

The groundwater rehabilitation monitoring program has been initiated as per the methodology outlined in the Site A GMMP. A compliance summary is provided in "Push Pull Test - Groundwater Monitoring Report, Land Water Consulting, James Fox." (refer attachment 2).

Key points from compliance report below:

- Individual exceedances of 80th%ile triggers are evident, though these are of low magnitude – i.e. they were not sustained nor statistically significant when accounting for relative percent difference error or laboratory duplicate error and were contemplating the laboratory control spike (LCS).
- Further, when the compliance criterion is applied only sulfate in monitoring well KPMON02 indicates a transient potential non-compliance occurred, noting both conductivity and pH have no data point around the 14-day mark post initial 'exceedance.' Sulfate in water from KPMON02 was within 10% of the 80th%ile value suggesting possible ambient contribution rather than a gross excursion of mining fluids.
- While individual assay values over the 80th percentile trigger thresholds were reported, are evident these are of low magnitude i.e. they were not sustained nor statistically significant.
- Groundwater chemistry data were compared to baseline (pre-trial) groundwater data and there were no significant differences, indicating a satisfactory level of rehabilitation has been achieved through natural attenuation.

For more information refer to Attachment 1 "Push Pull Operational Report" & Attachment 2 "Push Pull Groundwater Compliance Report."

Groundwater Monitoring & Management Plan (GMMP).

A groundwater monitoring and sample analysis methodology and schedule is required to formulate a robust baseline assessment of current pre-activity groundwater conditions such that any excursion of mining fluids or alteration to the natural hydro geochemistry as a function of SELT activities (i.e. a non-compliance) can be identified and (where necessary) corrected. This document has been updated with findings from the Push Pull test. Reference: "Groundwater Monitoring & Management Plan (Interim Criteria) (GMMP), Version FR002, Land and Water Consulting, April 2025" (Refer attachment 3)

The purpose of the GMMP is to:

1. Prescribe the monitoring and sample analysis methodology and schedule required to formulate a robust baseline assessment of current pre-activity groundwater conditions.
2. Formulate groundwater chemical substance trigger values for the SELT, that if exceeded, may indicate excursion of mining fluids or alteration to the natural Hydro geochemistry as a function of SELT activities (i.e. a non-compliance).
3. Define how a non-compliance is identified.
4. Prescribe actions required on identification of a non-compliance.

A change to the previous procedure is the incorporation of a sodium Bromide tracer to help discriminate between natural groundwater variance (due to abnormal weather conditions) and SELT activities.

For more information refer to Attachment 3 "GMMP (Interim Criteria) FR002 April 2025)."

Fracture Modelling

The University of Adelaide has constructed a Fracture/Flow Model over the historic mine area. This is a model that combines both predictions about groundwater flow and the rate of how much copper goes into solution. It will allow ECR to simulate a range of scenarios

and accurately model groundwater flow paths and copper grades, helping to produce more accurate economic estimates for the Kapunda project and future ISR operations.

Reference: "Modelling of Coupled Hydro-Thermo-*Chemical Fluid Flow through Rock Fracture Networks and its Applications (2020), Chaoshui Xu, Shaoqun Dong, Hang Wang, Zhihe Wang, Feng Xiong, Qinghui Jiang, Lianbo Zeng, Leon Faulkner, Zhao Feng Tian and Peter Dowd".*

Regional Groundwater Model

A probabilistic numerical groundwater flow model of the target area was developed by the University of Adelaide (Li et al 2020). The groundwater model has been used to predict and model groundwater flow paths and to validate the conceptual model.

The modelling suggests the following:

- A marked difference in hydraulic conductivity between the weathered (top 100m) and unweathered layer.
- A significant difference in hydraulic conductivity (HC) between the mine area (high HC) and the region south to the Light River (low HC). Refer Section J - Figure 7 "AMT Geophysical Survey"
- Porosity dependant, there is 95-99% chance of complete capture of particles from field trials. The model achieved is a good correlation between the response from AMT survey and hydraulic conductivity distribution of calibrated models.

For more information refer to Attachment 4 "Hydrogeological Description of the Environment"

Magneto telluric (AMT) Geophysical Survey

The University of Adelaide carried out Magneto telluric (AMT) geophysical surveys that took in approximately 110 sites. The ground survey was undertaken on private farmland south of the exploration area in March 2019. This survey showed a marked difference in both the resistivity and conductivity between rock types in the mine area and those to the south towards the Light River. The boundary between the high conductivity to the north, and the lower conductivity (higher resistivity) to the south, may be due to either change in porosity to the south due to more silica cemented rock matrix, or to a change in pore fluid salinity, or combination of both. The mine sits in a regional synclinal structure. This forms a 'bowl' like geological structure. Section J - Figure 7 "AMT Geophysical Survey"

For more information refer to Attachment 11 "Constraining regional-scale groundwater transport predictions with multiple geophysical techniques".

Groundwater Flow Path Prediction

A simulation of the SELT was conducted to determine the extent of affected groundwater. Comparison was made between LWC's CSM Model (refer attachment 10) and the Push Pull COMSOL model with results of the Push Pull field data to demonstrate a reliable model. Map G displays the COMSOL model overlain on Site B which estimates that the extend of the lixiviant would be approximately 12.2m from the extractor.

For more information refer to Attachment 7 "Kapunda Cu-ISR Trials Groundwater Impact COMSOL Study."

Source-Pathway-Receptor Linkage

The Light River is identified as an aquatic ecosystem that relies on the surface expression of groundwater–this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs. An investigation by CSIRO in 2020 concluded that the Light River receives groundwater discharge and that the discharge maintains flow and pools over summer. AMT survey concluded that there marked difference in both the resistivity and conductivity between rock types in the mine area and those to the south towards the Light River creating a barrier between the exploration area and the Light River. Surface expression may have been distributed by run-off along the ephemeral stream may have historical contamination from the Mine Site. The stream channels located near Site B therefore may have elevated levels of copper and other contaminants and are potentially showing stress from the presence of low pH acid mine drainage.

No adverse impact to the quality of groundwater available to other users and water dependent ecosystems i.e. Light River, as a result of exploration activities. Section J - Map E "Water Courses and Surface Water Management."

Monitoring Wells

All of the above information has been utilised in siting the 3 monitor bores for the circulation trial. See Section I: Plates 12, 13 & 14 show the monitor bore installation diagrams plan and downhole fit out.

Consultation (r. 64)

Using the table below, provide a summary of the individual or group of similarly affected persons and summarise the results of consultation that has been undertaken on the proposed operation. Types of interested or affected parties include residents, council, government agencies etc (exclude native title groups and defence owned or controlled lands – refer to relevant sections below).

Tenement	Stakeholder	Land tenure	Land use	Date and type of NOE served	Type of exempt land	Date waiver obtained	Date consultation/access agreement and/or permits signed/authorised	Stakeholder concerns raised and how addressed
EL 6198	Light Regional Council	Freehold	Council	Form 21B 21/04/2021	Council Land	14th March 2023	*21/04/2021 and Waiver Agreement extension signed 14/03/2023. Agreement active.*	*Continuous and on-going consultation with Light Regional Council since 2016 has addressed the key issues of maintaining public access and subsequent risk management. The project status is now addressed in the Community Land Management Plan for the Kapunda Mine Historic Site (CLMP) (see details below and refer Attachment 12).* *Refer Attachments 13 and 14 for original and subsequent Waivers of Exemption document.* *Notice of Entry on Land - Form 21B is provided as Attachment 15.*
EL 6198	Karen Sanderson	Freehold	Residential	NA	Within 400 metre radius	9th June 2023	*Consultation commenced 2018. Agreement active.*	*No issues presented in our face-to-face conversations since 2019.* *Refer Attachment 16 for Waiver of Exemption.*
EL 6198	Russell and Lisa Weber	Freehold	Residential	NA	Within 400 metre radius	1st February 2019	*Consultation commenced 2018. Agreement active.*	*Russell has requested that all noise and dust be monitored. To date we have successfully managed exploration drilling noise to Russell's satisfaction.* *Refer Attachment 17 for Waiver of Exemption.*
EL 6198	Tim & Kelly Ellbourne	Mortgage	Residential	NA	Within 400 metre radius	2nd June 2023	*Consultation commenced 2018. Agreement active.*	*No issues presented.* *Refer Attachment 18 for Waiver of Exemption.*

If any individual or group of similar affected persons were not able to be consulted, what steps were taken to consult with them?

N/A

Provide any additional relevant information.

N/A

SECTION C – DESCRIPTION OF THE ENVIRONMENT

Include a description of the features of the environment that are expected to be affected by the proposed operations. Each of the elements of the existing environment listed below must be described only to the extent that they may need to be considered in assessing the impacts that the proposed exploration operations are reasonably expected to have on the environment. If the element is not likely to be impacted by the operation, a statement to that effect must be included.

Where the terms and conditions of an RL include environmental outcomes, include any new baseline environmental data relevant to the control strategies or measurement criteria, and where changes to the environment are identified, provide an updated description of the environment to describe the changes.

Proximity to infrastructure and housing

Provide the following information:

- Settlements – indicate the name and distance of the nearest town, and residences within, or near the proposed exploration operations.
- Roads and tracks – indicate existing fence lines, roads and tracks, including those which are to be used in the exploration program.
- Other human infrastructure such as schools, hospitals, commercial or industrial sites, roads, sheds, bores, dams, ruins, pumps, scenic lookouts.
- Railway lines, transmission lines, gas and water pipelines, communication lines – e.g. fibre optic cables etc., if these may be impacted by the exploration operations.

Provide this information on a locality plan/map.

Site B is located in the southern area of the Kapunda historic mine site (Mine Site) in the Township of Kapunda, some 80km northeast of Adelaide (refer Section J, Map A for specific location details). The major land uses in the region are grazing and cropping.

All proposed exploration falls within EL6198 Kapunda, on Parcel ID F199322/A92.

The bores to be constructed are located on community land that is part of the Kapunda Historic

Mine. 1:250,000 Map Sheet – Adelaide (SI 5409)
1:100,000 Map Sheet – Kapunda (6629)

The proposed exploration site is located immediately to the northeast of the intersection of Perry Road and East Terrace to the south of Kapunda. Access to Site B is via a gate on East Terrace (refer to Section G - Photos, Plate 2, Section J, Map B “Exploration Operations Site”).

The proposed exploration site has been selected at the southern end of the original mining area, and as far from historic buildings as possible. The location of historically significant buildings relative to the proposed exploration location is shown in Section J – Maps of this application (refer Map I).

The centre of the township of Kapunda is located ~ 1km to the north of the site. There is one (1) neighbouring residential property located 150m to the southeast of Site B (Weber). There is also an unoccupied property ~400m to the east. There is a residential property 250m to the northwest (Ellbourne) and a further residential property 450m to the northwest (Sanderson). These are residential properties with associated sheds and buildings. See Section J – Maps, Map J. There is residential housing ~600m to the northeast of site (to the east across Cameron Street).

Perry Road and East Terrace run along the west and south of Site B. The Kapunda historic mine site and the historical trails are directly to the north of Site B. Access to Site B will be via a gate located near to the corner of Perry Road and East Terrace (refer Map B). There are fence lines to the north, west and south of Site B. The fencing separates the site from the Mine Site, Perry Road and East Terrace, respectively.

There is an industrial estate 600m to the northwest of the northern extent of the site, on the western side of Perry Road. There is also a stock feed mill 1.0km to the north.

Land use and tenure

Using the table below, select the land tenure and land use that the proposed exploration activities will occur in. Include additional information where prompted.

Land tenure/type	Applicable
Freehold	☐
Pastoral lease	☐
Perpetual lease	☐
Crown land	☐
Mining reserve	☐
Aboriginal freehold/leasehold land (e.g. Anangu Pitjantjatjara Yankunytjatjara and Maralinga Tjarutja lands)	☐
Forestry reserve	☐
Marine parks	☐
National parks, conservation parks, conservation reserves, regional reserves*	☐
Adelaide Dolphin Sanctuary	☐
Murray Darling Basin	☐
N/A	
Other*	☒
Site B is Located on Council owned community land, located within the Kapunda Historic Mine Site (Mine Site).	

Land use	Applicable
Grazing	☐
Cultivated land	☐
Residential	☐
Township	☐
Industrial	☐
Tourism	☐
Conservation	☐
Defence activity	☐
Road reserve	☐
Sites of scientific significance (geological monuments, fossil reserves etc.)	☐
Orchard/vineyard	☐
*Native vegetation heritage agreements	☐
N/A	
*European heritage sites	☐
Kapunda Historic Mine Site, Kapunda SA	
*Other (e.g. historic mining)	
* Site B is Located on Council owned community land, located within the Kapunda Historic Mine Site (Mine Site).	

* Indicates more information required in field immediately below.

Describe any council policies (or out of council) or development plans that may impact the program area.

Potential development of a Copper ISR mine is included in the Light Regional Council's *Community Land Management Plan (CLMP) for Kapunda Historic Mine Site. (*refer Attachment 12)

Provide a description of any known plans for future land use changes by other parties.

Nil known

Provide any additional relevant information.

Works and supporting research carried out for Site A have informed the program design for the works outlined in this application. Site A is mentioned in this application for reference only and will be shown on maps/figures to indicate location in relation to Site B.

Site B is located on Council land in the southern section of the Kapunda historic mine site (Mine Site). Site B is separated from the balance of the historic mine site by fencing and is not accessible to the public as part of community historical trails. The location is shown in Section J – Maps (refer Map A) of this application. Site B shows some evidence of historic mining activity. The site is located in a partly cleared and partly vegetated area in the southern section of the mine site immediately adjacent East Terrace. Location views are shown in Section G - Photos (refer Plates 1). Site B has not been previously explored by ECR.

Woomera Prohibited Area (WPA)

Will activities be conducted within the WPA	Yes ☐	No ☒	Do you have a resource exploration permit in place?	Yes ☐	No ☐
In which zone will activities be conducted?					
Does the Exploration Permit allow the operator to conduct exploration operations in the WPA?				Yes ☐	No ☐
What is the expiry date of the resource exploration permit?				N/A	
Identify closure periods that may impact on the exploration program.					
N/A					

Other land owned or controlled by the Commonwealth Department of Defence

Lands in South Australia that are owned or controlled by the Commonwealth Department of Defence, which they manage either as a training or test area, include the Port Wakefield Proof and Experimental Establishment, Murray Bridge Training Area, and Cultana Training Area.

These lands remain to be mineral land under the Mining Act 1971 (SA) and can be accessed for mineral exploration and mining subject to certain restrictions and conditions under the Defence Act 1903 (Cth) and the Defence Regulation 2016 (Cth).

Will operations be conducted within the Port Wakefield Proof and Experimental Establishment, Murray Bridge Training Area, or Cultana Training Area?	Yes ☐	No ☒
N/A		
Do you have a Deed of Access with Defence?	Yes ☐	No ☒
What is the expiry date of the Deed of Access?	N/A	
Provide the date the Range Control Officer granted access permission to conduct the proposed exploration operations. Describe the results of consultation and how any concerns raised were addressed.	N/A	
N/A		

Native title

Using the table below, describe how you have complied with the requirements of Part 9B of the Mining Act for each tenement (for further information refer to Minerals Regulatory Guidelines MG22).

Native title			
Is the proposed area of exploration located on native title land?		Yes ☐ No ☒ (If no, no further information in this section required.)	
Are there registered native title party/parties in the area of proposed exploration?	Yes ☐ No ☐		If no, an Environment, Resources and Development (ERD) Court determination is required.
Have you negotiated a native title mining agreement?	Yes ☐ No ☐	Is the agreement registered?* Yes ☐ No ☐	
Have you accepted an Indigenous land use agreement (ILUA)?	Yes ☐ No ☐	Is the ILUA registered?* Yes ☐ No ☐	
Have you obtained ERD Court determination?†	Yes ☐ No ☐	Is the determination registered?* Yes ☐ No ☐	

* The registration date refers to the date the agreement, determination or ILUA was registered with DEM.

† An ERD Court determination cannot be conjunctive (i.e. cannot apply to subsequent licences).

Provide any additional relevant information.

Not applicable to this application

Landform and topography

Describe the topography of the general area affected by the exploration program. Include the susceptibility to erosion and visual attributes (steep or undulating slopes, plains, rocky outcrops, dunes, saltpans, claypans etc.).

The topography of the area is gently sloping, with the slope running generally from north to south across the exploration area.

There are higher elevations to the north of site B (230m).

The land slopes down through the site, which is at an elevation of ~ 220m, and then slopes gradually towards the Light River to the southeast of site ~ 210-215m.

Contours for the site are shown in Section J - Map C "Water Courses and Surface Water Flow Management".

Note: Heights quoted are from SRTM above sea level digital elevation data.

Soil and surface cover

Describe soil types and soil surface cover - e.g. gibber, rocky - in the general area affected by the exploration program. Include details on the susceptibility to compaction, erosion, dust, runoff and any other soil characteristics – e.g. acid sulphate – that may require control strategies to reduce environmental impacts during operations or rehabilitation.

The site is located within the Kapunda Mine Site area and on the fringes of marginal agricultural land. Like most of the Kapunda area the surface soils are of the sandy variety of red-brown earth, which has a sandy loam topsoil and a yellow-brown clay sub-soil. This soil type is typically used for cropping and grazing. This soil type is potentially erodible and can be prone to waterlogging.

The site has been significantly disturbed by historic mining activity. The site also has elevated levels of copper and other contaminants in surface soils and surrounding surface water drainage lines, due to natural geology of the area and the impacts of historic mining activity. The soil structure may be susceptible to water logging, erosion from stormwater flows and compaction from wheel traffic as result of exploration activities.

Topsoil disturbance will be reduced by limiting track construction work, with easy access off East Terrace. A raised compacted mixed gravel dolomite base will be constructed for site laydown/equipment area. The program will also utilise surface truck mounted tanks rather than construction of sumps on site to limit soil disturbance. All areas of earthworks such as drill pad preparation undertaken will have temporary sediment traps (e.g. silt fencing) installed down slope to reduce any sediment travel in heavy rainfall events. An earthen swale will be prepared to move stormwater around the infrastructure for the exploration program.

Surface water

Will the proposed program interfere with surface water bodies and natural drainage (e.g. drainage lines, creeks, floodplains, wetlands)? If yes, describe the potential interference and surface water bodies and natural drainage on maps. If no, indicate why.	Yes ☒	No ☐

Overview

The target exploration area is located on the southern margin of the historic Kapunda Mine Site. The Kapunda Mine Site is located near the top of a local topographic high and forms the headwaters of a small surface water catchment leading to the Light River via an ephemeral stream channel.

A map showing the overall exploration area catchment and drainage lines is shown in Section J - Map C "Water Courses and Surface Water Management." The Light River catchment is in the Mid North region of South Australia and covers approximately 182 km2.

Climate data shows that the wettest months are between the months of May and October (wettest in August). Annual average rainfall at this location is 492.8 millimetres (mm). The mean number of days of rain ≥ 1mm is 2.3 – 3.4 between December and February and 6.1 – 9.3 between May and October (see figure 1).

Site B

The site is located on slightly sloping land. Immediately to the east of Site B is an ephemeral stream that runs north to south, eventually draining onto the culvert located to the south which drains under East Terrace.

Report 'Kapunda Copper Project – Summary of Existing Environmental Reports, Environmental Copper Recovery 2018', indicates that historical contamination from the Mine Site may have been distributed by run-off along the ephemeral stream. The stream channels located near Site B therefore may have elevated levels of copper and other contaminants and are potentially showing stress from the presence of low pH acid mine drainage.

To account for the presence of potential contamination in the exploration area, site track development and contouring will be kept to a minimum to avoid disturbance and erosion. All produced water will be stored in above-ground tanks to avoid disturbance associated with in-ground sumps and will be either taken off site for disposal or re-injected into the groundwater well (refer Drainage Discharge Licence) to avoid water flowing off site into drainage lines.

Is the program area located within water protection areas defined under the *River Murray Act 2003*? If yes, provide the name(s).	Yes ☐	No ☒
N/A		
Is the program area located within any prescribed watercourses or prescribed surface water areas under the *Landscape South Australia Act 2019*? If yes, provide the name(s).	Yes ☐	No ☒
N/A		

Groundwater

Is groundwater likely to be intersected when conducting the exploration program? If yes, use the table below to describe the expected groundwater (hydrogeological) conditions, and identify groundwater aquifers in the exploration area(s) that may be affected. Indicate the approximate depth of drillholes in each area. Copy and paste a new table for each area where different groundwater conditions are expected. If no, provide evidence or any supporting information demonstrating this.	Yes ☒	No ☐
See below table		

Description of the locality/area where different groundwater conditions may be encountered

See approved ePEPR 2023-015 pg. 10 for this section.

Baseline groundwater conditions for the area have been studied since 2017. Groundwater conditions are summarised in two (2) reference reports: "*Kapunda Copper Project Baseline Hydrogeological Assessment, Groundwater Science, 29 September 2017*" (refer Attachment 4, provided as hydrogeological background to this submission) and *"Kapunda Site Environment Lixiviant Trial (SELT) EPEPR – Hydrogeological Description of the Environment, Groundwater Science, August 2021"* (refer Attachment 3, provided as hydrogeological background to this submission). The following hydrogeological description is sourced from these two reference documents.

The project lies within the Adelaide Rift Geological Domain with the region dominated by Neoproterozoic Aged rocks. The 100K geology map indicates the main geological units as Tapley Hill Formation and Eudunda Arkose Member, with the southern portion of the historical mining area comprising Brighton Limestone and Tarcowie Siltstone.

The groundwater system comprises an unconfined fractured rock aquifer. Groundwater will move through fractures in the host rock. Fracturing will be controlled by structures in the host rock. The structure comprises beds steeply dipping to the west in this area. In general, the structure indicates that groundwater can be expected to move preferentially from northwest to southeast toward the Light River and this interpretation is supported by the potentiometric surface.

The scope of work for the exploration ISR operations includes the following activities to confirm the local fracture network. Borehole Optical imaging and logging (optical and acoustic imaging) will be carried out on a selection of cored drill holes. This will confirm structure of the deposit and fracture orientation. Core scanning will also be undertaken on a selection of cored drill holes. Tracer connectivity testing will be undertaken to demonstrate that the test wells and monitoring wells are connected to one another within the fracture network

Formation age and/or stratigraphic unit	Stratigraphic intervals (depth range) (m)	Aquifer formation name	Aquifer interval/thickness (from–to) (m)	Type of aquifer(s) intersected (e.g. unconfined, confined, artesian)	Provide aquifer salinity, depth to water level and any other relevant comments
Neoproterozoic Tapley Hill Formation			N/A	Unconfined	Wells in the area report a depth to water of 11.7 mBGL and salinity of 5,300 to 9,500 mg/L TDS.

Provide the environmental value of each aquifer present determined according to the current Environment Protection (Water Quality) Policy.

Environmental value of the groundwater at Site B is constrained by elevated metals. The water is not suitable for drinking, stock watering or irrigation.

A description of the hydrogeological environment has been prepared by Groundwater Science (refer Attachment 4 "*Kapunda Site Environment Lixiviant Trial (SELT) EPEPR – Hydrogeological Description of the Environment, Groundwater Science, August 2021*" provided as hydrogeological background to this submission). A summary of the report is provided below.

Overview

The following provides a specific, brief, tangible description of the subsurface in the immediate trial area. Further detail is provided in the sections that follow.

At the immediate trial area:

- There are skeletal soils of less than 0.5m thickness.
- The rock comprises siltstone of the Tapley Hill formation.
- The rock is weathered and oxidized to 16 m depth, neutral to approximately 50 m depth and reduced below that depth.
- The rock is bedded with dip direction/dip of 240/35. There are three main fracture sets: 270/70, 050/55, 310/65-80. Fractures are almost entirely infilled. Fracture Frequency is high, averaging 2.6 fractures per meter of rock.
- The groundwater table is at 11.7 – 11.8 mBGL. Groundwater is saline (7,7700 – 9,500 mg/L TDS) and acidic (pH 3.9-4.2).
- Total (matrix) porosity of the rock ranges from ~35% near surface declining to 25% as measured by downhole neutron log. Effective (Fracture) porosity is estimated to be approximately 0.5% based on fracture count and aperture from downhole optical logs.
- Transmissivity at the site was estimated at 0.36 - 0.93 from CRT tests of investigation holes. There will be anisotropy along the orientation of fractures.
- Inferred hydraulic gradient across the site is approximately 0.004 declining from north to south.

Local and Regional Hydrogeology Including Stratigraphy, Hydro-stratigraphy and Structure.

Kapunda is located within the Adelaide Geosyncline, a major geological province in central South Australia. The local geology is dominated by Neoproterozoic aged formations (Lambert, Donnelly, & Rowlands, 1980). The main geological formations in the study area include the Tapley Hill Formation which covers the SELT site, and the Brighton Limestone to the east. The Tapley Hill Formation primarily consists of blue-grey laminated siltstone and slate.

The site is positioned within a regional synform with northwest-southeast axis folded into the Tapley hill formation. There is a sequence of parallel antiforms and synforms from west to east across the site, refer to Section J - Maps, Figure 5 "Regional Geology and Inferred Groundwater Flow". The Eudunda Arkose member of the Tapley Hill formation is present on both sides of the antiform. The formation dips steeply to the west at the project site, and steeply to the east at the location of Mantina quarry some 1000 m to the east on the other side of the fold axis.

Table C1: Stratigraphy and Hydro-stratigraphy

Stratigraphy	Hydro-stratigraphy
Tapley Hill Formation. Laminated Siltstone	Unconfined Fractured Rock Aquifer
Eudunda Arkose Member of Tapley Hill Formation	Unconfined Fractured Rock Aquifer

The groundwater system comprises an unconfined fractured rock aquifer. Groundwater will move through fractures in the host rock. Fracturing will be controlled by structures in the host rock. The structure comprises beds steeply dipping to the west on the western side of the axis of the antiform. In general, the structure indicates that groundwater can be expected to move preferentially from north to south toward the Light River and this interpretation is supported by the potentiometric surface. The structure is shown in block diagram in Section J - Figure 10 "Block Diagram".

Section J - Maps, Figure 2 "Regional Geology and Inferred Groundwater Flow" presents geology and groundwater flow. The axes of the synforms and antiforms are oriented NNW-SSE. The potentiometric surface follows that structure and groundwater flow is inferred to move preferentially from NNW to SSE along the axes of these main structures.

Detailed Baseline Description of Groundwater Characteristics and Flow Dynamics

Background Hydro Geochemistry

The most complete data set for the test area at Site B is provided by the results from background studies carried out by Groundwater Science 2017 and 2021. These reference results from regional monitoring well located in the general area and wells established and monitored as part of testing works at Site A.

Hydro chemical data is presented in Table "Baseline groundwater geochemistry" and table "Groundwater Samples from KPFRT02 taken during tracer test". Bores KP001, KP060 and KP009 represent background groundwater quality. The location of wells sampled is shown in Section J – Maps, Map F "Test array and Monitoring Array".

Salinity in the broader catchment collated in the Water Connect database ranges from 2,000 and 8,000 mg/L, with isolated occurrences of salinity less than 1,500 mg/L TDS. The bores sampled for this project returned salinity values of 4,500 to 11,738 mg/L. These salinity levels are classified as brackish to saline, and the groundwater is suitable for stock or industrial uses (but not irrigation). The pH is slightly alkaline.

Seasonal variability is not yet measured but is expected to be minimal given the low rates of recharge in the semi-arid low recharge environment.

Baseline Hydro Geochemistry

Baseline groundwater data for Site A is included in this section as it is representative of groundwater geochemistry in the area.

Groundwater quality for Site B is predicted from regional monitoring wells KP001, KP060 and KP009 which represent background groundwater quality and Site A monitoring wells. Baseline groundwater hydro geochemistry data for Site B will be provided after construction of wells conducted under this Construction EPEPR #1 and prior to groundwater connectivity testing as outlined in Section D Detailed Description of Exploration Operations, Table D1 "Test Project scope and schedule".

Groundwater at Site A is saline and acidic and markedly different to the background regional groundwater quality due to the low pH and elevated metals. Salinity ranges from 5,300 to 9,500 mg/L TDS. The groundwater is acidic with pH of approximately 4 and elevated sulphate. The groundwater exhibits elevated metals with 48 mg/L copper, 85 mg/L zinc, 9 mg/L nickel and 1,200 mg/L iron. The beneficial use is constrained by the elevated metals. The water is not suited for drinking, stock watering or irrigation and is suited only to industrial use, including mining. Seasonal variability is not yet measured but is expected to be minimal give the low rates of recharge in the semi-arid low recharge environment.

Refer to Table C2 and C3 for groundwater composition.

Table C2: Baseline Groundwater Geochemistry (mg/L)

	Background				Site A						
Well ID	**KP001**	**KP060**	**KP060**	**KP009**	**KPFRT02**	**KPFRT02**	**KPFRT02**	**KPFRT03**	**KPFRT03**	**KPFRT02**	**KPFRT02**
Sample Date	12 Dec 2017	8 Apr 2019	1 Dec 2020	3 Oct 2019	4 Feb 2020	4 Feb 2020	4 Feb 2020	28 Nov 2019	1 Dec 2020	9 Dec 2019	1 Dec 2020
Lab Report	578446-W	651012-W	CSIRO Spreadsheet	977206	Metals: 703174-W Br: 708682-W pH and Salinity from field results			977206	CSIRO Spread sheet	Field Results	CSIRO Spread sheet
pH	8.7	7.8			4.22	4.22	3.9			3.9	
Salinity (TDS)	6300	4500		11738	9555	9555	9458	7730		9500	
Na	2600	1600	1360	3300				1600	1750		1590
Ca	36	44	42.5	210				320	334		627
Mg	330	230	221	510				330	268		393
K	55	34	14.3	70				52	19.9		33
Cl	4000	2600									
Br					10	11	11				
SO4	990	370	351						3180		5460
Carbonate Alkalinity	28	< 10									
Bicarbonate Alkalinity	140	92									
Hydroxide Alkalinity	< 10	< 20									
Total Alkalinity	160	92									
Ammonia			0.114						0.553		1.05
Nitrate + Nitrite			<0.1						<0.1		<0.1
Aluminium	< 0.05	< 0.05	0.00987	0.2	18	16	16	2	1.05		1.63
Arsenic	< 0.001	< 0.001	<0.0004		0.06	0.048	0.046		0.002		0.007
Boron	1.4	0.81	0.659	3	2.7	2.6	2.6	1	1.08		1.67
Barium	< 0.02	< 0.02		<0.1	< 0.05	< 0.05	< 0.05	<0.1			
Beryllium	< 0.001	< 0.001			< 0.01	< 0.01	< 0.01				
Cadmium	< 0.0002	< 0.0002	<0.0002	<0.1	0.069	0.064	0.063	<0.1	0.014		0.04
Chromium	< 0.001	0.001	<0.0004	<0.1	< 0.01	< 0.01	< 0.01	0.7	0.0007		0.0009
Cobalt	< 0.001	< 0.001	0.002		6.1	5.8	5.8		1.92		4.79
Copper	< 0.001	< 0.001	0.002	0.2	70	49	46	0.4	1.05		15.2

Gold					< 1	< 1	< 1				
Iron	< 0.05	11	0.377	<0.1	1600	1300	1200	570	459		1110
Lead	< 0.001	< 0.001	<0.0002	<0.1	0.047	0.043	0.042	<0.1	0.001		0.0004
Mercury	< 0.0001	< 0.0001			< 0.001	< 0.001	< 0.001				
Manganese	0.28	0.72	0.38	<0.1	2.6	2.5	2.5	0.1	0.865		2.2
Molybdenum	< 0.005	< 0.005	<0.0003	<0.1	< 0.05	< 0.05	< 0.05	<0.1	0.004		0.00062
Selenium	< 0.001	0.002	<0.0004		0.025	0.02	0.018		0.002		0.0068
Strontium			0.292						2.84		4.85
Uranium	< 0.005	< 0.005			0.2	0.18	0.17				
Vanadium	< 0.005	< 0.005		<0.1	< 0.05	< 0.05	< 0.05	<0.1			
Nickel			0.003	0.2	9.8	9.3	9.3	4	2.85		7.22
Zinc	< 0.005	< 0.005	0.016	<0.1	110	87	82	39	31.8		65.2
Silicon			<0.2	12	67	64	63	35	21.8		28.8
Antimony			<0.0004						<0.0004		<0.0004

Table C3: Groundwater Samples from KPFRT02 Taken During Tracer Test 4/2/2020.

Minutes of pumping	**45**	**105**	**165**	**210**	**255**	**300**	**360**	**405**	**450**	**510**	**Beneficial Use Limits**		
Lab Report	Metals: 703174-W; Br: 708682-W; pH and Salinity from field results										ADWG	Irrigation	Livestock
Silicon	67	64	63	63	63	54	64	61	69	65			
Heavy Metals													
Aluminium	18	16	16	17	16	17	16	16	15	17	7	20	5
Arsenic	0.06	0.048	0.046	0.051	0.044	0.03	0.04	0.053	0.024	0.027	0.01	2.0	0.05
Barium	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	2		
Beryllium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		0.05	
Boron	2.7	2.6	2.6	2.9	2.7	2.8	2.7	2.7	2.7	3	4	0.5	5
Cadmium	0.069	0.064	0.063	0.065	0.062	0.063	0.058	0.06	0.058	0.064	0.002	0.05	0.01
Chromium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		1	
Cobalt	6.1	5.8	5.8	6.1	5.8	5.9	5.5	5.7	5.6	6.2		0.1	1
Copper	70	49	46	52	48	49	47	46	43	50	2	5	0.4
Gold	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1			
Iron	1600	1300	1200	1300	1300	1200	1200	1100	1200	1300		10	
Lead	0.047	0.043	0.042	0.045	0.042	0.042	0.04	0.041	0.039	0.044	0.01	5	0.1
Manganese	2.6	2.5	2.5	2.6	2.5	2.5	2.4	2.4	2.4	2.7	0.5	10	
Mercury	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		0.002	
Molybdenum	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.05	
Nickel	9.8	9.3	9.3	9.8	9.3	9.5	9	9.1	9	10	0.5	2	1
Selenium	0.025	0.02	0.018	0.019	0.015	0.019	0.016	0.017	0.015	0.017	0.1	0.05	0.02
Silver	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
Uranium	0.2	0.18	0.17	0.18	0.17	0.17	0.16	0.17	0.16	0.18	0.02	0.1	0.2
Vanadium	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.5	
Zinc	110	87	82	91	86	86	81	78	80	92		5	20
Bromide	10	11	11	110#	160	350	590	510	580	600			
pH	4.22	4.22	3.9	3.94	3.9	3.93	3.77	3.76	3.82	3.82			
Salinity	9555	9555	9458	9575	9555	9679	9594	9711	9666	9633	1000		7,000*

- For sheep on dry feed
- # Arrival of tracer

Hydraulic Conductivity, Transmissivity, Storativity and Specific Yield

Wells have been drilled a full characterization will be carried out to inform the design and be approved prior to further testing and addition of lixiviant.

Provide a description of the existence, location and value of all Groundwater Dependent Ecosystems (GDEs) within and immediately surrounding the project area.

Groundwater Dependent Ecosystems (GDEs) in the study area were evaluated by firstly plotting the GDE Atlas maintained by BOM.

Refer Section J - Map D "Groundwater Dependent Ecosystems".

In proximity to the project site, the data set identifies:

The stand of vegetation adjacent Site B is identified as a potential terrestrial ecosystem that relies on the subsurface presence of groundwater–this includes all vegetation ecosystems. The area is classified as having a low potential for groundwater interaction. Given the groundwater depth is greater than 10 m below surface and the groundwater salinity is moderately high, and the dominant species is Blue Gum, this stand of vegetation can be excluded as a groundwater dependent ecosystem.

The Light River is identified as an aquatic ecosystem that relies on the surface expression of groundwater–this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.

The Light River at the site was investigated by CSIRO in 2020, who concluded that the Light River receives groundwater discharge and that the discharge maintains flow and pools over summer. Whilst a groundwater baseflow to streams and rivers is common, an interesting feature in the case of the Light River is that this baseflow is quite saline. Accordingly, the Light River is often considered by local management agencies to be 'degraded' owing to ecological classification systems for Australian waterways that use comparison with pristine (usually freshwater) reference environments. This approach is appropriate when formerly freshwater environments have become more saline due to land-use change or other processes. However, it is less so in cases when the environment is naturally saline.

Is the proposed program located within a prescribed wells area or prescribed water resource area? If yes, provide the name of the area.	Yes ☐	No ☒
N/A		

Provide the following additional (ISR related) information:

- a description of the local and regional hydrogeology, detailing both the stratigraphy and hydro stratigraphy;
- a detailed baseline description of the groundwater characteristics and flow dynamics which includes:
  - baseline groundwater hydrochemistry,
  - seasonal fluctuations and spatial variability
  - aquifer properties for each aquifer that may be affected by the proposed operations,
  - including waste disposal and water supply,
  - mineralogy, and chemical composition range for natural groundwaters.
- hydraulic conductivity, transmissivity, storage coefficient, total porosity, effective porosity, aquifer thickness, piezometric pressures,
- static water levels for each aquifer including seasonal fluctuations
- hydrogeological characteristics of confining strata, including hydraulic conductivity and thickness
- connectivity between the proposed exploration ISR test aquifer and lateral overlying, or underlying aquifers and surface water
- conceptualisation of groundwater flow regime
- a numerical model of groundwater flow dynamics, including recharge, discharge areas and processes.
- an assessment of any current or historical use of local groundwater by the landowner(s) and other users which includes a baseline survey of bores, including water level, groundwater quality, bore construction details, status and purpose and collar/ground elevations;
- a plan, to scale, identifying the application area, all drillholes and boreholes relevant to the identification of hydrogeology, GDEs, direction of groundwater flow, any potential paleochannels and recharge zones;
- a diagram of the potentiometric groundwater elevation contours for each aquifer system that occurs within the application area and include the location of all drillholes and boreholes and supporting tabulated data used in developing the contours;
- a diagram of the location of all drillholes and boreholes used to determine the baseline groundwater quality,
- **Groundwater Baseline Management and Monitoring Plan** (GMMP) (refined plan in hindsight of Kapunda A project GMMP) and supporting tabulated data and calculations used to define baseline groundwater quality and/or ranges; and
- cross-section(s) of the interpreted hydro stratigraphy showing the known and inferred groundwater levels, and groundwater flow direction, recharge, and discharge mechanisms (if applicable), application area, proposed mining operations, and relevant drillholes and boreholes used in developing the cross-section(s).

- An 'Excursion' is defined in the ePEPR as: 'the movement of lixiviant outside the trial area'. The trial area is defined as the 25 m radius around the extraction well. However, an excursion, and consequently, a noncompliance is the identification of:

- Low Level (Warning) Trigger: Two consecutive results above Limit B criterion (B1)
- High Level Trigger (determination of excursion): Three consecutive results above Limit B criterion (three consecutive Limit B exceedances (B2).

  Limit B, which is tested over two and three consecutive samples, will potentially provide detection of change over a shorter term, particularly if the change is significant. The period of time required to detect change foreach limit will depend on sampling frequency.

Aquifer testing at Site A has comprised the following:

- Opportunistic low-rate testing at KP001 during borehole sampling.
- Eight-hour constant rate pumping test
- Hydraulic conductivity inferred from NMR logs of drillhole KPFRT002
- Analysis of water yield reported during historic exploration drilling
- Analysis of reported historic mine dewatering rates.

An overview is provided in Table C4: Summary of hydraulic testing and aquifer properties.

Table C4: Summary of Hydraulic Testing and Aquifer Properties

Tests	Test Bore	Observation Bore	Transmissivity (m^2/day)	Storativity[3]	Specific Yield	Aquifer Thickness (m)	Bulk Average Hydraulic Conductivity (m/day)	Solution
Constant Rate Pumping Test	KPFRT03	KPFRT02	0.36	0.00035	0.01	7.5	0.048	Neuman
	KPFRT03	Pumped	0.93		0.02	7.5	0.12	Moench
NMR Log	KPFRT02		0.66			15	0.04	NMR
Low-Rate Pumping Test	KP001	KP001	40	-	-	Unknown		Logan[1]
Historic Exploration Drilling Yields	Mean (min and max)	27 data points	10 (0.3-36)	-	-	Variable		Logan[1]
Historic Mine Dewatering Sites	Historic workings	N/A	26	-	-	146	0.18	Logan[2]

Notes:

1) The Logan Approximation was applied to water yield recorded during exploration drilling. This is typically very short duration pumping at significant depth, and the aquifer response will be due to depressurisation of confined fractures rather than slow drainage of unconfined (specific yield) storage, hence the confined form of the equation was used.

2) The Logan Approximation was also applied to reported historic rates of dewatering from the mine workings. This long duration pumping will represent slow drainage of unconfined storage in this setting, so the unconfined form of the Logan Approximation was used. The unconfined form returns the bulk average hydraulic conductivity estimate of 0.18 m/day.

3) Storativity is the elastic (confined) storage released during early times of the pumping tests before slow drainage of the unconfined storage occurs. This is derived from the early time response at the observation bore.

4) All of the analyses produce estimates of aquifer properties that are not precise.

Testing the transmissivity of fractured rock aquifers is problematic because of the variability in fracture occurrence. Typically, small-scale tests such as single borehole tests or pumping tests will determine the transmissivity of the specific joint sets intersected by the drillhole. Regional scale transmissivity is controlled by the frequency and connectivity between joint sets. Larger scale test methods are better suited to determining transmissivity per Cook (2003)[1]:

> *"At the scale of hundreds of metres or more, hydrogeologic simulation models calibrated to estimates of recharge rates, watertable positions and/or potentiometric head data may be the most suitable and reliable way of estimating the large-scale hydraulic conductivity of the fractured rock aquifer. "*

The analysis of reported dewatering from the historic workings is likely the most useful regional scale evaluation of transmissivity for the current study. The transmissivity of the fractured rock aquifer is likely to range around 10 to 14 m^2/day, whilst the concomitant bulk average hydraulic conductivity will be around 0.05 to 0.1 m/day.

ECR will provide updated data for Site B conductivity, transmissivity, storativity and specific yield following the groundwater connectivity testing stage of works.

Hydraulic conductivity and Transmissivity are likely to be anisotropic with higher conductivity along the planes of bedding and also along the planes of fracturing.

Fracture and Bedding Orientation

A review of fracture orientation was caried out at Site A and is described here as representative of the area. As part of the proposed program of testing at Site B, once wells are drilled, similar optical imaging will be carried out inform design of the testing program.

[1] Cook, P. G. (Peter G.). A guide to regional groundwater flow in fractured rock aquifers. CSIRO 2003

The structure of the deposit was reviewed in detail on the basis of optical imaging of the KPFRT001 pilot hole. This data is supported by logging cored drillholes, historic geotechnical reports, aerial scanning of the historic pits and automated structural analysis. The orientation of the main structures at the site is summarised in Table C5 “Fracture and Bedding Orientation”.

The estimated fracture density averages 2.6 fractures per m of rock. Analysis of the fracture logs at KPFRT001 was undertaken and a fracture model was developed. Fractures were simulated in Frac-sim 3D and permeability tensors calculated for the site area.

Table C5: Fracture and Bedding Orientation

Feature	Dip Direction (Degrees)	Dip (Degrees from Vertical)
Bedding	240	35
Fracture Set #1	270	70
Fracture Set #2	050	55
Fracture Set #3	310	65-80

Porosity

Total porosity of a sedimentary rock typically ranges around 0.2 – 0.45. This reduces with cementation and lithification. Calibrated neutron logs were run on Pilot Hole KPFRT001. The total porosity measured by neutron log ranges around 0.35 from 10 to 30 m depth. Porosity decreases with depth to approximately 0.25 at the end of hole at 65 m depth.

Effective porosity was estimated based on structural analysis undertaken using downhole optical images. In total 82 structures were identified to 60 m depth. Cumulative fracture aperture was 1.08 m which equates to an average porosity of 1.7%. There is no data regarding cementation or filling of the fractures. The percentages presented here are an upper limit for effective (fracture) porosity assuming that the fractures are clean and open. Visual inspection of larger fractures confirmed that these are mostly infilled. Hence the effective porosity is expected to be significantly less than 1.7%, and an estimate of 0.5% to 1% has been used for planning purposes.

Piezometric Pressures (Groundwater Level)

Groundwater elevation data were obtained from the WaterConnect Database, industrial site investigations at Kapunda BP site (JBS&G 2019) and the drillholes drilled and sampled by ECR. The data points, the inferred water table elevation and inferred groundwater flow is presented in Section J - Maps, Map C “Groundwater Elevation and Inferred Flow”. The data is provided in Table 4.1 of Attachment 4 “*Kapunda Site Environment Lixiviant Trial (SELT) EPEPR – Hydrogeological Description of the Environment, Groundwater Science, August 2021*” (provided as hydrogeological background to this submission). Groundwater flow is inferred from the NNW to SSE along the axis of the syncline axis and bedding, and perpendicular to the Light River.

Mineralogy

The Kapunda Mineral Resource is a structurally controlled copper deposit with primary copper mineralisation consisting of an en-echelon series of lodes striking at ~020 degrees magnetic and dipping ~70 degrees west. Secondary supergene enrichment has taken place leading to the development of a significant copper enriched zone with kaolinized metasediments. Mineral species include copper oxides (azurite, malachite and cuprite) and secondary copper sulphide minerals (chalcocite and covellite) within 100m of surface.

Quantitative Evaluation of Materials by Scanning Electron Microscopy (QEMScan) results from the Pilot Hole KPFRT001 at Site A are presented in Table C6 “QEMScan Assay of Samples from Pilot Hole KPRFT01”. The rock is predominately Kaolinite (Clay), Feldspars, and Quartz. Pyrite becomes more abundant at depth exceeding 20 m below the redox boundary. Copper is present as Malachite/Azurite in the oxide zone and as chalcopyrite and Chalcocite in the reduced zone below 20 m depth.

Table C6: QEMScan assay of samples from pilot hole KPFRT01

Mineral	3 - 8 metres	8 - 18 metres	20 - 25 metres	26 - 29 metres
Kaolinite (clay)	31.63%	24.69%	3.72%	4.36%
Feldspars	26.66%	5.62%	45.75%	45.74%
Quartz	25.42%	40.79%	33.03%	33.51%
Micas	8.79%	1.21%	3.63%	2.83%
Fe-oxide/hydroxide	3.64%	16.08%	0.46%	0.08%
Rutile/Anatase	2.84%	3.17%	1.99%	2.04%
Others	0.37%	0.95%	0.57%	0.34%
Sulphates	0.25%	1.50%	1.03%	0.93%

Cu trap	0.11%	3.85%	0.11%	0.06%
Zircon	0.08%	0.11%	0.22%	0.37%
Amphibole	0.06%	0.02%	0.00%	0.02%
Cu-Kaolinite	0.05%	0.41%	0.00%	0.00%
Pyrite	0.04%	0.03%	9.06%	8.75%
Carbonates	0.03%	0.30%	0.01%	0.01%
Malachite/Azurite	0.01%	0.79%	0.00%	0.00%
Chrysocolla	0.00%	0.22%	0.01%	0.00%
Chalcopyrite	0.00%	0.00%	0.11%	0.34%
Chalcocite/digenite	0.00%	0.02%	0.17%	0.39%
Covellite	0.00%	0.00%	0.12%	0.22%
Curprite	0.00%	0.00%	0.00%	0.00%
Cu-Limonite	0.00%	0.24%	0.00%	0.00%

Chemical Composition Range for Natural Groundwaters

Refer description provided in sections above “Broader catchment baseline hydro-geochemistry” and “Site A baseline hydro-geochemistry”, and further detail in attached report from Groundwater Science, refer Attachment 4 (*Kapunda Site Environment Lixiviant Trial (SELT) EPEPR – Hydrogeological Description of the Environment, Groundwater Science, August 2021*), provided as hydrogeological background to this submission).

Static Water Levels for Each Aquifer Including Seasonal Fluctuations

Refer to description provided in section above “Piezometric pressures”.

Seasonal fluctuation

The only available record of seasonal water level fluctuation is a set of 15 monitoring wells installed around the former Mobil Petrol Station at the corner of Perry Street and Main Street. The depth to water ranges from 13 to 18 mBGL. 6 water level monitoring events occurred between 2003 and 2008. The maximum fluctuation in any one well from 2003 to 2008 was 1.1 m change from April 2003 to November 2005 in monitoring well MW3. In general, seasonal fluctuation was around 0.3 m. This data set is sparse and will likely not capture the full range of seasonal variation.

Hydrogeological Characteristics of Confining Strata

The fractured rock aquifer at the site is unconfined. There are no confining strata.

Connectivity Between Aquifers

The fractured rock aquifer at the site is unconfined, there is no overlying aquifer or underlying aquifer.

The fractured rock aquifer discharges to the Light River, which at its closest is a distance of some 650 m to the southeast of the project site. The groundwater discharge maintains saline perennial pools in the river (CSIRO 2020).

Conceptual Model of Groundwater Flow Regime

The site is conceptualised as a localised and structurally controlled groundwater flow system. The site sits within a regional syncline structure-oriented northwest to south east with a number of parasitic synform and antiform structures throughout the area. Groundwater flow is parallel to the fold axes and discharges to the Light River.

Recharge

Groundwater recharge will be via diffuse rainfall recharge and some localised higher rates at outcropping or thinly covered basement rock. The Clare valley is a nearby analogous fractured rock aquifer system. Estimated recharge reported in the Clare Valley Water Allocation Plan (WAP) (NYMRMB, 2009)[2] is 30 mm/year, though it is reported that the rate is variable and in many areas of the WAP, less than that estimate.

Chloride mass balance analysis of the groundwater at the Kapunda site (Li et al 2020) produced an estimate of 4 mm/year. This value seems appropriate for the more saline system at Kapunda.

Discharge

Discharge from the system is via baseflow to the Light River. The Light River at the site has been investigated by CSIRO (2020). The report concluded that the Light River receives groundwater discharge and that the discharge maintains flow and pools over summer.

Groundwater flows through the fractured rock aquifer toward the discharge zone of the Light River. Flow will be preferential via fractures. Flow velocity estimates from 0.3 m per year up to a maximum of 15 m per year have been derived. The lower range estimates around 0.3 are considered more realistic since these are based on individual fracture flow for a fractured rock aquifer.

Groundwater Flow

An estimate of flow velocity around 15 m per year is derived by the Darcy equation from the measured hydraulic gradient of 0.004, the bulk hydraulic conductivity estimate of 0.1 m/day, and an effective porosity estimate of 1% (assuming partially filled fracture porosity of 1.7%).

This analysis treats the aquifer as a porous media equivalent. Flow in discrete fractures will be both higher and lower than this estimate.

Mine and quarry workings

The historic mine pits retain water during winter but not during summer. The water is understood to be rainfall run-off. The historic mine is considered neither a marked groundwater discharge nor a groundwater recharge feature. Some enhanced recharge from the ponded water at the base of the pits is possible, but this is likely to be minor as there is no groundwater level mounding evident around the pits.

The historic mine workings do not express to surface. The mine workings are believed to act as a higher transmissivity feature. This may contribute to the flattening of the potentiometric surface shown on Map G (refer Section J – Figure 2 “Groundwater Elevation and Inferred Flow”.

The net impact of the nearby Mantina quarry on the water table is not known but likely to be minor. The quarry has two unlicensed bores that are used for water supply at an unknown rate, and this would lower the water table. However, rainfall run-off to the base of a quarry pit can act as a source of enhanced recharge which would act to counter the pumping of groundwater and raise the water table.

[2] Northern and Yorke Natural Resources Management Board, 2009, Water Allocation Plan for the Clare Valley Prescribed Water Resources Area. Government of South Australia, through the Northern and Yorke Natural Resources Management Board, Crystal Brook, South Australia

Numerical Groundwater Flow Model

A numerical groundwater flow model of the Site was developed by the University of Adelaide (Li et al 2020). A brief summary is provided here.

The fracture rock aquifer was simulated using the equivalent porous medium approach. A 3D regional-scale numerical groundwater model was developed for Kapunda using MODFLOW Unstructured Grid (USG)(Panday, Langevin, Niswonger, Ibaraki, & Hughes, 2017).

Model Grid

The model domain is 5.5 km × 5.2 km in area and the model edges were set ~2 km away from the study area to avoid boundary effects. The Voronoi grid was generated using AlgoMesh (Merrick, 2016) with a nominal cell size of 10 m² in the study area and up to ~25,000 m² in the regional area. The same grid was applied to two layers, resulting in a total of 294,356 cells.

The groundwater model was discretised into two layers, with the top layer representing the more permeable, weathered part of the fractured rock aquifer and the bottom layer representing the less permeable, unweathered part of the aquifer.

Layer Properties

Layer properties were applied in the range presented in Table C7 “Model Layer Properties”.

Table C7: Model Layer Properties

Parameter Group	Layer	Unit	Initial Value	Lower Bound	Upper Bound	Source
Hydraulic conductivity	1	m/d	0.1	$1e^{-5}$	1	Aquifer Test Logan Approximation

Hydraulic conductivity	2	m/d	$1e^{-4}$	$1e^{-5}$	$1e^{-3}$	Aquifer Test Logan Approximation
Specific storage[1]	1, 2	m^{-1}	$1e^{-6}$	$1e^{-7}$	$1e^{-5}$	Li and Cranswick (2016)
Specific yield[1]	1, 2	-	0.01	0.001	0.05	Li and Cranswick (2016)
Rainfall-Recharge Ratio	1	-	0.008	$1e^{-4}$	0.05	Chloride mass balance
Notes:						

1) Specific Storage is the elastic storage that is released during depressurisation. The aquifer is unconfined, and the aquifer response to changes in flow will be dominated by unconfined storage (specific yield) however modelling software requires an estimate of Specific storage to calculate the short-term changes in elastic storage that occur due to depressurisation.

Boundary Conditions

The AMT survey was used as one of the datasets that constrained hydraulic conductivity during model calibration. The comparison between AMT survey results and the hydraulic conductivity distribution of the model calibration show that inferred hydraulic conductivity and inferred electrical conductivity are somewhat coincident. The inference is that the areas of high electrical conductivity may also be areas of higher hydraulic conductivity.

River

The Light River and other ephemeral creeks were simulated using MODFLOW's RIV package (Panday et al., 2017). Time-varying river depths were used for the Light River based on data from the nearest gauging station.

Model Perimeter

The regional lateral groundwater inflows from the northern and southern sides were modelled in both layers using MODFLOW's GHB package (Panday et al., 2017). The head values were derived from groundwater level observations and the conductance was set to 0.1 m²/d.

Recharge

Net groundwater recharge was simulated using MODFLOW's RCH package (Panday et al., 2017). Annually varying rainfall data were incorporated into the model as recharge multipliers, which were multiplied with the spatially varying rainfall-to-recharge ratios (a calibration parameter) to derive net recharge.

Historic Pits

The historical mine and quarry were represented as groundwater discharge features using MODFLOW's DRN package (Panday et al., 2017). The drain elevation was sourced from the DEM and the drain conductance was set to 0.1 m²/d.

Time Steps

The model consists of 53 stress periods. The first period is steady-state and represents the pre-1970 period, which was selected based on the observation data availability. This stress period provides the initial conditions for the subsequent 50 transient annual stress periods, which represent the time period between 1970 and 2019 and were used for history-matching.

Calibration

Model calibration entailed varying the 5 parameter sets in the table above "Model layer properties". The calibration approach was an ensembler-smoother method via PESTPP-IES. This does not produce one calibrated model, but rather an ensemble models that represent the uncertainty of the study site. This ensemble of models is run to provide a range of possible outcomes.

Environmental Value of Aquifers

Environmental value of the groundwater at Site is constrained by elevated metals. The water is not suitable for drinking, stock watering or irrigation. Refer to section "Baseline Hydro Geochemistry" on page 13.

Groundwater Dependent Ecosystems (GDEs)

Groundwater Dependent Ecosystems (GDEs) in the study area were evaluated by firstly plotting the GDE Atlas maintained by BOM[3]. The data are shown in Section J - Maps, Map D "Groundwater Dependent Ecosystems".

In proximity to the project site, the data set identifies:

- The stand of vegetation to the south and west of the historic workings is identified as a potential terrestrial ecosystem that relies on the subsurface presence of groundwater–this includes all vegetation ecosystems. The area is classified as having a low potential for groundwater interaction. Given the groundwater depth is greater than 10 m below surface and the groundwater salinity is moderately high, and the dominant species is Blue Gum, this stand of vegetation can be excluded as a groundwater dependent ecosystem.
- The Light River is identified as an aquatic ecosystem that relies on the surface expression of groundwater–this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.

The Light River at the site has been investigated by CSIRO (2020). The report concluded that the river receives groundwater discharge and that the discharge maintains flow and pools over summer. Whilst a groundwater baseflow to streams and rivers is common, an interesting feature in the case of the Light River is that this baseflow is quite saline. Accordingly, the Light River is often considered by local management agencies to be 'degraded' owing to ecological classification systems for Australian waterways that use comparison with pristine (usually freshwater) reference environments. This approach is appropriate when formerly freshwater environments have become more saline due to land-use change or other processes. However, it is less so in cases when the environment is naturally saline.

[3] http://www.bom.gov.au/water/about/publications/document/BOM_GDE_Atlas_info_sheet_WEB.pdf

Current and Historical Local Groundwater Users

A review of all third-party bores in proximity to the site was undertaken (refer Table C8 "Third Party Bore Audit". Bore records were downloaded from WaterConnect and filtered to exclude records described as; mineral exploration holes (MW), or water points (WP), and to exclude records where the status was described as; backfilled or abandoned. The remaining records are presented in Section J, Map H "Third Party Bores" and Table C8 below. The status of these bores was followed up by site inspection and enquiry.

The only bores in use for water supply are located in Mantina Quarry approximately 1 km to the southeast of the site.

The remaining bore records are monitoring bores associated with a service station in Kapunda, a single shallow monitoring bore within Kapunda and two bores that no longer exist.

Table C8: Third Party Bore Audit

DHNO	Unit No	East	North	Date	Depth (m)	Purpose	Status	Audit Comment
63534	6629-381	309139	6196389					No Longer Exists
63551	6629-398	309893	6197614		22.86		NL	No Longer Exists
64602	6629-1459	309713	6196322	14/11/90	200	IND	OPR	Mantina Quarry Bore (in use)
164823	6629-1645	310023	6196450	8/04/97	71	IND	OPR	Mantina Quarry Bore (in use)
200105	6629-1847	307765	6197663	4/05/04	16	MON		Service Station Monitoring
214274	6629-2065	307945	6197536	17/10/05	19	MON		Service Station Monitoring
214275	6629-2066	307911	6197584	18/10/05	18	MON		Service Station Monitoring
214277	6629-2067	307894	6197563	18/10/05	18	MON		Service Station Monitoring
214278	6629-2068	307960	6197486	19/10/05	23.8	MON		Service Station Monitoring
214279	6629-2069	307954	6197584	19/10/05	24	MON		Service Station Monitoring
214370	6629-2074	307934	6197503	24/01/05	24	MON		Service Station Monitoring
214371	6629-2075	307951	6197533	24/01/05	24			Service Station Monitoring
214372	6629-2076	307971	6197550	25/01/05	24			Service Station Monitoring
214373	6629-2077	307948	6197569	27/01/05	24			Service Station Monitoring
214374	6629-2078	307907	6197553	27/01/05	22			Service Station Monitoring
214375	6629-2079	307922	6197577	28/01/05	18			Service Station Monitoring
271988	6629-2255	307732	6197657	29/10/12	12	INV		Service Station Monitoring
272010	6629-2256	307753	6197698	29/10/12	12	INV		Service Station Monitoring
289421	6629-2277	307792	6197410	29/01/16	15	INV		50 mm monitoring bore cased to 6m

Prescribed Water Resources

Site B is not in a Prescribed Wells Area or Prescribed Water Resources Area.

Native vegetation

Will you be working within areas of native vegetation? If yes, provide the following information: • description of the formation and structure of vegetation in the area (e.g. woodland, shrubland, grassland) • list of the dominant species. If no, indicate why you will not be working within areas of native vegetation?	Yes ☒	No ☐
See approved EPEPR2023-015 pg. 21-22 for this section.		

The proposed exploration site is located within the Broughton sub region of the Northern and Yorke Regional Species Conservation Assessment Project Area. The exploration site is located on an area that does not have areas of native vegetation as the site is located on land currently used for cropping and grazing.

A search of the Atlas of Living Australia (ALA) Species Occurrence was carried out within a 100m (0.1km) and 1km radius of the exploration sites A and B, as shown in Section J - Maps, Map E "Sensitive Receptors".

Search 1 - ALA Species Checklist (Flora) within 0.1km radius of Site B Latitude -34,354 and Longitude 138,918

Species	Common Name	Native Species/Conservation Status
Eucalyptus odorata	Box Gum	Y/N
Callitris gracilis	Southern Cypress Pine	Y/N

Eucalyptus leucoxylon	Red-Flowered Yellow Gum	Y/N
Hordeum glaucum	Barley Grass	N/N
Cassytha melantha	Mallee Strangle Vine	Y/N
Schoenus nanus	Tiny Bog-Sedge	Y/N

Search 2 – ALA Species Checklist (Flora) with 1km radius of Latitude -34,354 and Longitude 138,918

Species	Common Name	Native / Conservation Status	Species	Common Name	Native / Conservation Status
Cynodon dactylon	Couch Grass	N/N	*Acacia spilleriana*	Spillers Wattle	Y/Y
Rosa canina	Common Brier/Dog Rose	N/N	*Choretrum glomeratum*	Berry Broombush	Y/N
Eucalyptus dumosa	Waikerie/White Mallee	Y/N	*Kennedia prostrata*	Scarlet Coral Pea	Y/N
Olea europaea	Olive	N/N	*Pimelea humilis*	Common Rice Flower	Y/N
Eucalyptus leucoxylon	Red-Flowered Yellow Gum	Y/N	*Hypericum perforatum*	St John's-Wort	N/N
Acacia pycnantha	Golden Wattle	Y/N	*Heliotropium europaeum*	Caterpillar Weed	N/N
Schinus molle	Chilean Pepper Tree	N/N	*Goodenia pusilliflora*	Mallee Bonza	Y/N
Salvia verbenaca	Wild Sage	N/N	*Piptatherum miliaceum*	Smilograss	N/N
Acacia acinacea	Wreath/Gold Dust Wattle	Y/N	*Pinus radiata*	Monterey Pine	N/N
Scabiosa atropurpurea	Egyptian Rose/Scabiosa	N/N	*Euphrasia collina*	Purple Eye-Bright	Y/N
Eucalyptus odorata	Box Gum	Y/N	*Ranunculus muricatus*	Sharp Buttercup	N/N
Trifolium campestre	Hop Trefoil/Field Clover	N/N	*Juncus subsecundus*	Fingered Rush	Y/N
Atriplex semibaccata	Berry/Creeping Salt Bush	Y/N	*Boerhavia dominii*	Tarvine	Y/N
Echium plantagineum	Paterson's Curse	N/N	*Lomandra micrantha*	Mat Rushes	Y/N
Callitris gracilis	Southern Cypress Pine	Y/N	*Centipeda crateriformis*	Compact Sneezeweed	Y/N
Hordeum glaucum	Barley Grass	N/N	*Brachyscome dentata*	Lobe-Seed Daisy	Y/N
Juncus kraussii	Sea/Salt Marsh Rush	N/N	*Rostraria pumila*	Tiny Bristle Grass	N/N

Phragmites australis	Bamboo Reed/Cane Grass	Y/N	*Cassytha melantha*	Mallee Strangle Vine	Y/N
Asperula conferta	Common Woodruff	Y/N	*Adonis microcarpa*	Pheasant's Eye	N/N
Stackhousia monogyna	Creamy Stakhousia/Candles	Y/N	*Acacia iteaphylla*	Flinders Range Wattle	Y/Y
Eucalyptus behriana	Broad Leaved Box	Y/Y	*Verbascum virgatum*	Moth Mullein	N/N
Schoenus nanus	Tiny Bog-Sedge	Y/N	*Acacia paradoxa*	Kangaroo Acacia	Y/N
Eucalyptus phenax	Jeparit Mallee	Y/N	*Chrysocephalum semipapposum*	Clustered Everlasting	N/N
Austrostipa blackii	Spear Grass	Y/N	*Chenopodium desertorum*	Frosted Goosefruit	Y/N
Hordeum murinum	False Barley	N/N	*Euphorbia multifaria*	*None Recorded*	Y/N
Prunus dulcis	Almond	N/N	*Teucrium racemosum*	Forest Germander	Y/N
Austrostipa nodosa	Needle Grass	Y/N	*Bursaria spinosa*	Native Blackthorn	Y/N
Solanum elaeagnifolium	Bull Nettle	N/N			

Significant habitats and flora

If you are working within areas of native vegetation, use the table below to list any significant habitats and any rare or endangered flora species located or reported to have been in the area that may be impacted by the proposed program. Include known sightings of listed species on a locality plan/map.

Species/habitat	Common name	NPW Act rating*	EPBC Act rating†
Acacia spilleriana Single occurrence within 1 km radius of Site, but outside of exploration area and will not be disturbed or impacted by access to the exploration site (s) or by exploration activities. Refer Section J - Map E "Sensitive Receptors"	Spillers Wattle	Endangered	Endangered
Acacia iteaphylla Single occurrence within 1 km radius of Site, but outside of exploration area and will not be disturbed or impacted by access to the exploration site (s) or by exploration activities. Refer Section J - Map E "Sensitive Receptors"	Flinders Range Wattle	Near Threatened	Near Threatened
Eucalyptus behriana Two occurrences within 1 km radius of Site, but outside of exploration area and will not be disturbed or impacted by access to the exploration site (s) or by exploration activities. Refer Section J - Map E "Sensitive Receptors"	Broad Leaved Box	Near Threatened	Near Threatened

* *National Parks and Wildlife Act 1972* (NPW Act) conservation status includes extinct, endangered, vulnerable, threatened and rare.

† *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) listings include extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent.

Weeds and pathogens

Provide information of the extent the area is affected or potentially affected by weeds and pathogens (e.g. phytophthora; buffel grass *Cenchrus ciliaris*).

Weeds recorded as being present within 1km of the exploration site (Latitude -34,354 and Longitude 138,918) include:

- *Adonis microcarpa* (Pheasant's Eye)
- *Cynodon dactylon* (Couch)
- *Echium plantagineum* (Paterson's Curse)
- *Heliotropium europaeum*
- *Hordeum murinum*
- *Hypericum perforatum* (St John's Wort/Klamath Weed)

- *Olea europaea* (Olive)
- *Pinus radiata* (Monterey Pine)
- *Piptatherum miliaceum*
- *Prunus dulcis* (Almond)
- *Rosa canina* (Common Brier)
- *Rostraria pumila*
- *Salvia verbenaca* (Vervain)
- *Scabiosa atropurpurea* (Annual Scabious/Egyptian Rose)
- *Schinus molle* (Chilean Pepper Tree)
- Solanum elaeagnifolium (Bull Nettle)
- *Trifolium campestre* (Hop Trefoil)
- *Verbascum virgatum* (Moth Mullein)

Fauna

Describe the native and feral fauna that may be present in the application area, including feral species.

The proposed exploration site is located within the Broughton sub region of the Northern and Yorke Regional Species Conservation Assessment Project Area. The proposed exploration site will not work in areas of native vegetation as the site is located on council and community land in the southern section of the Kapunda historic mine site (Mine Site). Clearence of vegetation and soil disturbance will be kept to a minimum and surface tanks will be used for the storage of water and fluids, removing any requirement to construct or use sumps.

A search of the Atlas of Living Australia (ALA) Species Occurrence was carried out within a 100m (0.1km) and 1km radius of the exploration site (refer Section J - Maps, Map E “Sensitive Receptors”). There were no occurrences of fauna species found with 100m of the exploration site.

Search 1 – ALA Species Checklist (Fauna) with 1km radius of Site B Latitude -34,354 and Longitude 138,918

Species	Common Name	Native / Conservation Status	Species	Common Name	Native / Conservation Status
Platycercus (Platycercus) elegans	Crimson Rosella	Y/N	*Rhipidura (Rhipidura) albiscapa*	Grey Fantail	Y/N
Cracticus tibicen	Australian Magpie	Y/N	*Manorina (Myzantha) melanocephala*	Noisy Miner	Y/N
Ptilotula penicillata	White-Plumed Honeyeater	Y/N	*Anthochaera (Anthochaera) carunculata*	Red Wattlebird	Y/N
Ocyphaps lophotes	Crested Pigeon	Y/N	*Artamus (Angroyan) cyanopterus*	Dusky Woodswallow	Y/N
Turdus merula	Blackbird	N/N	*Chenonetta jubata*	Australian Wood Duck	Y/N
Columba (Columba) livia	Rock Pigeon	N/N	*Accipiter (Leucospiza) fasciatus*	Brown Goshawk	Y/N
Anthochaera carunculata	Red Wattlebird	Y/N	*Pachycephala (Alisternornis) rufiventris*	Rufous Whistler	Y/N
Rhipidura (Sauloprocta) leucophrys	Willie Wagtail	Y/N	*Aquila (Uroaetus) audax*	Wedge-Tailed Eagle	Y/N
Eolophus roseicapillus	Galah	Y/N	*Lalage (Lalage) sueurii*	White-Winged Triller	Y/N
Corvus mellori	Little Raven	Y/N	*Cacatua (Licmetis) sanguinea*	Little Corella	Y/N
Passer (Passer) domesticus	House Sparrow	N/N	*Geopelia striata*	Peaceful Dove	Y/N

Psephotus (Psephotus) haematonotus	Red-Rumped Parrot	Y/N	*Gallinula (Gallinula) tenebrosa*	Dusky Moorhen	Y/N
Phylidonyris (Meliornis) novaehollandiae	New Holland Honeyeater	Y/N	*Tachybaptus novaehollandiae*	Australasian Grebe	Y/N
Grallina cyanoleuca	Magpie-Lark	Y/N	*Caligavis chrysops*	Yellow-Faced Honeyeater	Y/N
Acanthiza (Geobasileus) chrysorrhoa	Yellow-Rumped Thornbill	Y/N	*Anas (Nettion) gracilis*	Grey Teal	Y/N

Hirundo neoxena	Welcome Swallow	Y/N	*Alauda arvensis*	Eurasian Skylark	N/N
Glossopsitta concinna	Musk Lorikeet	Y/N	*Anas (Anas) superciliosa*	Pacific Black Duck	Y/N
Sturnus (Sturnus) vulgaris	Common Starling	N/N	*Colluricincla (Colluricincla) harmonica*	Grey Shrike-Thrush	Y/N
Falco (Tinnunculus) cenchroides	Nankeen Kestrel	Y/N	*Haliastur sphenurus*	Whistling Kite	Y/N
Zosterops lateralis	Silvereye	Y/N	*Parvipsitta porphyrocephala*	Purple-Crowned Lorikeet	Y/N
Falco (Ieracidea) berigora	Brown Falcon	Y/N	*Trichosurus vulpecula*	Australian Brushtail Possum	Y/Y
Coracina (Coracina) novaehollandiae	Black-Faced Cuckoo-Shrike	Y/N	*Anilios bicolor*	Dark-Spined Blind Snake	Y/N
Corcorax melanorhamphos	White-Winged Chough	Y/Y	*Anilios bituberculatus*	Prong-Snouted Blind Snake	Y/N
Vanellus (Lobipluvia) miles	Masked Plover	Y/N	*Morelia spilota*	Carpet Python	Y/Y
Merops (Merops) ornatus	Rainbow Bee-Eater	Y/N			
Acanthiza (Subacanthiza) nana	Yellow Thornbill	Y/N			
Melopsittacus undulatus	Budgerigar	N/N			
Streptopelia (Spilopelia) chinensis	Spotted Dove	N/N			

Significant fauna

Where possible, using the table below, list any rare or endangered fauna species located or reported to have been in the area that may be impacted by the proposed program. Include known sightings of listed species on a locality plan/map.

Species	Common name	NPW Act rating	EPBC Act rating
Corcorax melanorhamphos Two occurrences within 1 km radius of Site, but outside of exploration area and will not be disturbed or impacted by access to the exploration site (s) or by exploration activities. Refer Section J - Map E “Sensitive Receptors”	White-Winged Chough	Near Threatened	N/A
Morelia spilota Single occurrence within 1 km radius of Site, but outside of exploration area and will not be disturbed or impacted by access to the exploration site (s) or by exploration activities. Refer Section J - Map E “Sensitive Receptors”	Carpet Python	Near Threatened	N/A
Trichosurus vulpecula Single occurrence within 1 km radius of Site, but outside of exploration area and will not be disturbed or impacted by access to the exploration site (s) or by exploration activities. Refer Section J - Map E “Sensitive Receptors”	Australian Brushtail Possum	Near Threatened	N/A

Note: NPW Act conservation status includes extinct, endangered, vulnerable, threatened and rare.
EPBC Act listings include extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent.

Environmentally sensitive locations

Are there any environmentally sensitive locations within or close to the proposed exploration area (e.g. areas having particular ecological, cultural, scientific, aesthetic or conservation value)? If yes, provide a description of identified environmentally sensitive location(s). Mark these areas on a locality plan to identify any areas of conflict so that access roads or other activities can be planned and located effectively.	Yes ☒	No ☐

Historic Mine Site

The historic mine site located to the north of the proposed exploration site is a significant European Heritage site, dedicated to demonstrating the cultural heritage of mining in the landscape. The historic mine site is managed by Light Regional Council and is subject to a Mine Site Conservation Plan and Tourism Development Plan. Access to Site B has been planned to allow all exploration vehicles access via Perry Road and East Terrace, which are heavy vehicle access public roads, and a traffic management plan will be prepared to avoid any areas of conflict. Refer Section J - Maps, Map J "Relevant Land Use Areas" and Section G – Photos (refer Plate 1).

Light River

The Light River is located approximately 1km south of the proposed exploration site (Site B). The Light River was noted in 2016 as a permanently flowing stream in autumn and spring with no rare or sensitive species recorded. Water was noted as saline, clear and enriched with nutrients. Riparian vegetation consisted of native trees over weedy understory of *("Light River Aquatic Ecosystem Condition Reports, Panel Assessment of Creeks and Rivers in the Adelaide and Mount Lofty Ranges NRM Region, Environment Protection Agency")*. There will be no traffic interaction or other activity to the south of the exploration site in the direction of the Light River.

Studies have been carried out as part of the Kapunda project into groundwater-surface water interactions. The Light River can be classified as a semiarid river. Semiarid streams and rivers become a series of pools during the dry season with minimal or no surface water flow between them. These pools are refuges for organisms which provide seed populations to recolonise rivers once surface flow resumes during wetter periods. In semiarid rivers, pools can be perennial when they are periodically filled by rainfall runoff or when they receive enough groundwater discharge to balance evaporative losses. The Light River in this region, consists of well-defined pools separated by wet meadows of aquatic plants. The ephemeral stream originating on the exploration area catchment drains into the Light River at Pool 16, with run-off contributing to river flows during storm events. A map showing the study area, the location of the Mine Site and pools along the Light River is shown in Section J – Maps, Map K "Pools Along the Light River" and Section J - Maps, Map L "Exploration Area Surface Water Catchment".

The Light River is influenced by surface water flows in the wet season and groundwater flows in the dry season. The baseline water quality of the Light River has been the subject of an extensive monitoring program. This has allowed the project to develop an environmental scorecard to evaluate any potential impact on water quality through surface water or groundwater flows. This water quality monitoring program will be continued for the duration of the exploration program and in anticipation of a future mining application.

Water quality is tested at a number of locations along the river and monitors for the following indicators:

- Electrical Conductivity (EC)
- pH
- Dissolved Oxygen
- Copper (Cu)
- Zinc
- Other nutrients, metals and metalloids

Water quality data will be used to detect any changes in water quality as a result of activities. However, no changes are considered likely with the small-scale exploration activity anticipated in this proposal. However, the water quality monitoring program, developed to support a future mining operation, will, identify water quality changes, which will be categorised and into "Minor, 'Moderate' or 'Major' and resulting management actions taken. The scorecard showing the proposed water quality indicators, identified change criteria and proposed management actions is shown in Section J - Maps, Figure 11 "Proposed Water Quality Environmental Scorecard".

Are you likely to impact on the environmentally sensitive area? If yes, detail the likely effects the proposed program may have.	Yes ☐	No ☒

N/A

Include a statement concerning whether or not an Aboriginal heritage survey has been conducted by the proponent and if so, the results of the survey.

The Register of Aboriginal Sites and Objects, administered by the Department of Premier and Cabinet, has advised by letter to Exploration License Holders Terramin that there is no record of Aboriginal sites in the area.

SECTION D – DESCRIPTION OF PROPOSED EXPLORATION ISR CIRCUALTION OPERATIONS

Each of the elements listed below must be described only to the extent that they apply to the proposed exploration program.

Equipment and personnel requirements

Using the table below, describe the equipment, size and composition of field crews, and proposed working hours/days required to conduct the proposed program.

Type of personnel	Number	Name of contractor company (if applicable)
Geologists	3	ECR Geologist (2), Hydrogeologist (1)
Land access/environmental	1	ECR Environmental Scientist (1)
Field assistants/technicians		
Drilling crew		
Site preparation and rehabilitation		
Other (provide details)	1	Consultant Hydro Metallurgist

Shifts worked per day	Hours worked per day	Days worked per week
1	8:00am – 17:30pm	7 days

Equipment / Instruments	Owner/operator	Description/capacity	Activity/purpose
2 X 4WD Light Vehicle	ECR	Land Cruiser or equivalent	Support Vehicle
Laboratory & wellhouse	ECR	Garden Shed 2.5 m by 3.5 m	Mixing and distribution of lixiviant
Reagent and waste	ECR	Up to 16 X 1000L IBC containers	Replaces in ground settling pits
Storage tanks	ECR	1 X 5000L tank	Storage tank for liquid processing applications.
Injection tanks	ECR	4 X 1000L IBC	Storage tanks at injection wells to gravity drain solution.
Site Generator	ECR	Diesel generator	Power for site operations including mixing and distribution, processing tanks and control equipment

Provide information on the proposed scope of operations, including:

- Description of the Lixiviant circulation test
- detailed description of each stage involved in the process;
- general description of the planned sequence and timing of test sites/stages (e.g. groundwater pre-treatment, lixiviant test, recovery);
- lixiviants used (acidic or alkali) and the recovery process;
- injection and extraction process used;
- any required initial groundwater flush or groundwater treatment;
- any other required groundwater flush or groundwater treatment;
- and estimated project commencement and completion schedules, including monitoring requirements.
- Groundwater Baseline Management and Monitoring Plan (GMMP) (refined plan in hindsight of Kapunda A project GMMP) and supporting tabulated data and calculations used to define baseline groundwater quality and/or ranges.

Detailed Description of each stage of the process;

Lixiviant Circulation Test

The circulation testing will provide information on potential flow rates that may be achieved through the formation, efficacy of using groundwater vs lixiviant and provide additional information on potential Copper and Gold recovery.

Following completion and acceptance of the baseline sampling data, the staged circulation trial will commence and will involve:

- Site access and preparation – compacted gravel access track, laydown/equipment storage area, earthen swale to divert storm water.
- Commissioning via Circulation of groundwater – this is to test site infrastructure and processes and to determine what Cu levels may be achieved by simply circulating groundwater.
- Circulation of aerated groundwater - look at the possible increase in leach efficiency with aerated water.
- Circulation of lixiviant (dilute sulfuric acid mixed with groundwater) with tracer to ascertain maximum concentrations of Cu that can be achieved.
- Circulation of lixiviant with copper removal to look at generating a leach or recovery curve for comparison with modelled data and verify economics.
- Rehabilitation

Site access and preparation

2 small level pads will be installed on site, one for the primary holding tanks and the second for siting of the wellhouse. The tank pad will be 15m by 10m and consist of gravel/road base and a limestone capping to help neutralise any low pH material. The wellhouse pad will be 3.6m by 2.4m and of similar construction. An earthen swale 300 mm high will be created to divert runoff water around the site. Other site infrastructure will be minimal with bulk chemicals being stored off site.

Commissioning via Circulation of groundwater

This phase of testing will comprise circulating ~5,000L of groundwater pumped from the extraction well into holding tanks and then drained via gravity back through the 4 injection wells in a continuous operation. Site infrastructure (valves, pumps etc.) and groundwater chemistry will be monitored to record any changes.

Circulation of aerated groundwater

This phase of testing will be the same as the previous with the exception that ground water will be aerated via low pressure compressed air while in the holding tanks, groundwater chemistry will be monitored to record any changes.

The purpose of this step is to evaluate if the circulation of aerated groundwater, without additional reagents can oxidise and leach copper.

Circulation of lixiviant

This phase of testing will comprise ~1,200L of groundwater pumped per day from the extraction well to a 5,000L holding tank with radar water level detector. The addition of dilute Sulphuric acid to the groundwater will take place in the wellhouse mixing tank to achieve a pH of approximately 1.5. A tracer of Sodium Bromide will be added as an addition measure to monitor for excursions and the solution drained back into the ground via the injection bores.

The volume of lixiviant will be calculated to create a zone of leached rock with a radius of approximately 5-7m. An example calculation is shown in Table 1 “Example leached volume calculation”. the calculation applies a conservative (low) estimate of effective porosity. A higher effective porosity will result in a smaller plume extent and a lesser tonnage of leached rock, and lesser radius of impact.

Table 1 Example leached volume calculation.

Parameter	Units	Result	Comments
Effective Porosity	%	1.0	Porosity calculated from Pump Test
Leached Interval Thickness	m	9	SELT Bores screened interval
Pattern Size	m^2	98	SELT Bores pattern size
Rock Volume	m^3	882	Calculation
Leached Tonnage	T	1676	Calculation assuming rock density of 1.9 t/m^3
Pore Volume	m^3	8.8	Calculation

The lixiviant will follow the planes of fracturing which will be established through whole core CT imaging validating the results of the predictive fracture modelling.

The area of the Test is defined as a zone in the aquifer 100 m radius from the test pattern. The basis for this area is to allow sufficient space to establish a lixiviant plume of approximately 10 m radius, and then to allow for remediation of the lixiviant within one year.

The maximum estimated natural groundwater flow velocity less than 15 m per year (likely around 0.5 m/year locally at Site B). The lixiviant plume is then expected to remain within 7+15 = 22 m of the injection wells.

Estimates of groundwater flow in the fractured rock aquifer are uncertain, and flow is not homogenous. Measures are in place to manage this uncertainty; a tracer test has been undertaken prior to the trial to determine the rate of movement of lixiviant under an induced gradient identical to the planned Test. *For results refer to Attachment 6: Kapunda Site B Hydrogeological Tracer Testing, Land & Water Consulting, October 2024.*

Circulation of lixiviant with copper removal

This phase of testing will comprise 2 phases 1. the removal of copper solution via precipitation and 2. the removal of between 5,000 and 10,000 litres of leach solution which will then be taken off site for testing to help ascertain the relevant economics for the generation of a saleable product.

Precipitation, if required will be via the addition of soda ash to the pregnant leach solution in the holding tanks, the resulting slurry will be disposed of in a licensed facility. The second part of the trial will entail sending a sample of pregnant leach solution to Bureau Veritas laboratory facilities at Wingfield to undergo metallurgical recovery test work including concentration by Ion Exchange and copper recovery using an EMEW cell.

Mixing and Distribution Equipment

The existing wellhouse used in the Push/Pull test (approved ePEPR 2020-038) will be used to circulate groundwater and lixiviant to allow laboratory testing of metals concentration in solution, and other relevant groundwater parameters. This wellhouse is small, modular and is transported by trailer.

The wellhouse contains dosing pump, transfer pumps, flow meters, filters and switchboard to allow addition of lixiviant and distribution to wells. Pipework used will be made from High Density Polyethylene (HDPE) which is chemical resistant, UV stabilised and unaffected by hot and cold temperatures.

Lixiviant Injection

The lixiviant (dilute Sulphuric Acid) with tracer (sodium bromide) will be prepared and stored in four 1,000L IBC at each injection well.. Lixiviant will be drained into the Injection wells under gravity. No pressurisation of the wells will occur. The level in the well will be maintained at 2m below ground surface using a down well float valve to ensure that lixiviant expression at surface is impossible. The groundwater/lixiviant mix will be adjusted for pH during the trial by the addition of either acid or alkali to maintain a constant pH and will be filtered to remove any particulate matter that develops.

Lixiviant Circulation

The lixiviant will be circulated for a period of approximately 90 days (or shorter if reaction times are faster). Lixiviant samples will be taken daily as shown in the table “Groundwater Monitoring” below. The reaction period will end once pH and copper concentration are relatively stable.

Lixiviant Extraction

After the 90-day circulation period (or less), lixiviant will be extracted by pumping with a submersible pump. The lixiviant will be stored onsite in the storage tanks (5,000L) until it can be transported and disposed of by a wastewater contractor to a licensed facility.

Active Rehabilitation

Active rehabilitation comprises extraction of lixiviant from the extraction well (1 – 2 pore volumes) until rehabilitation criteria are met at the injection, extraction and monitoring wells. Active rehabilitation may occur post-test. The GMMP indicates the GW Rehabilitation method could require emergency actions:

- If not remediated in 10 days: Pumping from monitoring wells in addition to injection/ extraction well(s) to achieve high flow rates and larger area of extraction until full rehabilitation parameters return to baseline at all wells.
- If not remediated in 30 days: Injection of clean (mains) water into observation and/ or monitoring wells while pumping from the extraction well to flush formation until rehabilitation parameters return to baseline at all wells.

Extracted Water, Sample Collection and Metallurgical Testing

Water samples will be collected via the wellhouse for metallurgical testing. pH adjustment will be directly into tanks utilising soda ash or dilute sulphuric acid as required. The tanks and well house will be bunded to 120% of the net capacity of the largest tank as per Australian standards and EPA 080/16: Bunding and spill management with suitable spillage and management controls.

ECL yard is EPA licensed with a bund capacity of ~70m3. All equipment will be removed from site at the end of the test program.

All transport of leach solution off-site will be done by an EPA licensed transport operator to an EPA licensed site.

Groundwater Monitoring During Circulation trial

Groundwater monitoring will be the same methodology as approved in ePEPR 2020-038.

The purging process can be found in Appendix E of GMMP (April 2025) Groundwater Monitoring Methodology and Sample Analysis Program. A low flow purging method is used to ensure the groundwater level elevation does not decline greater than 10 cm and the groundwater extracted from the well comprises fresh groundwater obtained from the adjacent formation and not stagnant water contained in the well water column.

If emergency actions are required ECL have a range storage and pumping capacity different situations including high volume submersible and surface transfer pumps.

SCHEDULE

An overview of the project scope and the schedule is presented in Table 2 “Test project scope and schedule”.

Table 2 Test program scope and schedule

Stage	Description	Duration (Days/Weeks)	Monitoring
Groundwater Circulation	Circulate groundwater and monitor key parameters (pH, Ec, ORP, metal concentrations etc.).	5-10 days	Circulation trial
Circulation of aerated groundwater	Circulate groundwater and monitor key parameters (pH, Ec, ORP, metal concentrations etc.).	5-10 days	
Circulation of lixiviant	Circulate lixiviant and monitor key parameters (pH, Ec, ORP, metal concentrations etc.).	10-20 days	

Circulation of lixiviant with copper removal	Circulate lixiviant, remove copper from solution and monitor key parameters (pH, Ec, ORP, metal concentrations etc.).	10-20 days	
Lixiviant extraction and active remediation	Lixiviant pumped from the bore until water quality at all bores returns to baseline conditions defined in GMMP.	12+ days	Monitoring and Remediation phase
Monitoring	Monitoring will take place in accordance with approved GMMP	Up to 21 days post-trial and then 18-, 24- and 30-months post-trial.	
Contingency active rehabilitation	If trigger values / conditions are exceeded at any Monitoring Well, the following actions will be taken: Injection of lixiviant ceases. Extraction commences from the Extraction Wells and continues until the chemistry at the affected Monitoring Well returns to below trigger value controls. If excursion management does not result in correction of the excursion, then the extraction pump will be moved to the impacted monitoring well and groundwater will be pumped until the chemistry at the Monitoring Well returns to below trigger value controls.	TBA as applicable	
Trial Completion	The trial is complete when water quality at all bores returns to baseline conditions	21 days post-trial then up to 30 months as noted in the row below.	
Post Test Monitoring	Monitoring post SELT changes to groundwater quality.	Specifically, 1,3,7,14,21 days after the circulation trial and 18, 24 and 30 months 'post-trial completion'.	

Low impact exploration activities

Will low impact exploration operations be conducted that are not covered by the Generic program for environment protection and rehabilitation – low impact mineral exploration in South Australia, (generic PEPR)? If yes, describe each type of low impact operations proposed.	Yes ☐	No ☒
<Include text here.>		

Well activities

Will well equipment and monitoring activities be conducted? If yes, fill out the below table	Yes ☒	No ☐
Describe the ISR management and monitoring equipment down hole and at surface		

Well Identifier	Well Type	Well Depth (m)	Casing & Screen Material	Screen Intervals (m)	Storage tanks per well	Fluid storage capacity (m^3)	Size of each drill/well pad (m^2)	Well pad formworks (m^3)
KPSELTX01	Extractor	28.5	PVC	18.6 – 28.6	1	5	1	1
KPSELTI01	Injector	29.0	PVC	18.4 – 27.4	1	1	1	1
KPSELTI02	Injector	30.0	PVC	19.5 – 28.5	1	1	1	1
KPSELTI03	Injector	29.2	PVC	18.5 – 27.5	1	1	1	1
KPSELTI04	Injector	29.2	PVC	18.3 – 27.3	1	1	1	1
KPSELTM01	Monitor	29.4	PVC	23.6 – 29.4	0	0	0	0
KPSELTM02	Monitor	31	PVC	22.0 - 28.0	0	0	0	0
KPSELTM03	Monitor	29.0	PVC	22.0 – 28.0	0	0	0	0
TOTAL					**6**	**9**	**5**	**5**

• Injector • Extractor • Observation • Monitor • Sentinel	Measured hole depth.	• PVC • Steel • Stainless	Identify the top & bottom depth of each interval.	Count	Total capacity	Area of disturbance	Volume of material to cut and fill.

ISR Site preparation

If exploration drilling activities are proposed, describe the methods used to prepare sites, including vegetation clearance requirements, site levelling and digging of sumps.

Drilling completed in EPEPR2023-015.

Well construction, operation and decommissioning

Have the personnel responsible for implementing the proposed program read and understood the Earth Resources Information Sheet M21, Mineral exploration drillholes – general specifications for construction and backfilling?	Yes ☐	No ☒
Describe how drillholes will be constructed, including the casing material to be used, depth of casing, if the casing will be cemented, cementing intervals and the class of driller that will install the casing.		
See Section I: Plates 7 – 14 for extractor, injector and monitoring well construction diagrams.		
When describing drillhole decommissioning requirements, include the materials to be used, stratigraphic intervals where cement plugs will be placed, if the casing will be removed and when decommissioning will occur after drilling is completed.		
N/A		

Provide standard design and construction details (including screened intervals) in both text and schematic form where applicable for:

- injection wells;
- extraction wells;
- liquid disposal wells;
- water supply wells;
- observation wells
- compliance (monitoring) wells.

Describe any additional well construction considerations required to ensure that all wells remain inert to the leaching solution.

Describe decommissioning requirements, including the materials to be used, stratigraphic intervals where cement plugs will be placed, if the casing will be removed and when decommissioning will occur after drilling is completed.

Permits

The introduction of a Lixiviant into the environment will likely require an Environment Protection Authority (EPA) authorisation to conduct activities considered significant to the environment, under the Environment Protection Act 1993. The EPA licence is typically issued after the approval of the EPEPR.

Provide a statement confirming that an EPA Mineral Works Licence will be obtained prior to commencement of operations.

Indicate if water affecting activity permits required for the construction of wells, have been obtained in accordance with the Landscape South Australia Act 2019. If not provide a statement confirming that permits/licences will be obtained prior to commencement of operations.

Notes:

- Construction and abandonment requirements for mineral drillholes must be compliant with Mineral exploration drillholes — general specifications for construction and backfilling, Earth Resources Information Sheet M21, available on the DEM Minerals website.
- Water affecting activity permits (well construction permits) must be in place prior to commencement of drilling operations.
- Drilling, construction and decommissioning of any water wells must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority.
- The Environment Protection Act 1993 (EP Act) requires that all reasonable and practical measures are taken to protect, restore and enhance the quality of the environment, including requiring persons engaged in polluting activities to progressively make environmental improvements. This will affect how the minimum acceptable standards are determined and reflected in licences. A public notice must be published on the EPA website and/or in a newspaper circulating generally in the state (and if deemed appropriate, the local newspaper), and the EPA will write to adjacent land owner/occupiers, within 60 metres of the facility (usually the property boundary), referring to the application and

the type of activity that is being proposed. Members of the public will be given a minimum period of at least 14 days to submit comments

Test well configuration

Describe in both text and schematic form, the basic configuration of test well patterns and layout (includes injection, extraction and monitoring wells), including:

- infrastructure requirements;
- criteria for and the selection of a fit for purpose monitoring array; and
- design principles that minimise the disturbance and impact on sensitive receptors (e.g. native vegetation, built heritage sites, water courses etc.) and minimises excursions of injected solutions.

The monitoring well array comprising 3 monitoring wells is placed 25m distant from the trial pattern, and located along the main lines of structure / fracturing, as determined from CT scanning of core, transposition of surface expression of faults at outcrop, and transposition of structures mapped at Site A.

The configuration of the test wells is shown in Section J - Maps, Map F "Site B test array and Monitoring Array", A five (5) spot test pattern will be used, comprising four (4) injection wells and (1) extraction well. The four (4) injection wells will be positioned along the major lines of fracturing. One (1) extraction well will be installed at the centre of the pattern. The extraction well will be positioned 7-10 m from the injection wells along the two main fracture orientations.

The following criteria apply to the test wells. The test wells will be hydraulically connected to the ore zone. They will be sealed off from overlying material and able to accommodate a pump. Test wells will be screened across the ore zone as determined by assay of drilling samples. The casing will be grouted in place from the top of the screen to the surface. Casing integrity is checked by calliper log. Minimum internal diameter of 100 mm.

Three (3) monitoring wells will be installed 25m down hydraulic gradient, and in line with the fracture orientations at the site (along groundwater flow paths). There is an allowance for (1) monitoring well to be located 50m up hydraulic gradient along the major fracture orientation. A decision on the requirement for this well will be taken during the drilling program following an understanding of the requirements for repositioning of wells to achieve connectivity. The drillholes will be logged to confirm fracture orientation.

The following 'fit for purpose' criteria apply to the monitoring wells. Monitoring wells will be positioned using site-specific fracture mapping from downhole imagery and tracer testing. The monitoring wells will demonstrate that future addition of lixiviant is contained within the test area (100 m radius of test pattern). Located at 25m this will allow time to act before an any non-compliance occurs.

Leak prevention and detection

Describe the leak prevention and detection system(s) which will enable the operator to promptly and accurately detect and control loss of liquids for all:

- wells; and
- associated connecting infrastructure.

Well heads will be regularly inspected to detect leaks. Daily maintenance and condition inspections will be carried out at the start and end of each working day. Maintenance logs will be kept of the inspections and all leaks and loss of material will be detailed in an incident report. The operational site will also be continuously crewed during the tests, allowing immediate response to any leaks or losses.

Spill containment

Describe the spill containment or control system(s) as applicable, including bunding and leak prevention designs, for:

- wells; and
- associated connecting infrastructure.

Each operational well-head (injectors and extractors) has a purpose-built tray placed at its base to contain any leaks or spills. These are commonly used for in-situ recovery wells and are an industry standard. All tanks and mixing equipment are bunded.

Sample management

Describe the size of samples collected (including drilling samples and bulk sampling), collection methods, materials used when collecting the sample, sample disposal methods (including removal of sample bags), safety management and any other sample management requirements at the exploration site (e.g. tarps or matting used to contain cuttings). Include requirements for on-site geological sample management (splitting of archive samples, bag farms, core processing and storage).

Water samples will be taken as required for ongoing groundwater quality monitoring. The purging process can be found in Appendix E of GMMP (April 2025) Groundwater Monitoring Methodology and Sample Analysis Program. Throughout the purging process pH, ORP, Ec are

monitored and recorded using various water quality meters. All equipment calibrated prior to commencement of purging. Samples are refrigerated immediately, throughout storage and during transport to the laboratories. Samples will be delivered within 48 hours of the sampling event.

The GMMP identifies approximately 10 - 14 data points are available per well location, spanning from February 2024 to July 2024.

- Extraction well - X01 ~ 14 samples
- Injection well I01 ~ 14 samples
- Injection well I02 ~ 10 samples
- Injection well I03 ~ 10 samples
- Injection well I04 ~ 10 samples
- Monitoring well - M01 ~ 13 samples
- Monitoring well - M03 ~ 14 samples

Since the interim GMMP monitoring of the wells has continued. A total of 145 sample points have been collected between February 2024 and March 2025. Prior to commencement of trial the GMMP criteria will be revised with all new data:

- Extraction well - X01 ~ 20 samples
- Injection well I01 ~ 23 samples
- Injection well I02 ~ 19 samples
- Injection well I03 ~ 19 samples
- Injection well I04 ~ 19 samples
- Monitoring well - M01 ~ 22 samples
- Monitoring well - M03 ~ 23 samples

Bulk liquid samples (IBC) between 5,000 – 10,000L will be taken for metallurgical test work at the conclusion of the trial. This will be taken from the extractor at the conclusion of the trial, before rehabilitation commences. It will be transported by an approved EPA operator and stored at Kapunda storage facility until sent to the relevant parties for test work. Any extra will be disposed of at licenced facility.

Access routes to work areas

Will existing tracks require upgrading and/or maintenance? If yes, detail the work required to upgrade/maintain existing tracks.	Yes ☒	No ☐
In consultation with Light Regional Council MFY 23-039 TTMP (attachment 20) and Site Layout (attachment 19) which states, subject to the management of drag out, the proposed construction traffic will not create an undue hazard to the public, particularly as the design of the proposed access will comply with the requirements of a permanent facility. The proposed truck volumes will be low and will not alter the nature and function of the adjacent road network. Accordingly, no specific traffic management is warranted for the safe operation of the proposed access.		
Will access be required across adjoining tenements? If yes, detail the method(s) for gaining access, and if an agreement is in place with all stakeholders. Include the total area of disturbance required (i.e. length (km) and width (m) of tracks) and provide on a locality map.	Yes ☐	No ☒
N/A		
Will access off existing tracks be required? If yes, detail the method(s) for gaining access and if vegetation clearance is required. Include the total area of disturbance (includes drill traverses and seismic lines) required off existing tracks (i.e. length (km) and width (m) of new tracks).	Yes ☒	No ☐
Access to Site B will be directly off East Terrace (as previously described), through a widened access gate and gravelled track leading to the compacted gravel equipment laydown area. The length of access track will be approximately 50m with width of 4m, with a total disturbance area of 200m^2. The compacted gravel raised platform will cover an area of 10m x 15m, a total disturbance area of 150m^2, with a total disturbance area of ~350m^2 An estimated of 105m^3 of fill material will be needed to construct the track and raised platform. See Section I - Photos of this application (refer Plates 1-6). Diagrams showing planned access point on a locality plan for Site B is shown in Section J – Map B “Exploration operations site” of this application.		

Indicate planned access routes on a locality plan and distinguish between existing and proposed new access tracks and drill lines (including fence lines).

Campsites, storage and equipment laydown areas

Using the tables below, provide a description of campsites and/or laydown areas required. Indicate the campsite and laydown area on a locality plan.

Campsite details
Indicate where staff and contractors will be accommodated during the exploration program.
Most staff are Kapunda based; other supporting contractors will be mobilising daily from Adelaide.

What is the maximum number of personnel requiring accommodation?	0	
Is a campsite required to be established? If no, no further information is required.	Yes ☐	No ☒
Provide a description and justification of the camp location (e.g. previously cleared areas etc.), and any other relevant information.		
N/A		
What will be the total area (ha) of the campsite(s)?	N/A ha	
What will be the total area (ha) of vegetation clearance for the campsite?	N/A ha	
If vegetation clearance is required, describe the methods used to prepare the site.		
N/A		
Will any excavations be required? If yes, describe the purpose of the excavation and the maximum volume (m^3) of material to be excavated.	Yes ☐	No ☒
N/A		
Are the proposed ablution facilities endorsed/approved for use by the Department of Health or local council, where applicable? If no, indicate why.	Yes ☐	No ☒
N/A		

Proposed infrastructure (includes caravans, tents, offices, hydrocarbon and water storage requirements etc)	Quantity	Description/capacity
N/A		

Laydown area details		
Will laydown areas be required? If no, no further information is required.	Yes ☒	No ☐
Will the laydown area(s) be located at the same location as the campsite? If no, has the location(s) been discussed with the landowner?	Yes ☐	No ☒
N/A – there is no campsite		
What will be the maximum area (ha) required for the laydown area(s)?	0.15 ha	
What will be the total area (ha) of vegetation clearance for the site?	0.25 ha	
If vegetation clearance is required, describe the methods used to prepare the site.		
Minimal vegetation clearance required.		
Will any excavations be required? If yes, describe the purpose of the excavation and volume (m^3) of material to be excavated.	Yes ☒	No ☐
The compacted gravel raised platform (laydown area) will cover an area of 10m x 15m, a total disturbance area of $150m^2$		

Proposed infrastructure (includes hydrocarbon and water storage requirements)	Quantity	Description/capacity
Storage Water Tanks	1	$5m^3$ storage tank liquid processing applications.
Spare Water Tanks	1	Standard $5m^3$ water tank to store any required water needed for top ups.
Provide a description and justification of the location (e.g. previously cleared areas), and any other relevant information if required.		
All tanks will be bunded and located on the raised platform, the gravel will consist of a mix of road base and limestone/dolomite to neutralise any low pH material.		

Other exploration methods and/or ancillary operations

Are any other proposed exploration methods (e.g. seismic) and/or ancillary exploration operations required? If yes, describe the activity(s), site preparation, vegetation clearance, and safety and maintenance requirements.	Yes ☐	No ☒
N/A		

Water supply and management

Will camp and/or drilling water be required? If yes, describe how and where water will be sourced for drilling, track maintenance and camping purposes (e.g. groundwater, surface water, mains). Provide details on the volume of water required and how wastewater or runoff water will be managed.	Yes ☒	No ☐
This will be supplied to the site via IBC's which will be filled at the Light Regional Council standpipe facility in Kapunda. The standpipe is located 1.1km away from site. In emergency situations ECL has access to contractor with 20kL tanker.		
Will surface water and/or mineral drillholes be used as a water source/supply? If yes, indicate if a licence for water extraction/usage is required (refer to relevant Natural Resources Management water allocation plan available on the Department for Environment and Water (DEW) website. If a licence is required and has been obtained, please attach a copy. Where a licence has not been obtained, include a statement confirming that a licence will be obtained before the extraction and/or usage of water.	Yes ☐	No ☒
N/A		

Groundwater and drilling investigation activities

Will any water bores be required and/or water investigation activities (e.g. pump testing, water monitoring sites, water storage, turkey nests/dams) be conducted? If yes, describe the water drilling and investigation activities, including site preparation, vegetation clearance, and safety and maintenance requirements.	Yes ☒	No ☐
Test Wells and Monitoring Wells have been constructed to conduct the SELT and for baseline and ongoing monitoring. Bunded above ground water storages will be installed on site for the SELT. The vegetation clearance will be of small trees and bushes, required to complete the gravelled access track and construct the compacted gravel laydown area. Where possible native vegetation will be trimmed rather than removed. Full details of the work program are given in the section entitled 'Section D - Detailed description of exploration ISR operations' of this application.		
Indicate if well permits have been obtained and whether or not a water extraction licence is required in accordance with the Landscape South Australia Act 2019. If yes, attach a copy of the permit(s)/licences. If no, provide a statement confirming that permits/licences will be obtained prior to commencement of water investigation activities.	Yes ☐	No ☒
N/A		

Water affecting activities

Will any water affecting activities, other than drilling a water well, be undertaken (refer to s. 127 of the Landscape South Australia Act 2019)? If yes, attach a copy of the permit. If a permit has not been obtained, provide a statement confirming that a water affecting activity permit(s) will be obtained and provide a description of the site preparation, vegetation clearance, and safety and maintenance requirements.	Yes ☒	No ☐
See approved Drainage or Discharge Permits no. 449074/5/6/7 exp. 10/11/2026.		

Management of hazardous materials

Will activities be conducted in areas of known uranium and thorium mineralisation? If yes, attach a Radiation Management Plan and confirmation of endorsement of the plan by the Environment Protection Authority South Australia (EPA).	Yes ☐	No ☒
Will any other hazardous material be encountered when exploring in the area? If yes, list the types of hazardous materials and provide a management plan on how these materials will be managed.	Yes ☒	No ☐

The SELT circulation testing will require the storage and use of up to 10,000 Litres of treated re-circulated groundwater. Other chemicals such as 1,000L sulphuric acid solution and 1000kg soda ash will be stored offsite in a secured shed on self-bunded pallets.

An EPA licence has been applied for and granted (refer Attachment 22).

The site has been disturbed by historic mining activity and has elevated levels of copper and other contaminants in surface soils.

Proposed management controls for management of residual historical contamination include:

- Limiting disturbance of soil and material by using current access tracks.
- Limiting earthworks and site disturbance.
- Stockpiling and stabilising any topsoil required to be removed to prepare the site.
- Stormwater generated on-site from disturbed areas where possible to be contained on site and not released to drainage lines.
- Preferred use of surface tanks rather than construction of sumps to contain produced water.
- Removal from site of all produced water from circulation testing activities to avoid soil erosion or release of water to drainage lines. Water will be disposed at a licenced facility.

See Section I – Photos of this application (refer Plates 1 - 6).

Rehabilitation

Detail all activities, strategies and designs relating to the remediation of impacts associated with the proposed exploration operations, including the rehabilitation of groundwater, rehabilitation of test wells and associated infrastructure.

Where active groundwater remediation is to be used as a rehabilitation strategy, detail must be provided on the proposed remediation technique to demonstrate how outcomes will ultimately be achieved.

Where natural attenuation and biodegradation of the lixiviant (or any associated by products) is to be relied on for the remediation of aquifers to achieve post exploration groundwater quality outcomes, include:

- a description of the nature and expected rates of the attenuation, biodegradation and active remediation processes;
- predictions of the rate and full extent of attenuation/biodegradation and active remediation supported by laboratory tests and modelling;
- a demonstration (including laboratory evidence using host rock samples) that the predicted attenuation, biodegradation and active remediation can be achieved within expected timeframes;
- a description of how the predicted attenuation/biodegradation and active remediation will be validated; and
- a contingency plan if attenuation/biodegradation and active remediation is not demonstrated to be occurring within expected timeframes.

Rehabilitation strategies must ensure that final remediation of surface impacts, infrastructure and groundwater is completed within 3 months after the expiry of the 12-month approval period. In regard to the retention of permitted wells, provide adequate justification as to why they should not be decommissioned.

REHABILITATION OF GROUNDWATER

Expected Attenuation and Biodegradation Processes

Sulphuric Acid Degradation

2-3 times the volume of affected groundwater will be extracted at the end of the trial as part of the active rehabilitation process, any remaining acid will breakdown via natural attenuation.

Geochemical Modelling

A geochemical fate transport study was undertaken to understand the fate of metals mobilised by lixiviant. The study is provided as Attachment 10 "*Conceptual Site Model and Predictive Assessment - Kapunda ISR Hydro geochemistry Support for SELT*". The push/pull trial conducted at Site A verified this model with fluid moving less than ten metres from the injection well in the push/pull trial

Groundwater Rehabilitation

Rehabilitation of groundwater is detailed in previous section 2.6 "Actions on Non-Compliance". This includes details of rehabilitation criteria and rehabilitation method. Full details are also available in Section 4 of the Interim GMMP FR002, April 2025 (see attachment 3).

Groundwater Waste Disposal

Any groundwater for needing to be disposed during the baseline purging, extractions and active rehabilitation will be stored at ECL yard in Kapunda under EPA License 51363. The wastewater will be transported and disposed by an EPA licensed wastewater contractor to a licensed EPA facility.

GENERAL SITE REHABILITATION

Access to Site B will be directly off the East Terrace, through a widened access gate and gravelled track leading to the compacted gravel equipment laydown area. The length of access track will be approximately 25m with width of approximately 3m, and total area of 75m2. The access and location of Site B is in an open area with limited vegetation clearance required. The vegetation clearance will be of small trees and bushes, required to complete the gravelled access track and construct the compacted gravel laydown area. Where possible, native vegetation will be trimmed rather than removed. The access track is required to allow heavy vehicle access to site to deliver equipment for the SELT.

Following completion of the SELT, and in consultation with the landowner, the site will be rehabilitated. Any compacted areas on site will be prepared to loosen the soil and vegetation will be respread to encourage regeneration. Where vegetation is not available the areas will be reseeded. Any stockpiled soil will be redistributed in areas where swales have been created to capture spills from connecting pipework. These swales will be filled in with soil and be returned to the natural site contour and seeded.

The landowner has requested to keep the gravelled track for future use. The raised platform is to be removed using bobcat and tipper. The site will be scarified and rehabilitated.

All disturbed topsoil will be stored on site and used for rehabilitation post-exploration.

Fence and entry gates will be replaced/upgraded as required following completion of the this amended ePEPR. Records for the exploration program will demonstrate that any spillage or leak of material has been reported, and rehabilitation measures taken and will be provided within the 'Rehabilitation' section of the annual exploration compliance report.

In the case of soil being contaminated by hydrocarbons, the affected soil will be bagged and taken to an EPA licensed waste disposal facility immediately. The area from where the soil was removed will be rehabilitated.

Well Decommissioning

Injection/Extraction and Monitoring Wells will not be decommissioned but will be retained for future testing and monitoring.

State the estimated budget required to rehabilitate impacted sites.

Estimated costs of rehabilitation are $47,500 and will comprise the following:

- Groundwater rehabilitation
  - Pumping and disposal of water (as required) for rehabilitation of groundwater to baseline target levels. Allowance only $17,500
  - Rehabilitation sampling and assays $10,000
- General site rehabilitation
  - Soil loosening and scarifying as required $2,500.
  - Reseeding and planting (if required $2,500)

Detail all activities, strategies and designs relating to the remediation of impacts associated with the proposed exploration operations, including the rehabilitation of groundwater, rehabilitation of test wells and associated infrastructure.

Where active groundwater remediation is to be used as a rehabilitation strategy, detail must be provided on the proposed remediation technique to demonstrate how outcomes will ultimately be achieved.

Where natural attenuation and biodegradation of the lixiviant (or any associated by products) is to be relied on for the remediation of aquifers to achieve post exploration groundwater quality outcomes, include:

- a description of the nature and expected rates of the attenuation, biodegradation and active remediation processes;
- predictions of the rate and full extent of attenuation/biodegradation and active remediation supported by laboratory tests and modelling;
- a demonstration (including laboratory evidence using host rock samples) that the predicted attenuation, biodegradation and active remediation can be achieved within expected timeframes;
- a description of how the predicted attenuation/biodegradation and active remediation will be validated; and
- a contingency plan if attenuation/biodegradation and active remediation is not demonstrated to be occurring within expected timeframes.

Rehabilitation strategies must ensure that final remediation of surface impacts, infrastructure and groundwater is completed within 3 months after the expiry of the 12-month approval period. In regard to the retention of permitted wells, provide adequate justification as to why they should not be decommissioned.

- Storage and reuse of topsoil for contouring and filing of swales $5,000.
- Removal pf pipework and gravel. Includes allowance for clean-up of any spillage, with bagging and disposal at licenced facility $5,000.
- Allowance for repair/replacement of entry gate and/or fencing as required $5,000.

Injection/Extraction and Monitoring Wells will not be decommissioned but will be retained for future testing and monitoring.

Vegetation Clearance

Will any area of cleared native vegetation be unrehabilitated after the authorised period?	Yes ☐	No ☒

If yes, provide a description of the vegetation present in the application area, the extent of the proposed vegetation clearance and the likelihood of the presence of threatened flora. Provide this information on a map.

N/A

State the estimated quantum of significant environmental benefit (SEB) to be gained in exchange for the proposed native vegetation clearance and describe how the SEB will be provided.

N/A

SECTION E – LEASE CONDITIONS

Retention leases

Where the retention lease includes specific conditions that are not environmental outcomes, demonstrate where these have been addressed in the PEPR (if relevant) or demonstrate how otherwise they have or will be complied with.

N/A

SECTION F – MANAGEMENT OF ENVIRONMENTAL IMPACTS

Use the table below (instructions provided) to identify all of the potential environmental, social and economic impact events that are likely to occur as a result of the proposed exploration operations, how each of the identified impacts will be managed, and the residual risk, i.e. the level of risk remaining after implementing control and management strategies. Identified potential impact events should be developed based on the aspects of the environment that may be impacted on and the proposed operational details. Potential impact events must have corresponding outcomes and measurement criteria.

Where the terms and conditions of an RL include environmental outcomes, list them (where different) in the table below and complete all sections (i.e. receptor, potential impacts, control strategies, risk assessment and measurement criteria).

Environmental management – potential impacts/events, outcomes, measurable criteria and monitoring plan

			Likelihood of consequence (LH)				
			1	**2**	**3**	**4**	**5**
			Rare	**Unlikely**	**Possible**	**Likely**	**Almost certain**
Severity of consequence (CQ)	**A**	**Insignificant**	Low	Low	Low	Low	Low
	B	**Minor**	Low	Low	Moderate	Moderate	Moderate
	C	**Moderate**	Moderate	Moderate	High	High	High
	D	**Major**	High	High	Extreme	Extreme	Extreme
	E	**Catastrophic**	High	Extreme	Extreme	Extreme	Extreme

How to fill out the table

1. Based on the description of the environment and exploration operations, indicate which potential impacts are applicable to the proposed program. Note that some potential impacts are applicable to all programs.
2. For each applicable potential impact (and corresponding receptor), describe control strategies that will reduce the risk of the potential impact to an acceptable level, and achieve the corresponding environmental outcomes.
3. Conduct an impact assessment to determine if the control strategies address the potential impact (i.e. reduce the risk to an acceptable level). Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level.
4. For each applicable potential impact, the corresponding outcome and outcome measurement criteria are required.
5 Based on the description of the environment and proposed exploration activities, determine if any other potential impacts are applicable. For each new potential impact, describe proposed control and rehabilitation strategies, conduct an impact assessment, and develop corresponding outcomes and outcome measurement criteria.

Use the above matrix to conduct an impact assessment for each potential impact.

Impact assessment								**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty		
				LH	**CQ**	**Risk**	**UC**		
Stakeholders Receptor: • Local Government (Light Regional Council) • Neighbouring landowners • Local community • Department of Environment & Water (DEW) • Environmental Protection Authority (EPA) • Department of Premier and Cabinet (Heritage) Source: • Exploration vehicles and equipment • Exploration drilling activities • Test operations Pathway: • Movement of vehicles (traffic) • Air (noise/light/dust) • Land (leaks/spills)	Interference to: • existing or permissible land use (includes loss of income, noise, dust, light and other emissions). • buildings, structures, existing tracks or other infrastructure. • aesthetic values of an area. Noncompliance with legislative requirements. Exploration activity does not align with existing community values	**Yes** (Applicable to all programs.)	**Freehold Landowners:** Site B is located on Council land within the Kapunda Mine Site. Council as the owner of the land has been consulted and informed of ECR activities. Access agreements and permits have been signed and authorised. ECR is committed to: • giving notice prior to entry onto land and negotiating and executing waivers of exemption where required. providing a list of names of all ECR staff and contractor personnel on site. • restrict works to a single day-time shift, 7:30am to 6:30pm, Monday to Sunday • appropriately compensating landholders at a rate to reflect the economic loss, hardship and inconvenience resulting from the proposed exploration activities; and • carrying full public liability insurance. All wells drilled and not being retained will be finalised and sites rehabilitated in accordance with details in the DEM Information Sheets - M21: Mineral Exploration Drillholes - General Specifications for Construction and Backfilling, and M33: Statement of Environmental Objectives and Environmental Guidelines for Mineral Exploration Activities in South Australia, and honouring any additional commitments as agreed with the landholder. If required, after rehabilitation earthworks are completed, vegetation matter will be spread across the sites to encourage regeneration and reduce visual impact. Following consultation with the landholder, drill sites and access tracks will be re-seeded appropriately. **Local Government:**	**2**	**B**	**Low**	Significant consultation has taken place and Council, neighbouring landowners and community issues are well understood.	Stakeholders and community are fully informed and satisfied with the proposed methods used to conduct exploration activities on their land, and all prescribed forms are served, and agreements obtained in accordance with the Mining Act and Local Government (LG) Act.	Any complaints from landowners, Council or the community are recorded, investigated, and resolved within a two (2) week period. Provide the information requested within the 'Complaints' section of the annual exploration compliance report demonstrating that all reasonable complaints from stakeholders are resolved to the satisfaction of both parties prior to and ongoing during the exploration program, without the involvement of DEM. Provide the information requested within the 'Landowner Details and Liaison' section of the annual exploration compliance report demonstrating that prescribed forms were served, and agreements obtained in accordance with the Mining Act prior to the commencement of exploration activities. Conditions of all DEW Well Permits, and Drainage and Discharge Permits were complied with. This will be confirmed be providing a compliance report to DEM following successful completion of the Test program. Conditions of EPA licence and permits were complied with, by providing a report on the Test program to DEM as part of the compliance reporting regime.

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
			Site B is located on Light Regional Council (Council) controlled land in the southern section of the Mine Site. The proposed location (Site B) is separated from community access and walking tracks by fencing. Light Regional Council as the owners of the Mine Site (Site B) are responsible for walking trails and community access in the area. Under the LG Act 1999, lease or licensing of land is required to access areas within the Mine Site. This also includes a process of community consultation. An access agreement has been negotiated and agreed with Council and in place for this exploration program. A copy of this Council approval document is included as an attachment 13 & 14 to this application for reference. **Neighbouring Landowners:** All neighbouring landowners have been consulted and where exempt land obligations are applicable, waiver of exemption documents issued for signature. Waivers will be in place prior to the start of exploration and Site B. **Local Community:** There has been sustained consultation with the Kapunda community including opening a local office for ongoing discussions. This will continue throughout the exploration program. Also, as part of the CRC-P, CSIRO Land & Water was commissioned by ECR to undertake a review of community perceptions of potential renewed Copper mining and specifically ISR mining at Kapunda. Focus groups and interviews demonstrated that renewed mining activity would generally align to town existing values provided it was done in a way that maintained town character, included historical links to mining, preserved the friendly and relaxed lifestyle that locals value and if it was well regulated. Potential benefits have been identified including modest economic benefits, including increased tourism and sense of renewed pride in the town's mining heritage. Concerns identified included potential noise and dust. Specific concerns related to ISR mining include the use of lixiviants and how activities may affect groundwater. **Department of Environment and Water (DEW) and Environmental Protection Authority (EPA):** The project requires specific licences to be in place from South Australian government agencies DEW and EPA. These specifically relate to the drilling and use of wells and the storage and use of lixiviants for the purposes and scope as described in this application. The required licenses are as follows: • DEW Permit to undertake a Water Affecting Activity pursuant to section 112 of the Landscape South Australia Act 2019 - Well Permit (Permits will be in place prior to the start of Test program) • DEW Permit to undertake a Water Affecting Activity pursuant to section 135 of the Natural Resources Management Act 2004 – Drain or Discharge Permit (449074, 449075, 449076 & 449077) • EPA Licensing, pursuant to the Environment Protection Act 1993 and Water Quality Policy 2015. A licence is in place and a copy attached to this application. DEW permits have been applied for and approved and will be in place prior to the start of the Test program. For						

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
			activities related to well construction and operation all DEW permit requirements will be complied. All potential impacts from drainage and discharge activities have been identified and control measures put in place. See relevant groundwater quality and / or quantity section below for more detail. EPA licence no. 51363 (refer Attachment 22) has been approved for exploration activities, including the use of lixiviant. **Site Management:** ECR has specifically established a Work Health and Safety Management Plan (WHSMP) in accordance with Work Health and Safety Act and Regulations 2010. Site exploration activities will be managed using this WHSMP. A Site Management Plan will be implemented to control access, traffic, and site activities for the exploration program. Exploration activity methods will be selected to reduce nuisance impacts such as dust and noise. Lighting will be task-specific, directed downwards wherever practical and used only when required for safety.						
• **Stakeholders** • Receptor: • Parks & Reserves – State Government, Department of Environment & Water (DEW)	Interference to: • existing or permissible land use. • buildings, structures, existing tracks or other infrastructure. • aesthetic values of an area. Noncompliance with legislative requirements.	**No** (Applicable to programs located adjacent to or within parks and reserves.)	Not applicable (N/A) to the proposed exploration location as it is not located within or adjacent to a regional reserve or national conservation park.	**N/A**	**N/A**	**N/A**	N/A	N/A	N/A
Native Vegetation Includes Commonwealth and State scheduled species. Receptor: • Native vegetation and habitats Source: • Exploration vehicles and equipment • Access for test operations • Test operations Pathway: • Movement of vehicles • Land • Spills/leaks	Loss/modification of native vegetation and associated habitats through the clearance of vegetation.	**Yes** (Applicable to exploration programs located within or impacting on native vegetation.)	Site B is located in a partly cleared section of land in the southern section of the Kapunda Mine Site area. Around the edge of the cleared area there is sparse vegetation, dominated by large exotic trees (Olive and Pepper), native shrubs (Golden Wattle), and native eucalypts (Box and Yellow Gum). Minimal vegetation clearance will be required, focused on the removal of a small number of smaller trees (circa <0.5m in height), shrubs and wood debris. Where possible, native vegetation will be trimmed rather than removed. The short access track, and equipment laydown are positioned in areas that are essentially already cleared. The wells have been drilled in a predominantly open area which has been partially disturbed through former historic mining activity. Refer Plate 7 and 8 Section I - photographs of this application. Access to Site B will be directly from East Terrace which may be widened.to allow heavy vehicle access and may require only minor clearance of native vegetation impeding the area around the Site B access gate. Refer Section I - Plate 2. Signage is to be used to instruct entry/exit to the site and bunting used to delineate accessible areas and no entry areas. This will avoid unnecessary traffic damage to the vegetation across both sites.	**1**	**B**	**Low**	The location of native vegetation is well defined.	No permanent loss/modification of native flora and fauna populations and their habitats through: • clearance • fire • other unless prior approval under the relevant legislation is obtained.	Maintain before, during and after photographic evidence of all exploration sites (e.g. drill sites, new track exit/entry points off existing tracks) demonstrating that: • The area and method of disturbance is consistent with that described in the PEPR. • No uncontrolled fires* occurred as a result of exploration activities. Representative photos to be included within the annual exploration compliance report.

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
			Photographs of the site before and after the conduct of the exploration program will be submitted with the annual exploration compliance report. Rehabilitation of the site will promote regrowth and reseeding of existing native shrubs and eucalypts where these have been trimmed to allow access for previous drilling. A seed bank will be established to support rehabilitation.						
Weeds and Plant Pathogens Receptor: • Operational rehabilitated areas • Native vegetation and habitats Source: • Exploration vehicles and equipment Pathway: • Movement of vehicles • Land	Loss/modification of the environment (biological, social, and economic) through the introduction of weeds and pathogens.	**Yes** (Applicable to all programs)	To help prevent the spread of plant pathogens and weeds, ECR will introduce facilities and procedures to wash down vehicles entering sites. Mud will be removed, and tyres will be inspected when arriving at the work site. While on site vehicles will be required to use nominated tracks, and laydown area. Vehicles will also be washed prior to departure or travelling between properties. Vehicle logs will be kept during the exploration program to record that all vehicles are clean and free of plant and mud material prior to entering properties. Land disturbance will be minimised. Inspections will identify any areas of weed infestation on the operational site or rehabilitated areas. Registered herbicides will be used to control infestations as required. Weed monitoring around the exploration location is to continue for the duration of the 12-month exploration program and for 3 months following completion of the program while rehabilitation activities are taking place, to ensure there are no weed impacts on surrounding native habitat. Any replaced topsoil is to be reseeded with native grasses endemic to the immediate vicinity. Photographs of the site before and after the conduct of the exploration program will be submitted with the annual exploration compliance report to demonstrate rehabilitated sites have no new weeds.	**2**	**B**	**Low**	The presence of weeds on site is understood. The presence of weed species and abundance may change with seasons i.e. dry and wet periods.	No introduction of new species of weeds and plant pathogens, nor increase in abundance of existing weeds species.	Provide a statement within the 'Compliance with Approved Programs' section of the annual exploration compliance report, confirming that: • Vehicle logs were kept during the exploration program, demonstrating that all vehicles are clean and free of plant and mud material prior to entering properties† within the tenement areas, unless otherwise agreed to with the relevant landowners. • Photographic evidence before and during exploration operations and after rehabilitation of disturbed sites was captured, demonstrating that no new weeds and plant pathogens were introduced, nor an increase in abundance of existing weeds recorded.
Native Fauna Injured or Killed Receptor: • Rare and endangered fauna Source: • Entrapment • Collision with machinery • Test operations Pathway: • Movement of vehicles • Construction of sumps and excavations • Exposure to chemicals, test solutions and waste materials	Potential for rare and endangered native fauna to be injured or killed by vehicles or machinery. Entrapment of fauna through open drillholes and excavations.	**Yes** (Applicable to exploration programs that involve drilling and/or require excavations)	The use of surface tanks for water and other fluids is preferred to the use of sumps for this exploration program. This will deter birds and remove the risks of fauna entrapment. All bores will be capped/plugged immediately upon completion. This will reduce risks of fauna entrapment. All vehicles and equipment must comply with traffic management plan that will include a speed limit. This will reduce the risks of vehicle collision. Operation will be on single shift consisting of 7 days a week (Mon to Sun) from 7.30am to 6.30pm. There will be no exploration operations during nighttime hours. This will reduce the risks to fauna raised by nighttime operations.	**1**	**A**	**Low**	The sites(s) are not considered to provide high value habitat for rare and endangered fauna species.	No fauna traps created as a result of exploration activities.	Maintain before, during and after recorded and photographic evidence that: • All drillholes were permanently or temporarily capped/plugged immediately upon completion. • No fauna and livestock became trapped in drillholes and/or excavations throughout the duration of the program. • All rehabilitation was completed within 3 months of expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. • No vehicle collisions occurred involving native fauna. • No fires were reported on site. Representative photos are to be included within the annual exploration compliance report. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.
Aboriginal Heritage Sites Receptor: • Aboriginal heritage object and/or site	Disturbance to Aboriginal heritage	**Yes** (Applicable to all programs)	The Register of Aboriginal Sites and Objects, administered by the Department of Premier and Cabinet, has advised by letter to Exploration License Holders Terramin that there is no record of Aboriginal sites in the area.	**1**	**B**	**Low**	Whilst there is an absence of reported Aboriginal items within proximity	No disturbance to Aboriginal artefacts or sites of significance unless prior approval under the relevant legislation is obtained.	Maintain a database and provide a statement within the 'Compliance with Approved Programs' section of the annual exploration compliance report demonstrating that:

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
Source: • Exploration vehicles and equipment Pathway: • Exploration drilling activity • Earthworks • Movement of vehicles			There is a very low probability of discovery of Aboriginal sites and artefacts due to the site's history of agricultural and mining land disturbance. If Aboriginal heritage sites or artefacts are identified during the exploration program this will result in cessation of works and the site/artifact(s) will be reported to authorities. Work will only recommence once approval from relevant authorities is sought and confirmed.				to the site(s), it is possible that artefacts, objects or remains could exist that are not currently known about.		• Aboriginal Heritage sites/artifacts were not impacted during the conduct of the exploration program unless prior approval was obtained under the appropriate legislation. • Work ceased on discovery of a significant site/artifact and recommenced only after authorisation. • Aboriginal heritage sites/artifacts identified during the exploration program were appropriately recorded and reported to authorities, if not previously known.
European Heritage Sites and Sites of Scientific and Environmental Significance Receptor: • Heritage object and/or site Source: • Exploration vehicles and equipment Pathway: • Exploration drilling activity • Earthworks • Movement of vehicles	Disturbance to European heritage sites and sites of scientific and environmental significance (e.g. geological monuments, fossil reserves).	**Yes** (Applicable to exploration programs located close to or within European heritage sites and sites of scientific and environmental significance)	Exploration Site B is within the boundaries of the Kapunda Mine Historic Site, which is listed in the State Heritage Register (State Heritage Place No. 11535). To support this application, Australian Heritage Services (AHS), were asked to conduct a heritage review of the area. The results of the review indicated that *"Documentary and photographic evidence indicates that the subject site is located in the vicinity of former mining operations but does not appear to have ever been the location of any structures or of any direct mining activities. Some evidence of the nearby mines may remain, primarily related to the Stockwell and East Kapunda shafts. This is most likely to be loose artefacts dropped by the some of the many people who worked here since the c.1850s – c.1917 or moved by an excavator in the 1970s. Given these circumstances, any artefacts may have limited historical context".* The AHS report identifies the following strategy to ensure the management of archaeological potential is appropriately planned, communicated and excavated during the proposed works. Works Planning: Archaeological Permit requirements, including the location of significant mine features in the vicinity and the nature of possible artefacts that might be uncovered, will be communicated in planning documents and directly to the on-site project team, prior to the commencement of the proposed works. Archaeological Permit requirements to be included in site induction, as appropriate. Works Methodology: Photographs of the informal excavation and any possible artefacts will be taken and sent to the consultant archaeologist for review. Should any artefacts of potential heritage significance be identified, excavation works will stop in that well location and the find will be communicated to the consultant archaeologist. The consultant archaeologist will determine an appropriate path forward, in consultation with Heritage SA / the SA Heritage Council, as appropriate. Should a historic structure be identified, the location of the well site may need to be moved to avoid any further disturbance of significant artefacts. The informal excavation and any findings will be detailed in a concise report, which will be supplied to Heritage SA.	**1**	**B**	**Low**	Whilst there is an absence of reported heritage items within close proximity to the site(s), it is possible that artefacts, objects or remains could exist that are not currently known about.	No disturbance to European heritage sites and to sites of scientific and environmental significance unless prior approval under the relevant legislation is obtained.	Demonstrate no impact to heritage sites and sites of scientific and environmental significance through: • Preparation of an Archaeological Results Report - The informal excavation and any findings will be detailed in a concise Archaeological Results Report, which will be supplied to Heritage SA. The report will clearly detail specific location of each well site, the process of investigating the subject ground area and installing the wells, and any artefacts identified. Should any potentially significant artefacts be identified, the report will also include an analysis of the findings, which will aim to expand on the known history of the Kapunda Mine. • Maintaining evidence, including detailed maps showing sites compared to the location of exploration activities, and photographic evidence of sites before and after the conduct of the exploration program. • Providing a statement within the annual exploration compliance report confirming sites were not impacted during the conduct of the exploration program.
Soil/Vegetation/Fauna - Contamination	Soil/vegetation contamination (e.g. hydrocarbons, rubbish, ablutions, other sources).	**Yes** (Applicable to all programs)	All chemicals will be stored and handled on site according to The Dangerous Goods Act and Dangerous Substances Regulations.	**2**	**B**	**Low**	Chemicals, solutions, and associated	No contamination of soil, vegetation or surface water as a result of exploration activities.	Records for the exploration program demonstrate that all domestic or industrial waste (includes general rubbish and hydrocarbons) is disposed of in accordance with the *Environment Protection Act 1993* within 3 months of

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
Receptor: • Soils • Native flora and fauna • Ephemeral stream Source: • Exploration chemicals, test solutions and wastes Pathway: • Spill and leaks of chemicals, solutions and waste material.	Groundwater expression at surface.		Fuels, and operational quantities of chemicals will be similarly stored within the bunds or self-bunded pallets. A spill kit will be available on site to contain and collect any small spill events. Regular inspections will be carried out of storage areas to ensure integrity and cleanliness. Pipework connecting mixing and distribution equipment with well-heads will be made from HDPE. Polyethylene's toughness, immunity from corrosion, excellent resistance to chemicals and temperature, have contributed to its continued appeal for use in-situ recovery applications. To further control any spills, connecting pipework will have slight swales created into which the pipework will be laid. The swales will also be lined with black polyethylene (LDPE), to act as secondary containment in the event of a spill. Each operational well-head (injectors and extractors) will have a purpose-built spill tray placed at its base to contain any leaks or spills. These are commonly used for in-situ recovery wells and are an industry standard. Storage of liquid solutions, mixing and distribution equipment, connecting pipework and well heads will be regularly inspected to detect leaks. Daily maintenance and condition inspections will be carried out at the start and end of each working day. Maintenance logs will be kept of the inspections and all leaks and loss of material will be detailed in an incident report. The operational site will also be continuously crewed during the tests, allowing immediate response any leaks or losses. Lixiviant will gravity drain into the wells and the water level in the well will not rise above 2m below ground level; this will prevent any pressurisation of the aquifer and eliminate any surface expression of groundwater. Water extracted during testing will be carted offsite for disposal to prevent artificial wetting of native vegetation and prevent surface soil erosion. All domestic or industrial waste (includes general rubbish) will be disposed of in accordance with the Environment Protection Act 1993 within 3 months of the expiry of the PEPR approval. The following waste management measures will be implemented: • All rubbish removed from Site will be bagged and disposed to an EPA licensed waste disposal facility.				waste will be present on site. Quantities are known and not likely to change.	Groundwater will not express on the surface.	the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), and that all fuel and chemicals are stored in accordance with EPA requirements, by providing: • The name, location, and contact details of the authorised waste disposal facility. • A statement within the 'Compliance with Approved Programs' section of the annual exploration compliance report confirming domestic and industrial waste was removed from all exploration sites and disposed of at an authorised waste disposal facility. • Photographic evidence within the annual exploration compliance report demonstrating that all fuel and chemical storage facilities were managed in accordance with EPA requirements. Maintain photographs of all exploration sites and provide representative photos within the annual exploration compliance report demonstrating that drill cuttings are: • Removed from site and disposed of at a licensed facility. • Records for the exploration program demonstrate that any spillage or leak of material has been reported and rehabilitation measures taken. • Records for the exploration program demonstrate maintenance and condition logs are kept. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report. Any potential expression to surface detected of groundwater, within 100m of the injection bore to the surface will be recorded and subsequent reductions in injection to stop expressions will be recorded. This information will be reported to DEM.
Soil Profile and Erosion Receptor: • Land • Ephemeral stream/stormwater drainage line Source: • Earthworks Pathway: • Soil excavation • Run-off during rainfall events	**Disturbance to the soil profile and topography and accelerated soil erosion caused by exploration activities (e.g. construction of sumps, new tracks, and drill pads; ground compaction at laydown areas).**	**Yes** (Applicable to all programs)	Access tracks are not expected to require the disturbance of topsoil, drill site work areas may require the pads to be prepared but disturbance will be kept to a practical minimum. In areas where clearing is required, topsoil will be scraped to a depth of 0.4m and stored on site to avoid mixing as per Regulatory Guideline M21. Access tracks will be constructed from compacted gravel to allow heavy vehicle access. Following the program's completion and consulting with the landowners, the site will be rehabilitated. Any compacted areas on site will be prepared to loosen the soil and vegetation will be respread to encourage regeneration. Where vegetation is not available the areas will be reseeded.	**2**	**B**	**Low**	The scale of excavation is understood. Quantities are known and not likely to change.	Where soil disturbance occurs as a result of exploration activities, ensure that: • Topsoil quality and quantity are maintained. • The soil profile and topography are reinstated to original conditions. • There is no accelerated soil erosion.	Records are kept of before, during and after photographic evidence of all excavations, drill sites, camps, laydown areas and new tracks demonstrating that: • The soil profile and topography are reinstated to original conditions and is consistent with natural surroundings within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. • Where required, sufficient topsoil is removed (depending on soil profile), stored separately from subsoil and reinstated (in the correct order) within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised.

Impact assessment								Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty		
				LH	**CQ**	**Risk**	**UC**		
			The exploration site shows evidence of historic mining activity, including scarring and deposition of mining waste material. Environmental reports from the area related to historic operations indicate this material may contain elevated levels of copper and other contaminants. Proposed management controls for this historical residual contamination include: • Limiting disturbance of soil and material by using current access tracks • Limiting earthworks and drill site disturbance • Stockpiling and stabilising any topsoil required to be removed to prepare the site • Stormwater generated on-site from disturbed areas where possible to be contained on site and not released to drainage lines • Preferred use of surface tanks rather than excavation of sumps to contain produced water and drill muds and cuttings • Removal from site of all produced water from pump testing activities to avoid soil erosion or release of water to drainage lines. Photographs of the sites before and after the conduct of the exploration program will be submitted with the annual exploration compliance report. All disturbed topsoil will be stored on site and used for rehabilitation post-exploration. The topsoil will be reseeded with grass from the grazing land to quickly restabilise the area.						• There are no signs of accelerated soil erosion during and post rehabilitation of disturbed sites and surface water and erosion protection devices are preventing the release of contaminated waters leaving the site. Representative photos to be included within the annual exploration compliance report. Provide the information requested within the ‘Rehabilitation’ section of the annual exploration compliance report.
Surface Water Flow Receptor: • Ephemeral stream/stormwater drainage line and downstream users (including Light River) Source: • Access and site preparation/crossing of drainage lines Pathway: • Reduce/impede stormwater flow	Alteration to surface hydrology – interference to surface drainage.	**Yes** (Applicable to exploration programs that are likely to impact on surface drainage channels)	The work program has been designed to minimise any requirement for surface-work or access to drill sites that could potentially interfere with surface drainage lines in the area surrounding the exploration sites. Consultation with Council and an engineering review carried out by consultants has resulted in the preparation of a proposed design for the access and infrastructure requirements to support this EPEPR extension which details engineering plans for the site, including design of gravel access roads and infrastructure, including raised rubble platforms and stormwater control features/structures, such as earthen swales and drainage lines. The access track and equipment laydown area will be constructed from compacted gravel. An earthen swale will be constructed to move stormwater away from the test pattern during high rainfall events. All water, including groundwater generated on site during the exploration program will either be removed from site or re-injected into the bore and will not be released to surface water drainage lines. All compacted gravel will be removed post exploration program as part of the site rehabilitation.	**2**	**B**	**Low**	Stormwater flow in defined ephemeral stream/drainage lines around the exploration sites well understood. Flow rates will vary with season.	No permanent modification to hydrological features caused by exploration activities without obtaining a water affecting permit from the relevant Landscape Management Board. No decrease in the quantity of surface water available to water dependent ecosystems (including permanent pools) on or off the land as a result of activities.	Records of inspection are to record rainfall events and demonstrate review and maintenance of drainage line crossings to ensure stormwater flow is not impeded. Provide before, during and after photographic evidence within the annual exploration compliance report demonstrating that original drainage contours (watercourses) are consistent with the natural relief post-rehabilitation within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period).
Groundwater Quantity Receptor: • Groundwater users (Mantina Quarry) • Groundwater Dependant Ecosystems (GDE’s) – Light River Source:	Reduction in water quantity available for other users; Mantina Quarry water supply bores, and ecosystems (i.e. permanent pools of Light River).	**Yes**	**Reduction in Water Quantity** The trial will inject dilute lixiviant into the aquifer over likely a max 90-day period of continuous injection, extraction and reacidification. To rehabilitate the groundwater two (2) and three (3) times the injected volume will be extracted as remediation at a rate of up to 0.5 L/s at the conclusion of the SELT.	**1**	**B**	**Low**	No Uncertainty. The volumes of water to be pumped and the duration are insignificant from a water resource perspective.	No adverse impact to the quantity of groundwater available to other users and water dependent ecosystems i.e. Light River, as a result of exploration activities	None

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
• Operations: addition, circulation and abstraction of groundwater Pathway: • Groundwater movement			This will not impact water levels outside a 200 m radius of the Test Pattern. This has been confirmed through Push Pull Test results and prior modelling. COMSOL modelling predicts that the extent of the affected groundwater would be approximately 12.2m from the extractor (refer attachment 7 & section J Map G). There is no possibility of impact on the Light River, and there are no other users within 200 m of the Test Pattern.						
Groundwater Quality Receptor: • Groundwater users (Mantina Quarry) • Groundwater Dependant Ecosystems (GDE's) – Light River Source: • Operations: addition, circulation and abstraction of lixiviant solutions Pathway: • Groundwater movement	Contamination of aquifer from lixiviant and mobilised metals impacting other users including ecosystems (i.e. permanent pools of Light River)	**Yes**	**Well Array Fit For Purpose** The well array will be installed such that all wells are located along the orientation of fracturing. Well location and fracture orientation will be verified by whole core CT fracture logs obtained from each well. Solute connection between Test Wells and Monitoring Wells will be demonstrated by tracer test. **Operational (Lixiviant) Management** Baseline groundwater conditions for all wells will be determined during the water quality monitoring program will be outlined in a GMMP specific to Site B. During the trial, lixiviant will be contained within the trial zone, defined as within 100 m of the test array. A non-compliance is the identification of excursion from Site B that may affect the baseline groundwater and any associated receptors. An 'Excursion' is defined as: 'the movement of lixiviant outside the trial area'. The trial area is defined as the 25 m radius around the Injection/Extraction Wells where Monitoring Wells (KPSELTM01, M02 & M03) are located. Reference Action on Non-Compliance Section above Interim GMMP FR002, April 2025 (see attachment 3). Leading indicators of an excursion will be detected by monitoring excursion control parameters and comparing them to the established intra-well trigger values at Monitoring Wells (KPSELTM01, M02 & M03) located 25 m down hydraulic gradient from the Injection /Extraction Wells (KPSELTX01, I01, I02, I03 & I04) at Site B. Addition of the tracer (sodium bromide) will be used as an addition measure to monitor for excursions. Reference Action on Non-Compliance Section above and Interim GMMP FR002, April 2025 (see attachment 3). Identification of exceedances and timing of reporting and response is described in detail in Section "Action on Non-Compliance" Section of the Interim GMMP FR002, April 2025 (see attachment 3) and summarised above. The statistical approach is shown in Table 5 Test project scope and schedule. **Corrective Action - Immediate Control** If trigger values / conditions are exceeded at any Monitoring Well, the following actions will be taken: Injection of lixiviant ceases. Extraction commences from the Extraction Well (KPSELTX01) and continues until the chemistry at the affected Monitoring Well returns to below trigger value controls.	**2**	**B**	**Low**	Baseline groundwater quality is defined. Groundwater flow direction is well understood. Site specific fracture orientation will be determined by way of downhole logs.	No adverse impact to the quality of groundwater available to other users and water dependent ecosystems i.e. Light River, as a result of exploration activities. No adverse impact to the beneficial use category of groundwater because of exploration activities outside the recovery zone. The above will be achieved by maintaining lixiviant within the 25m radius trial area during operations and by rehabilitation of groundwater to baseline conditions at the end of the trial.	Outcome Measurement Criteria Comprise: Rehabilitation of the Trial area demonstrated by return of groundwater quality to baseline conditions. Specifically, no significant change to baseline groundwater quality as derived from statistical evaluation. Refer Section Baseline Groundwater Sampling above and Interim GMMP FR002, April 2025 (see attachment 3) for statistical approach. Details of monitoring and management approach are found in Section D – Baseline Groundwater Sampling and Groundwater Monitoring, of this document and full detailed reference is available in Interim FR002, April 2025 (see attachment 3).

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
			No further injection is undertaken, and the trial is completed and rehabilitated. Reference Corrective Action Section above and Interim GMMP FR002, April 2025 (see attachment 3). **Contingency** If excursion management does not result in correction of the excursion, and trigger value controls concentration limits continue to be exceeded in one of the Monitoring Wells (KPSELTM01, M02 & M03), even after the extraction has continued to the point that lixiviant is removed from the Injections/Extraction Wells to meet the rehabilitation criteria, then the extraction pump will be moved to the impacted monitoring well and groundwater will be pumped until the groundwater chemistry at the Monitoring Well returns to below trigger value controls. Reference Contingency Section above and Interim GMMP FR002, April 2025 (see attachment 3). **Rehabilitation** The rehabilitation criteria for the site are: • Return to baseline conditions or better of all rehabilitation parameters (better is defined as lower dissolved species and higher pH). Baseline is defined above under the heading “Baseline Groundwater Sampling”. • Rehabilitation parameters are those that have been identified from column leach tests and geochemical modelling as modified or potentially mobilised by leaching: pH, EC, Metals: Fe, Co, Zn, Cu, Ni, Ag, Li, Mo, Cr V. **Rehabilitation Method** Active rehabilitation comprises extraction of lixiviant from the Extraction/Injection Wells (KPSELTX01, I01, I02, I03 & I04) until rehabilitation criteria has been met. Reference Rehabilitation and Rehabilitation Method Section above and Interim FR002, April 2025, August 2024 (see attachment 3). The dilute sulphuric acid to be injected into groundwater has the Drain or Discharge Permit no. 449074,449075, 449076, 449077 in place. This activity has approval until November 2026, issued by EPA Licence No. 51363. (see attachment 22) For activities related to well injection testing all appropriate permits and licences are gained and complied with. **Bore Permits, Drainage Permits and EPA Licenses** The Test program activities require an EPA Licence (no. 51363 - see attachment 22.) For activities related to well injection testing all appropriate permits and licences will be in place prior to the start of the exploration program.						
Groundwater Surface Discharge Receptor: • Native flora and fauna Soil Source: • Groundwater Pathway:	Discharge of groundwater into the surrounding environment.	**Yes** (Applicable to all exploration programs that may intersect groundwater or where activities require the discharge of groundwater into the surrounding environment)	There is no injection pressure applied. There will be gravity drainage to the Injection Well and the water level in the injection well will be maintained below 2m beneath ground surface to ensure that lixiviant expression at surface is impossible. Above ground tanks and equipment will be sited away from trees and vegetation where possible.	**1**	**B**	**Low**	Volumes and the potential for spillage from wells and tanks is well understood. Chemicals, solutions and associated	No discharge of groundwater outside of the exploration site into the surrounding environment and no discharge of water into a watercourse unless prior approval under the relevant legislation is obtained.	Maintain photographic evidence of Site B demonstrating that groundwater was not discharged into the surrounding environment, unless water affecting activity permits were obtained allowing the discharge of groundwater into watercourses and/or lakes. Representative photos and water affecting activity permits (where applicable) to be included within the annual exploration compliance report.

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
• Groundwater well overflow							waste will be present on site. Quantities are known and not likely to change.		
Soil/Vegetation/Fauna – Degradation of Rehabilitated Access Tracks Receptor: • Operational rehabilitated areas • Native flora, fauna and habitats Source: • Exploration vehicles and equipment. • Third party vehicles Pathway: • Movement of vehicles • Land	Degradation of rehabilitated access tracks caused by third party access (includes previously closed and rehabilitated access tracks).	**Yes** (Applicable to exploration programs that create new access tracks)	The site is located on fenced Council land and is only accessible to Council and ECR. ECR will monitor entry and access to the sites during the 12-month exploration program and during a further 3-month rehabilitation period. As the wells will be maintained for future use, fencing and access track maintenance and control will continue beyond the exploration period. Photographs of the sites before and after the conduct of the exploration program will be submitted with the annual exploration compliance report.	1	A	Low	The requirement for rehabilitation of access tracks is fully understood. Access to the site and vehicle movements is strictly controlled.	Rehabilitated access tracks remain permanently closed unless prior approval under the relevant legislation is obtained.	Maintain before and after photographic evidence demonstrating that all tracks are in good condition and are being maintained for future use. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report. Where access tracks have been rehabilitated and closed, maintain photographic evidence, and submit for inclusion within the annual exploration compliance report.
Community/Landowners Receptor: • Land and buildings • Infrastructure • Flora, fauna and habitats Source: • Exploration vehicles and equipment • Exploration drilling activities • Test operations Pathway: • Vehicle movement • Vegetation • Spillage of fuel and chemicals.	Damage to infrastructure and loss of income through fire.	**Yes** (Applicable to all programs)	The following fire prevention procedure (see below) will be implemented by ECR on Site B. Dry pasture grass and stubble will be removed from sites where these present a fire risk. Fire prevention requirements are: • Availability of a long-handled shovel and rake. • Availability of at least one 9L water-based fire extinguisher. • Availability of 1000L IBC fire-fighting pump. Communications equipment (mobile telephones / two-way radio) to be present at the site always. Immediately call '000' on the outbreak of fire. If grinding and/or welding is to be carried out the equipment that needs repairing will be moved to a site (e.g. bit sharpening and repairs) that meets the following requirements: o An area of 10m around the cutting, welding, or grinding site clear of flammable material, or maintained in a wetted down state for the duration of the activity. o Screens erected around each cutting, welding or grinding site to prevent the escape of sparks. o Firefighting unit with minimum 1000L water tank, powered pump, 30m of hose. o The hose is to be deployed. o One or more persons whose sole job is to act as "Fire Spotter". o Notify the appropriate SACFS Regional HQ of work location on a day of Total Fire Ban. ECR and contractors acknowledge that, if a fire is started, even if all the conditions of the permit have been followed, the person who lit the fire is still accountable.	**2**	**B**	**Low**	The potential impacts to third-party property are well understood based on observations and monitoring from previous and current exploration activity	No loss of infrastructure or income through fire as a result of exploration activities.	Provide a statement within the 'Compliance with Approved Programs' section of the annual exploration compliance report confirming that no uncontrolled fires* occurred. Alternatively, provide a report on the independent investigation of all uncontrolled fires* demonstrating that the licensee could not have reasonably prevented the fire through the implementation of precautionary measures.
General Public – Health & Safety Receptor:	Injury or death to members of the public as a result of exploration activities.	Yes (Applicable to all programs)	The following procedures will apply to prevent accidents and injury to members of the public: Gates to work sites will be closed and "Authorised Entry Only" signage erected.	**2**	**B**	**Low**	Exploration activities are high regulated.	No accidents involving the public that could have been reasonably prevented.	Provide a statement within the 'Compliance with Approved Programs' section of the annual exploration compliance report confirming no accidents occurred involving the public during and after the exploration program.

Impact assessment									
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence			**Uncertainty (UC)** Describe any significant degree of uncertainty	**Outcomes**	**Outcome measurement criteria (inc. monitoring plan)**
				LH	**CQ**	**Risk**	**UC**		
Member of the public Source: Exploration vehicles and equipment Exploration activities Test operations Pathway: Movement of vehicles (traffic) Unauthorised public access to exploration area			Requirement of site induction of all visitors prior to entering work sites Vehicles to be cleaned prior to entering the road to prevent drag out of material onto the roadway. Spotter required for heavy vehicles entering the road. A Traffic Management Plan is to be put in place for vehicle entering or exiting the property access gate on East Terrace via access gate.				Health and safety management systems govern the exploration operation. Fencing and access control will be implemented for exploration sites.		If an accident involving the public did occur, provide a copy of the independent investigation report with the annual exploration compliance report demonstrating that the licensee could not have reasonably prevented the accident through the implementation of precautionary measures.
General public, employees, contractors and the environment Receptor: N/A Source: N/A Pathway: N/A	Contamination of the environment when exploring for known uranium and thorium deposits. Public and employee/contractor exposure to low level radiation.	**No** (Applicable to exploration programs located within known uranium or thorium deposits.)	This potential impact does not apply to the exploration program.	**N/A**	**N/A**	**N/A**	N/A	N/A	N/A

* Uncontrolled fires = fires that escape outside of the work area (e.g. drill site).

† Properties = freehold (cropping and grazing land); perpetual/pastoral lease land; council land; regional reserves; national, conservation and marine parks; Aboriginal land; Commonwealth land etc.

SECTION G - OPERATOR CAPABILITY

Provide information demonstrating that the tenement holder and operator (where applicable) has the capability to conduct the program in a manner that consistently ensures ongoing achievement of the environmental outcomes. This may be demonstrated within the PEPR by providing an overview of the following:

- Manuals or standard operating procedures that outline the safe and environmentally sound operation of all critical operations associated with the exploration program that ensure compliance with the PEPR.
- Systems in place to monitor, audit and assess compliance against the criteria approved in the PEPR.
- Systems in place to identify and report any noncompliance with regulatory requirements or relevant environmental outcomes (e.g. measures in place to report incidents in accordance with regulation 79(3)).
- Practices and procedures in place to provide appropriate communication of regulatory requirements to employees and contractors (e.g. induction programs).
- Practices and procedures in place to respond to, and communicate with landowners and external parties on the proposed program and compliance matters (e.g. complaints)

All activities undertaken by ECR are done so in a manner that is aimed to achieve “zero harm”. ECR is committed to ensuring the following objectives are met during every phase of the exploration program:

- Legislative compliance with respect to health, safety, the environment and community
- The protection of the natural environment, public safety, and amenity
- Achievement of agreed environmental outcomes.

ECR has an existing Work Health and Safety Management System (WHSMS) that describes how work health and safety and can be maintained. Working conditions will be continually improved and will ensure environmental and EPEPR compliance. The WHSMS includes policies and procedures, checklists, and forms. Employees and contractors are inducted and trained in the WHSMS and relevant procedures.

The WHSMS has established procedures for environmental and safety hazard identification & risk management and incident reporting (in accordance with regulation 79(3)) & investigation. An overview of the WHSMS Flowsheet is provided as figure 6.

ECR and contactors will also be inducted and trained in the relevant environmental outcomes stated in the approved EPEPR (refer Section F – Management of Environmental Impacts). Compliance with the outcome measurement criteria will be reported by ECR in the relevant sections of the Annual Exploration Compliance Report.

ECR has already developed and implemented a stakeholder and community engagement plan and have been active in the Kapunda community for a number of years.

As described in the EPEPR (refer Section F – Management of Environmental Impacts), any complaints from landowners, Light Regional Council or the community will be recorded, investigated, and resolved within a two (2) week period. Complaints and actions will also be reported in the ‘Complaints’ section of the annual exploration compliance report.

As previously discussed, the exploration activities are accounted for within the Light Regional Councils Community Land Management Plan (CLMP) for the Kapunda Historic Mine Site.

SECTION H –ADDITIONAL INFORMATION

List any other supporting information and/or documents submitted with the application, including land access approvals/permits required to conduct the proposed exploration program.

Attachments included with this application are as follows:

Attachment Number	Title/Description
Attachment 1	Push Pull Test - Operational Report, ECL Ltd, August 2024 *NEW*
Attachment 2	Push Pull Test - Groundwater Monitoring Compliance Report, Land & Water Consulting, James Fox, July 2024 *NEW*
Attachment 3	NJ 01 04 Kapunda Site B Groundwater Monitoring & Management Plan (Interim Criteria) (GMMP), Version FR002, Land and Water Consulting, April 2025 *UPDATED*
Attachment 4	Kapunda Site Environment Lixiviant Trial (SELT) E-PEPR, Hydrogeological Description of the Environment, Groundwater Science, Ben Jeuken and Paul Magarey, August 2021
Attachment 5	Kapunda Site B Hydrogeological Pump Testing, Land & Water Consulting, April 2024 *NEW*
Attachment 6	Kapunda Site B Hydrogeological Tracer Testing, Land & Water Consulting, October 2024 *NEW*
Attachment 7	Kapunda Cu-ISR Trials Groundwater Impact COMSOL Study, ECR, Matt Swann, October 2024 *NEW*
Attachment 8	Kapunda Site A & Site B Comparison, ECR, Leon Faulkner, October 2024 *NEW*
Attachment 9	Community perceptions of potential renewed Copper mining, Kapunda, SA, Tom Measham, Simone Carr-Cornish and Andrea Walton, CSIRO, October 2019
Attachment 10	Conceptual Site Model and Predictive Assessment Kapunda ISR Hydro geochemistry Support for SELT, Land and Water Consulting, James Fox, August 2021
Attachment 11	Constraining regional-scale groundwater transport predictions with multiple geophysical techniques, Chris Li et al., 2021
Attachment 12	Community Land Management Plan for the Kapunda Mine Historic Site (CLMMP)
Attachment 13	Light Regional Council Waiver of Exemption Agreement, April 2021
Attachment 14	Light Regional Council Third Addendum Waiver of Exemption Agreement, March 2023
Attachment 15	Form 21B Notice of Entry on Land Light Regional Council, April 2021
Attachment 16	Waiver of Exemption 23B, Karen Sanderson
Attachment 17	Waiver of Exemption 23B, Russell Weber
Attachment 18	Waiver of Exemption 23B, Timothy Ellbourne
Attachment 19	SELT Proposed Site Layout *NEW*
Attachment 20	MFY 23-039 Temporary Traffic Management Plan (TTMP) *NEW*
Attachment 21	Sulphuric Acid Safety Data Sheet (SDS)
Attachment 22	EPA Licence no. 51363
Attachment 23	Drain or Discharge Permit no. 449074, 449075, 449076 & 449077 *NEW*
Attachment 24	Kapunda Site B Additional Hydrogeological Pump Testing, Land & Water Consulting, November 2024 *NEW*

20

SECTION I – PHOTOS

Include photographs in this section:

- that have been obtained during site visits
- that help describe relevant environmental and operational aspects in the PEPR.

To insert photos, copy and paste the photo into the template below. Resize photos to fit page width. Ensure that all information about each photo is completed and refer to the photo number in the relevant section of the PEPR.

Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Details and Comments
Perry Road Turning Left onto East Terrace	12/09/2024	Plate 1	308604	6196792	54 H	Site B access from Perry Road (public and heavy vehicle road)

Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Details and Comments
Access Gate from East Terrace to Site B	19/7/2023	Plate 2	308633	6196797	54 H	Site entrance gate looking northwest from East Terrace

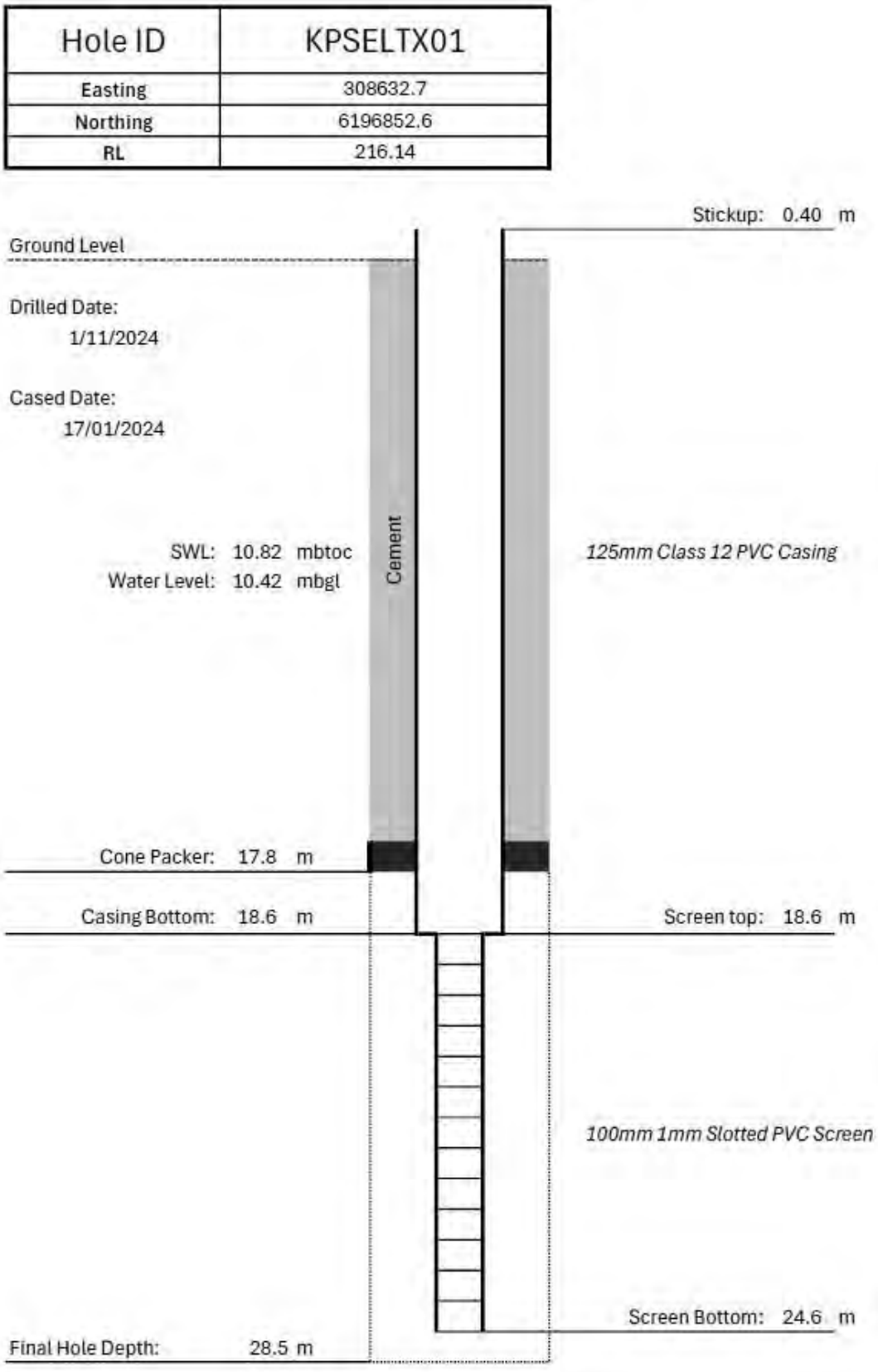
Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Details and Comments
Site B	19/7/2023	Plate 3	308652	6196832	54 H	Pan across test site looking north

Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
Infrastructure Laydown Area	19/7/2023	Plate 4	308641	619839	54 H	Infrastructure laydown area close-up looking north-west

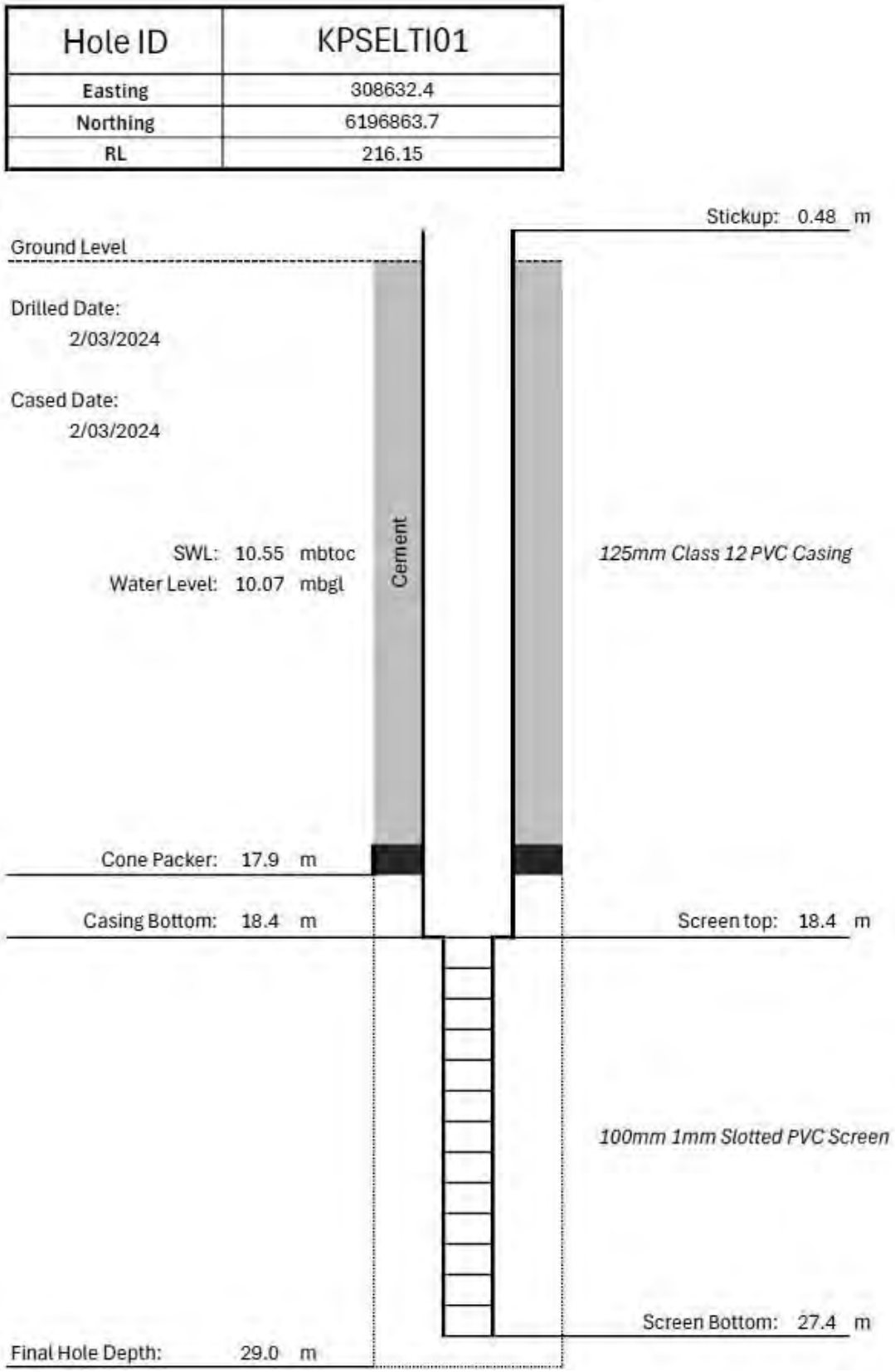
Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
Test Wells Location	19/7/2023	Plate 5	308364	6196847	54 H	Test well area close-up looking north-west

Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
Monitoring Wells Location	19/7/2023	Plate 6	308654	6196841	54 H	Monitoring wells location close-up looking north-west

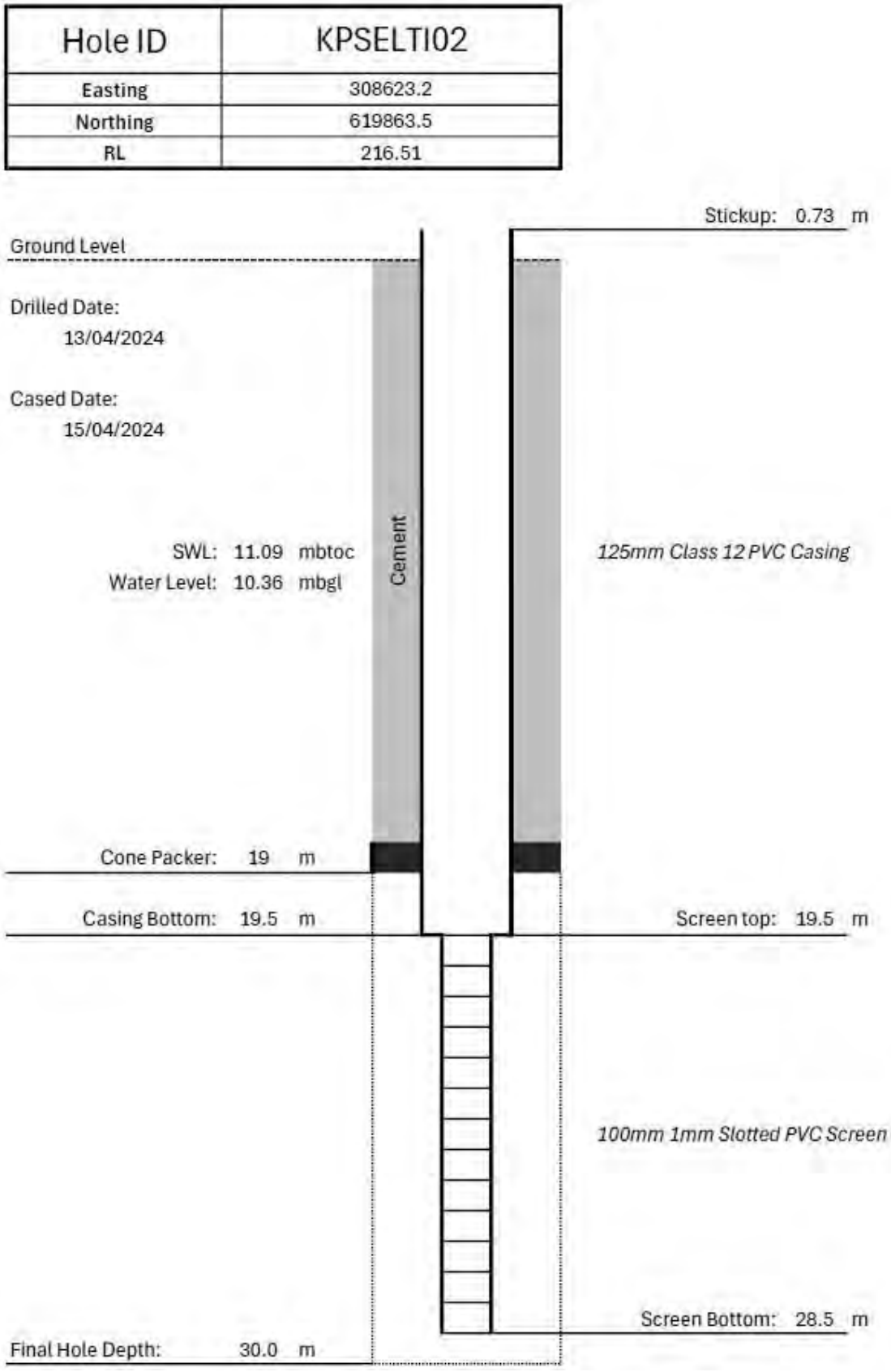
Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTX01 Construction		Plate 7	308632	6196852	54 H	Construction diagram



Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTI01 Construction		Plate 8	308632	6196863	54 H	Construction diagram

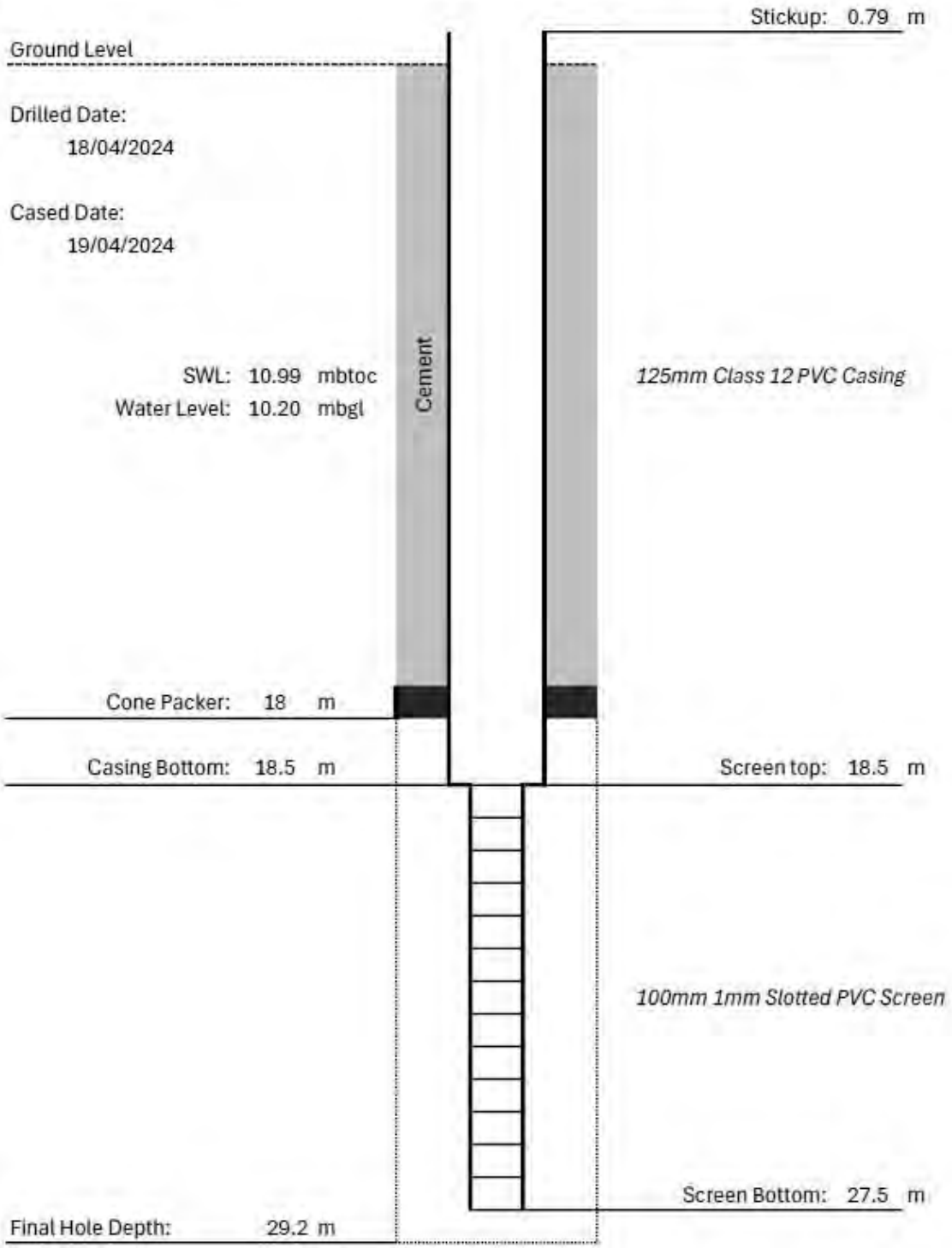


Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTI02 Construction		Plate 9	308623	6196863	54 H	Construction diagram

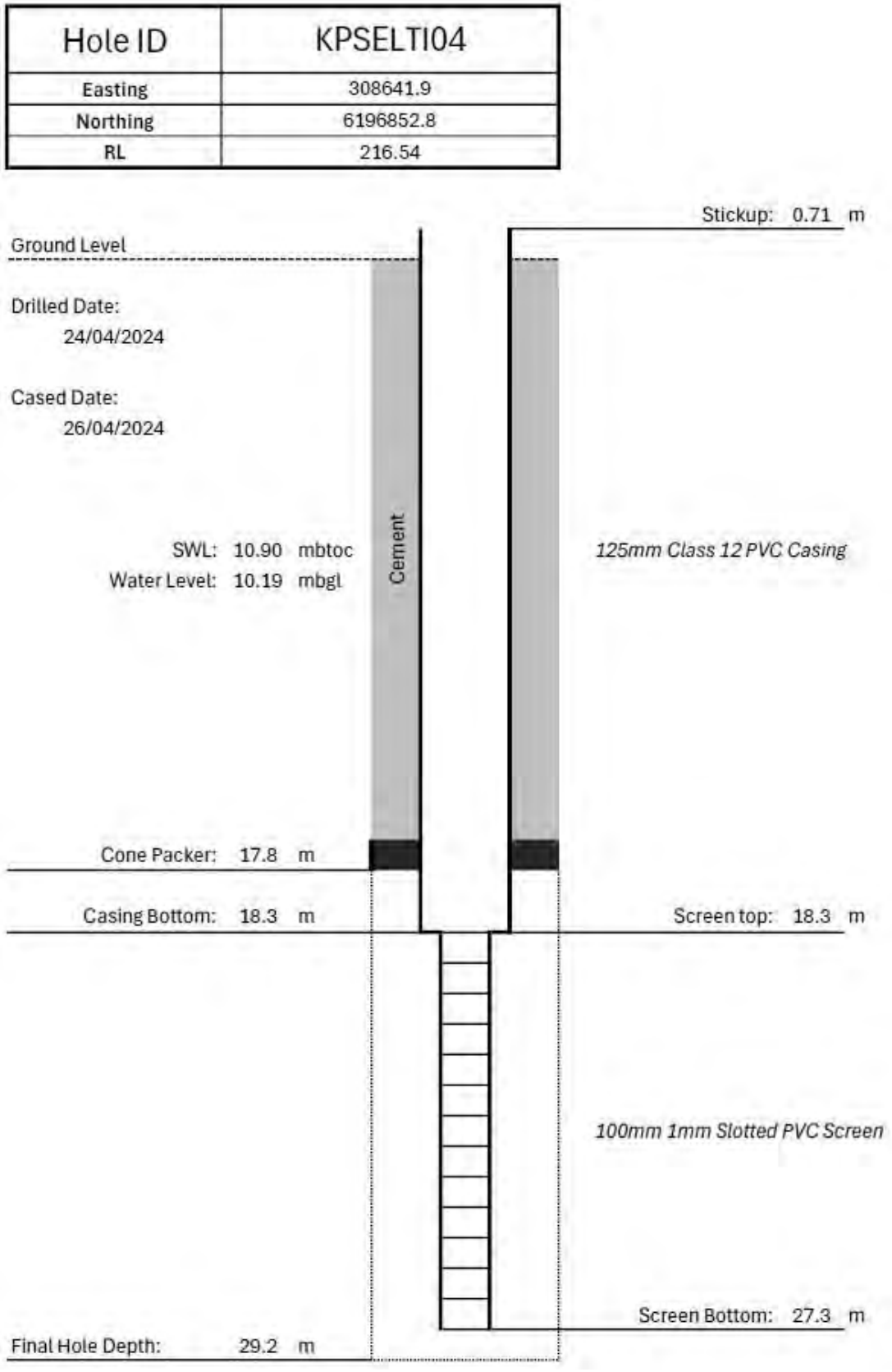


Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTI03 Construction		Plate 10	308632	6196852	54 H	Construction diagram

Hole ID	KPSELTI03
Easting	308632.7
Northing	619852.6
RL	216.24

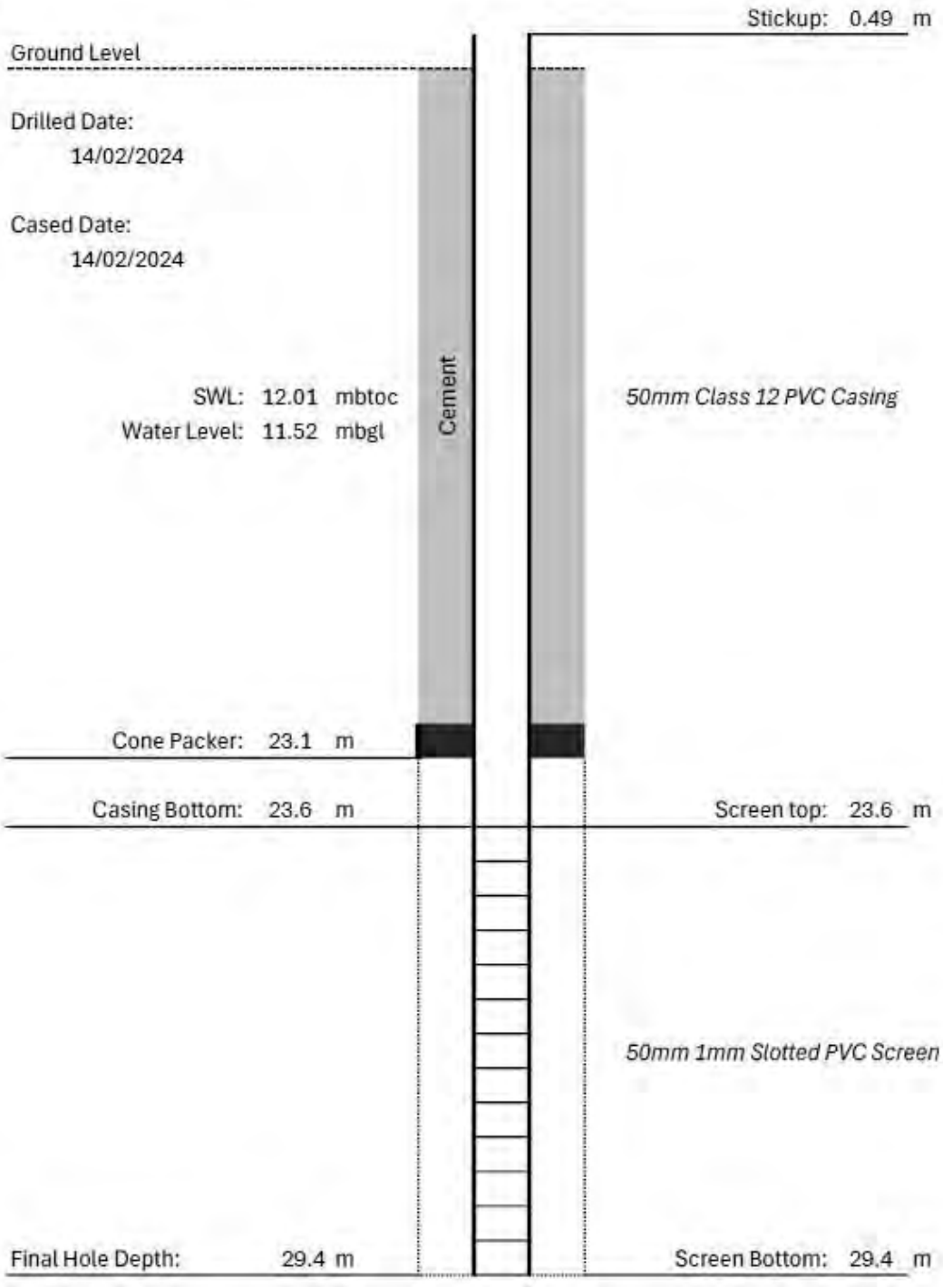


Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTI04 Construction		Plate 11	308641	6196852	54 H	Construction diagram

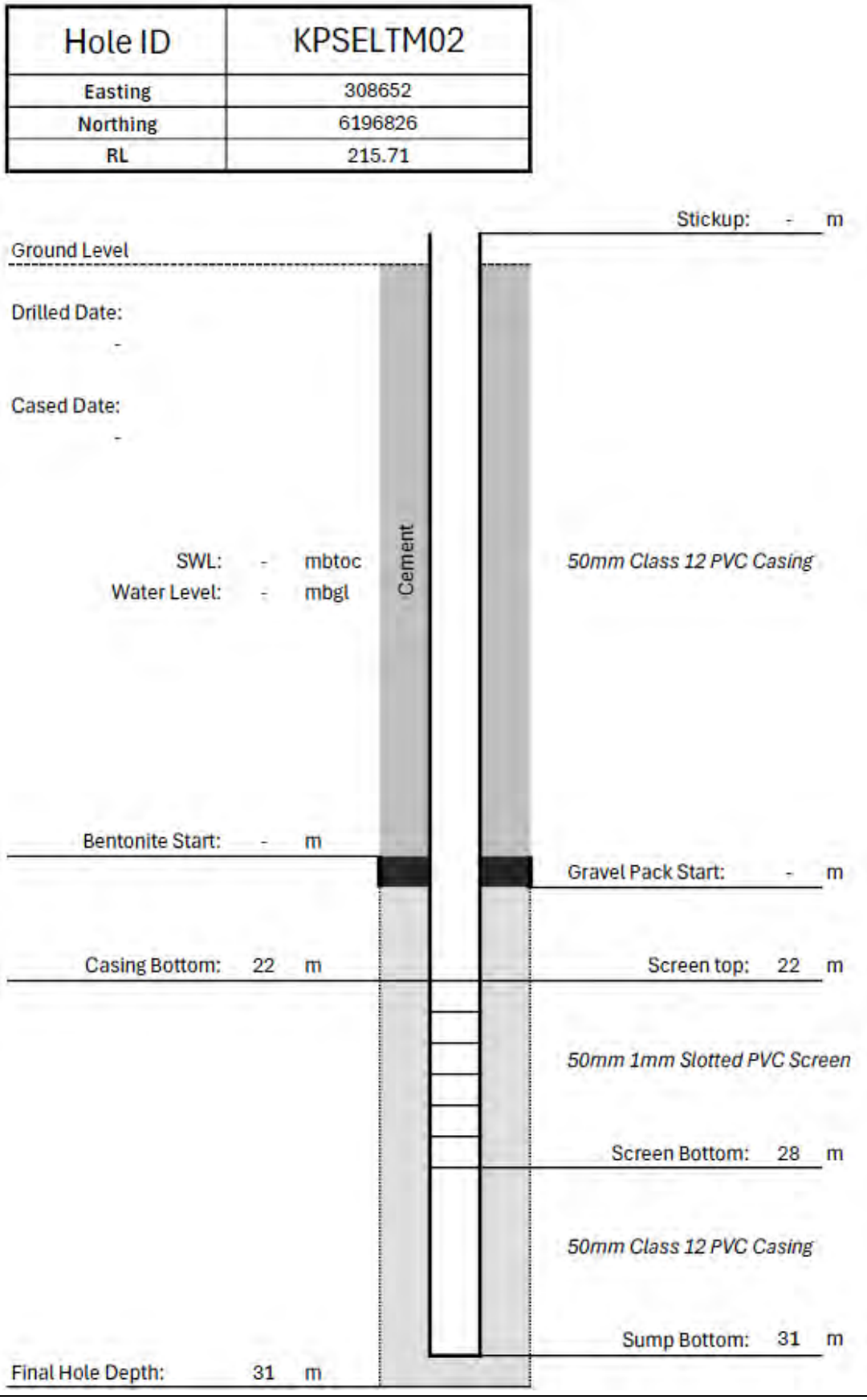


Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTM01 Construction		Plate 12	308614	6196841	54 H	Construction diagram

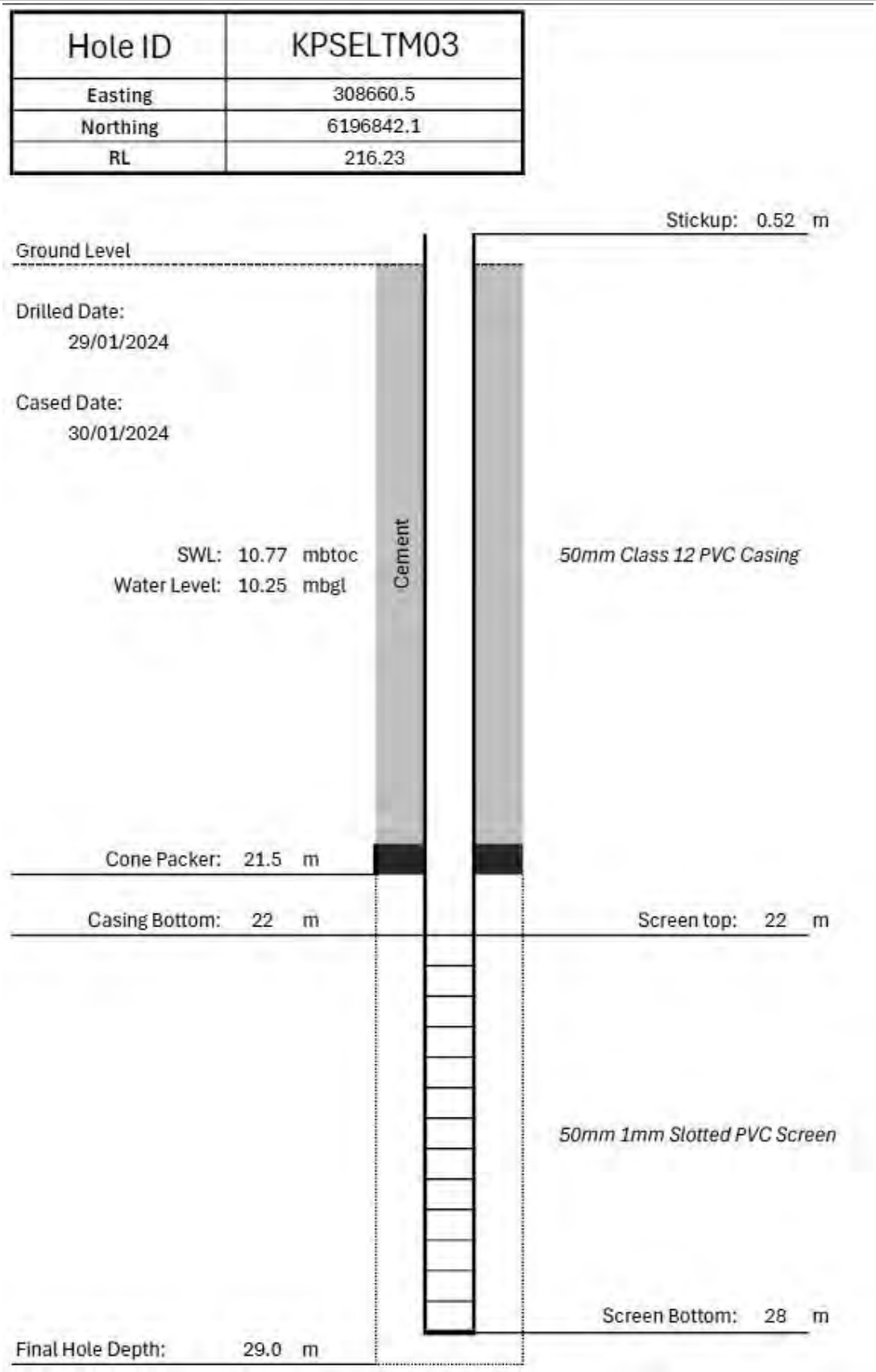
Hole ID	KPSELTM01
Easting	308614.5
Northing	6196841.2
RL	217.19



Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTM02 Construction		Plate 13	308652	6196826	54 H	Construction diagram



Site identification/details	Date taken	Photo number and PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Comments
KPSELTM03 Construction		Plate 14	308660	6196842	54 H	Construction diagram



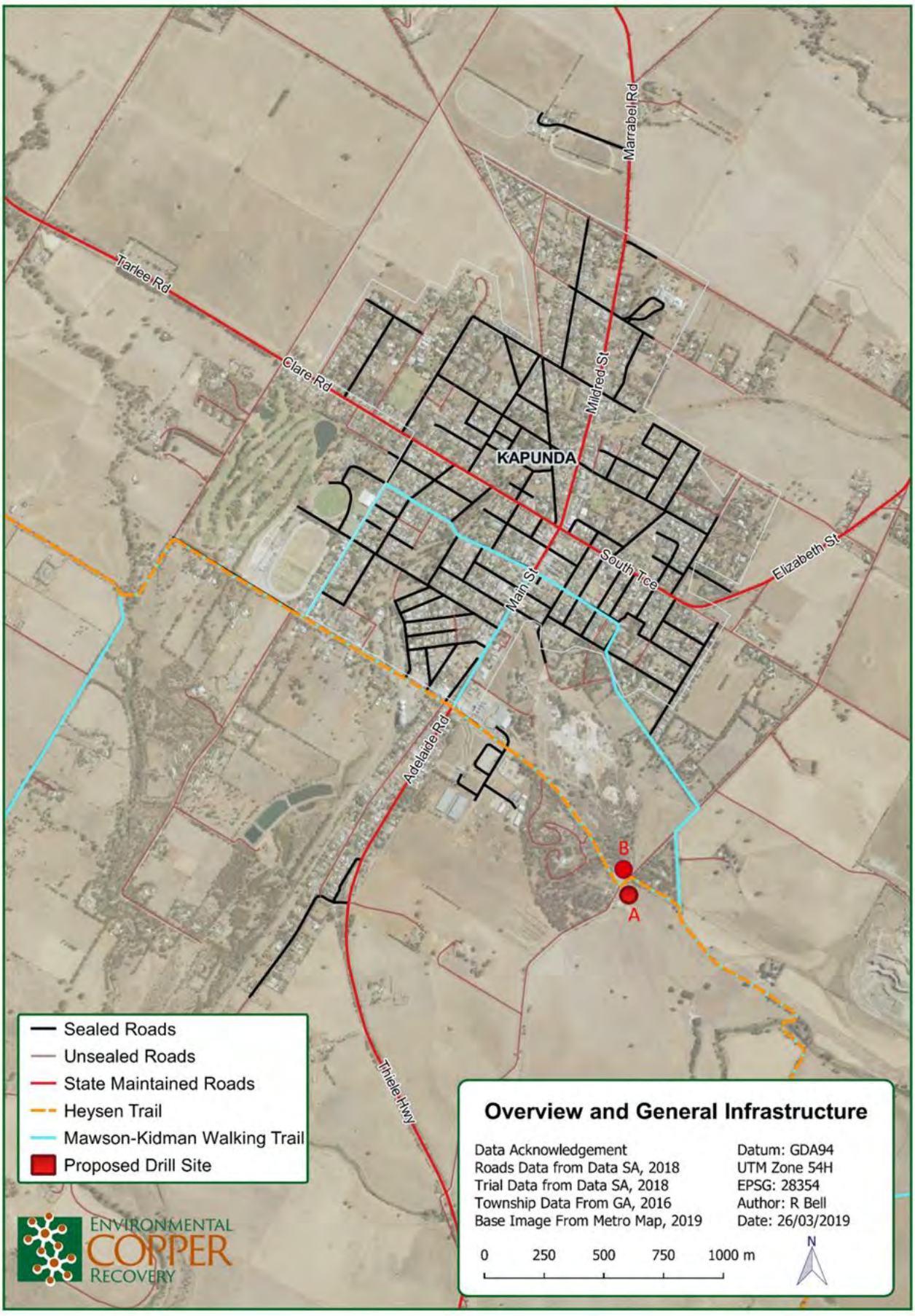
SECTION J – MAPS

Provide a map(s) showing the following information that is located adjacent to or within the proposed area of operations, where applicable:

- tenement boundaries,
- cadastral information,
- existing surface contours,
- existing vegetation,
- location of the proposed exploration operations (includes drillholes, existing and new access tracks, drill traverses, campsites, laydown areas and other applicable information) and/or the target exploration area(s),
- location of existing ephemeral and permanent rivers, creeks, swamps, streams or watercourses and water management structures,
- location of towns, dwellings, existing roads, rails, fences, trails, transmission lines, buildings, dams and pipelines
- known sightings of listed species,
- location and extent of all environmentally sensitive areas,
- any relevant land use types (e.g. parks and reserves, Aboriginal freehold land, Woomera Prohibited Area).

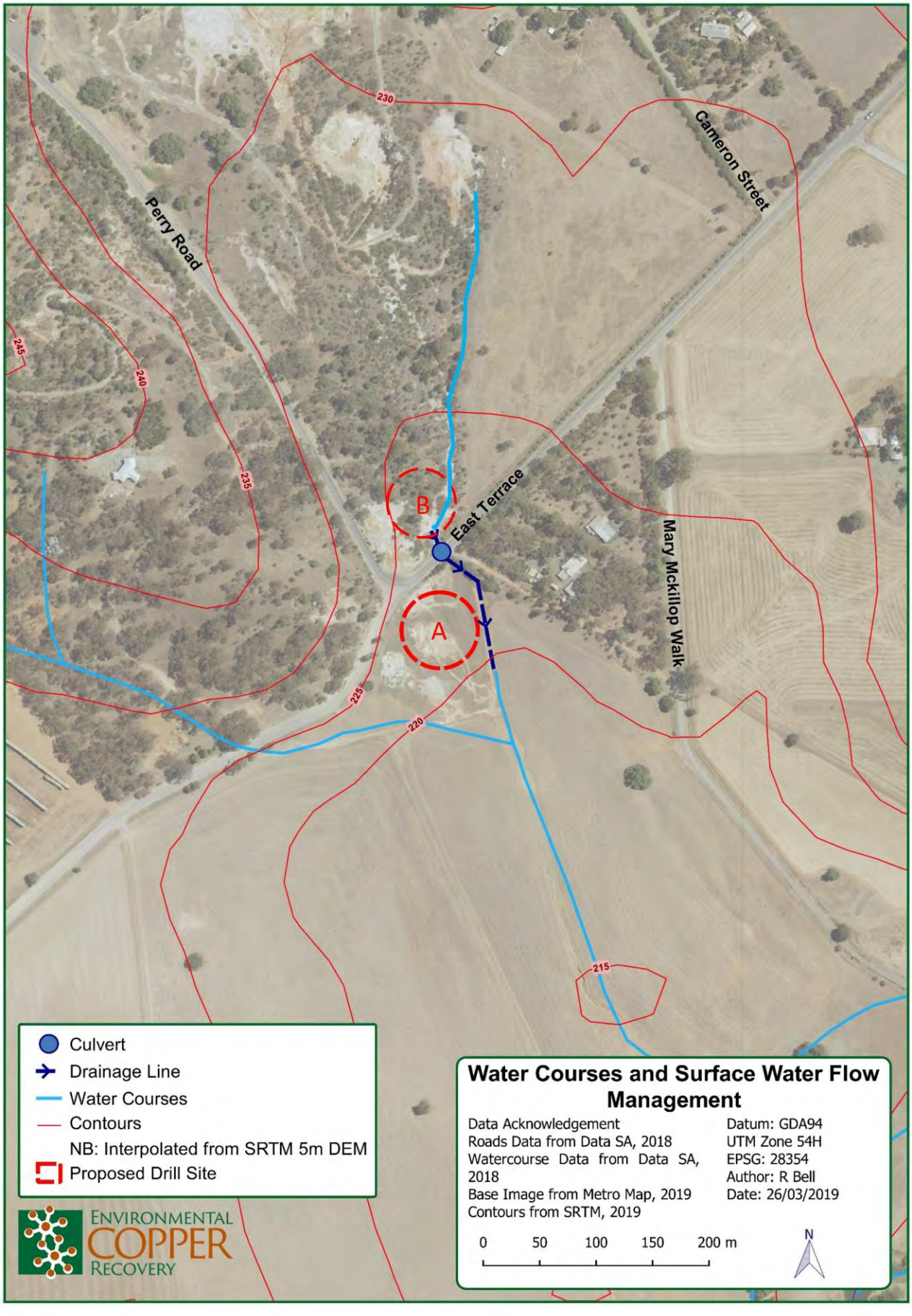
All maps and sections must conform to the standards outlined in the Exploration PEPR Terms of Reference.

MAPS

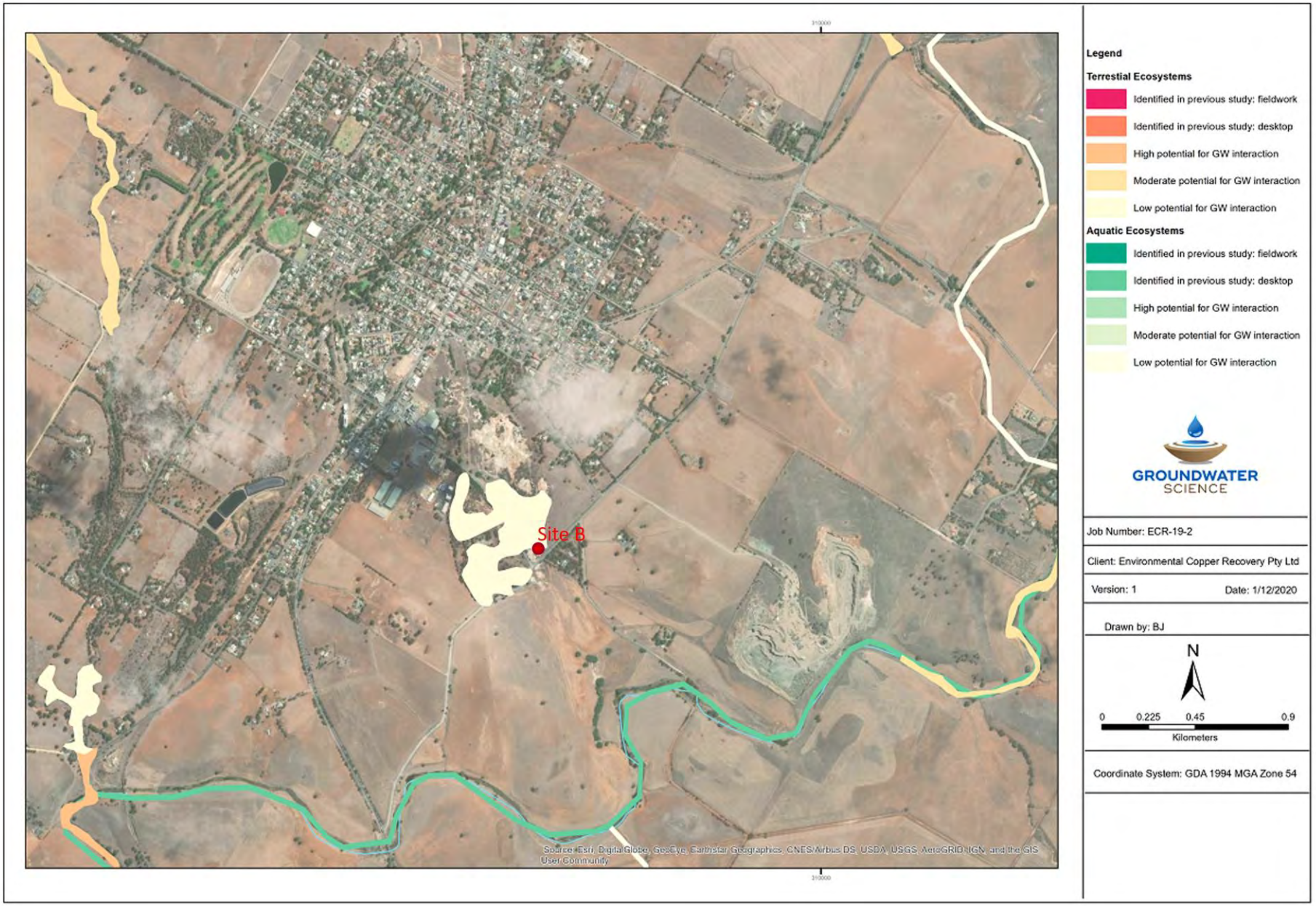


Map A Exploration site and general infrastructure (Site A shown for reference)

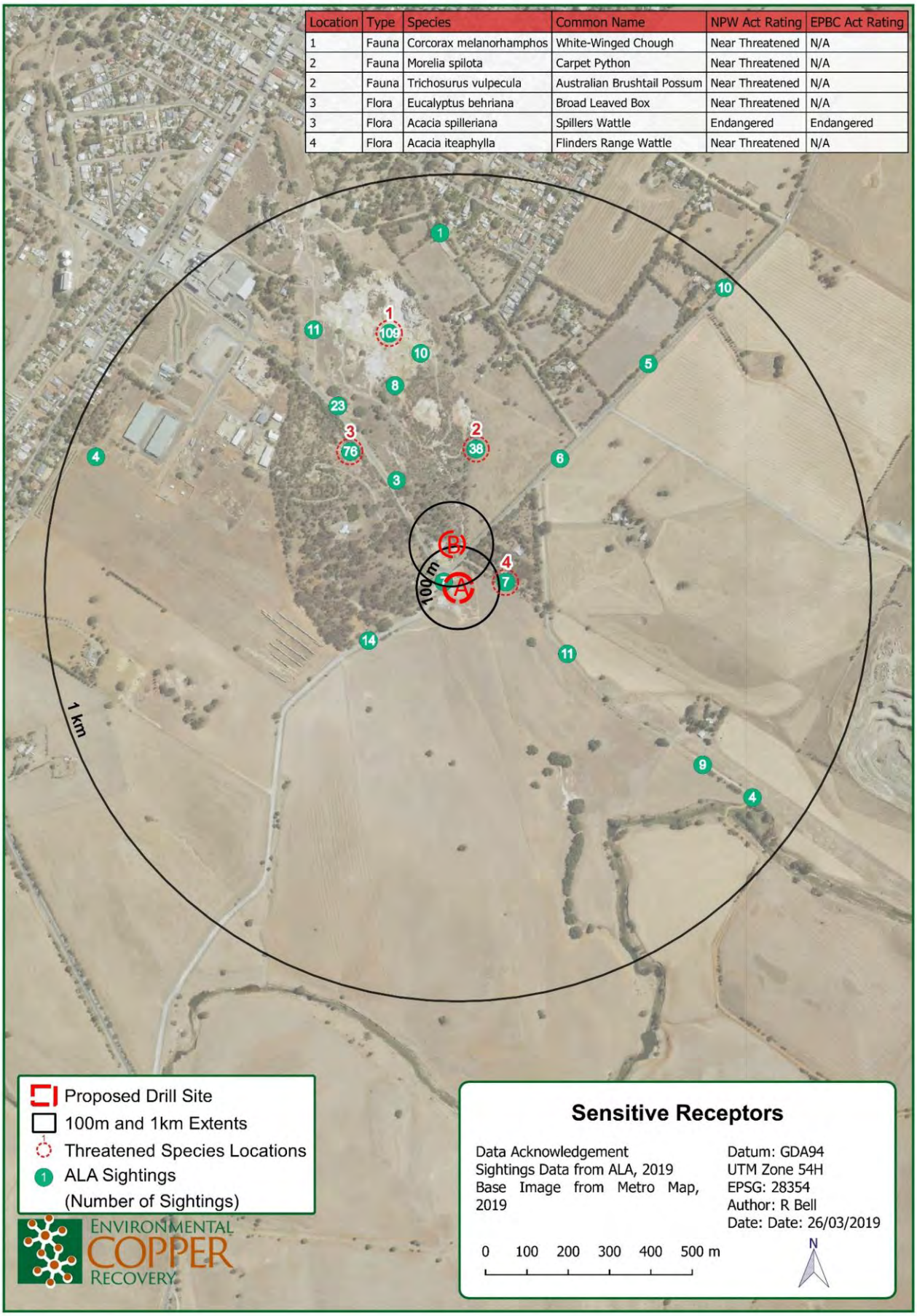
Map B Exploration operations site



Map C: Water courses and surface water flow management (Site A shown for reference)

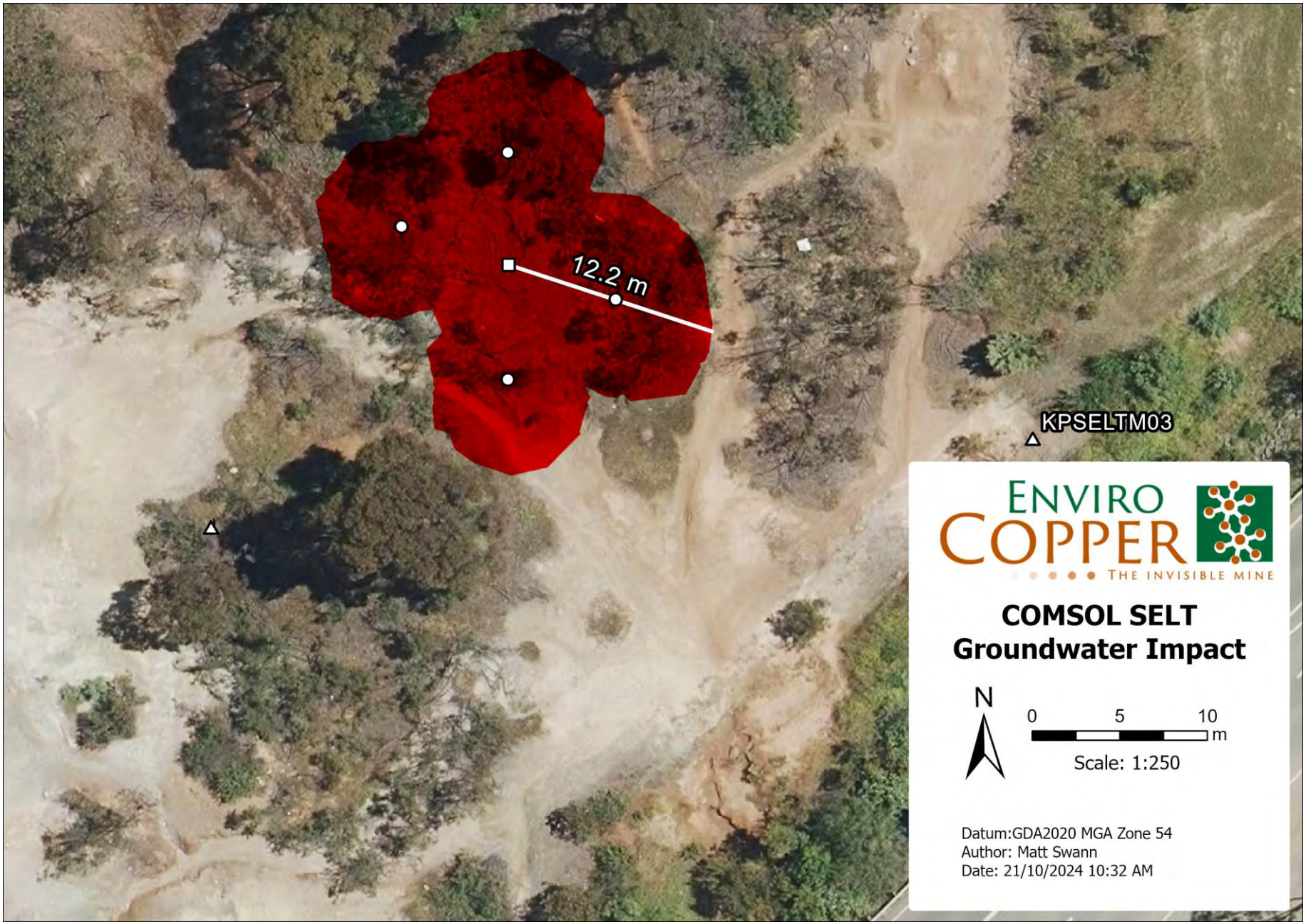


Map D Groundwater Dependent Ecosystems



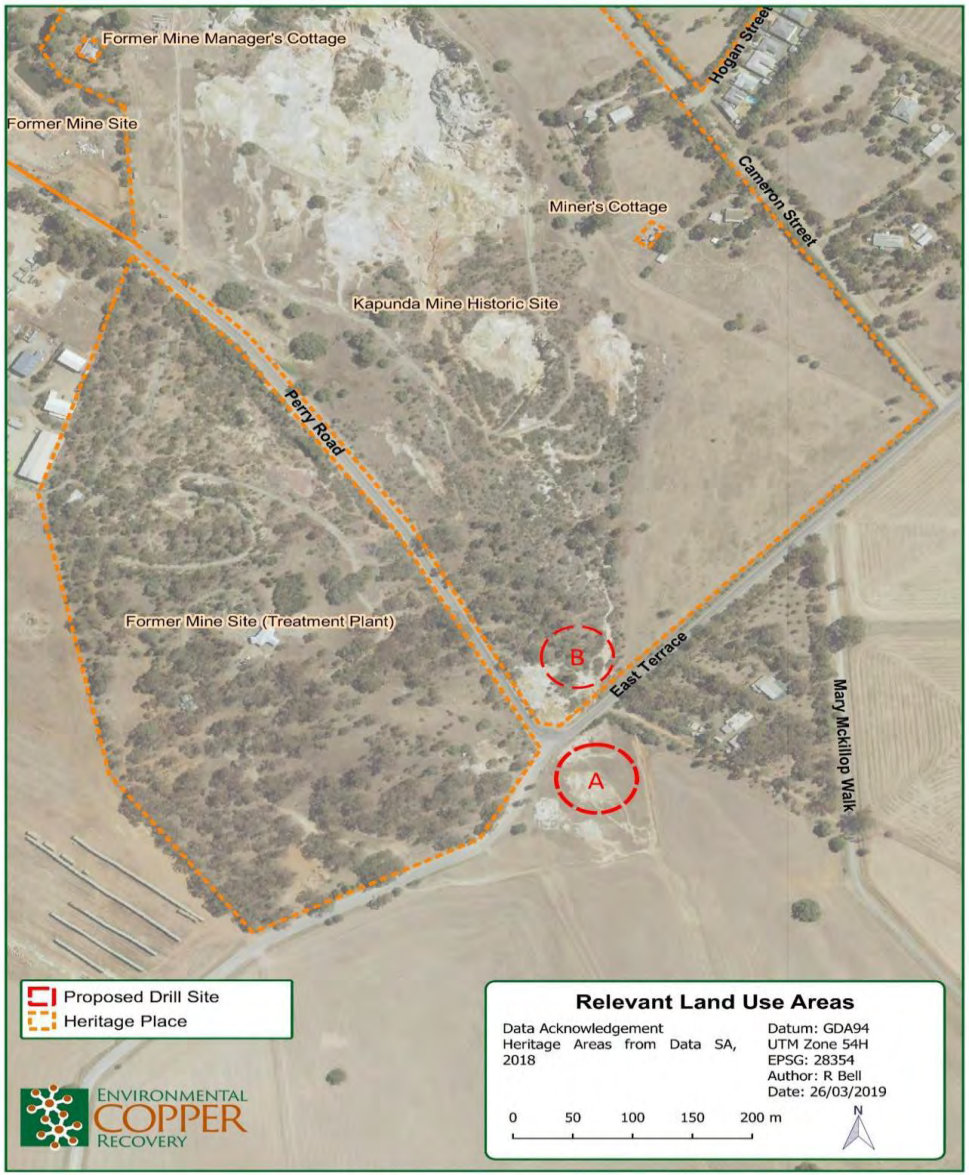
Map E Sensitive Receptors (Site A shown for reference)

Map F Site B test array and monitoring array

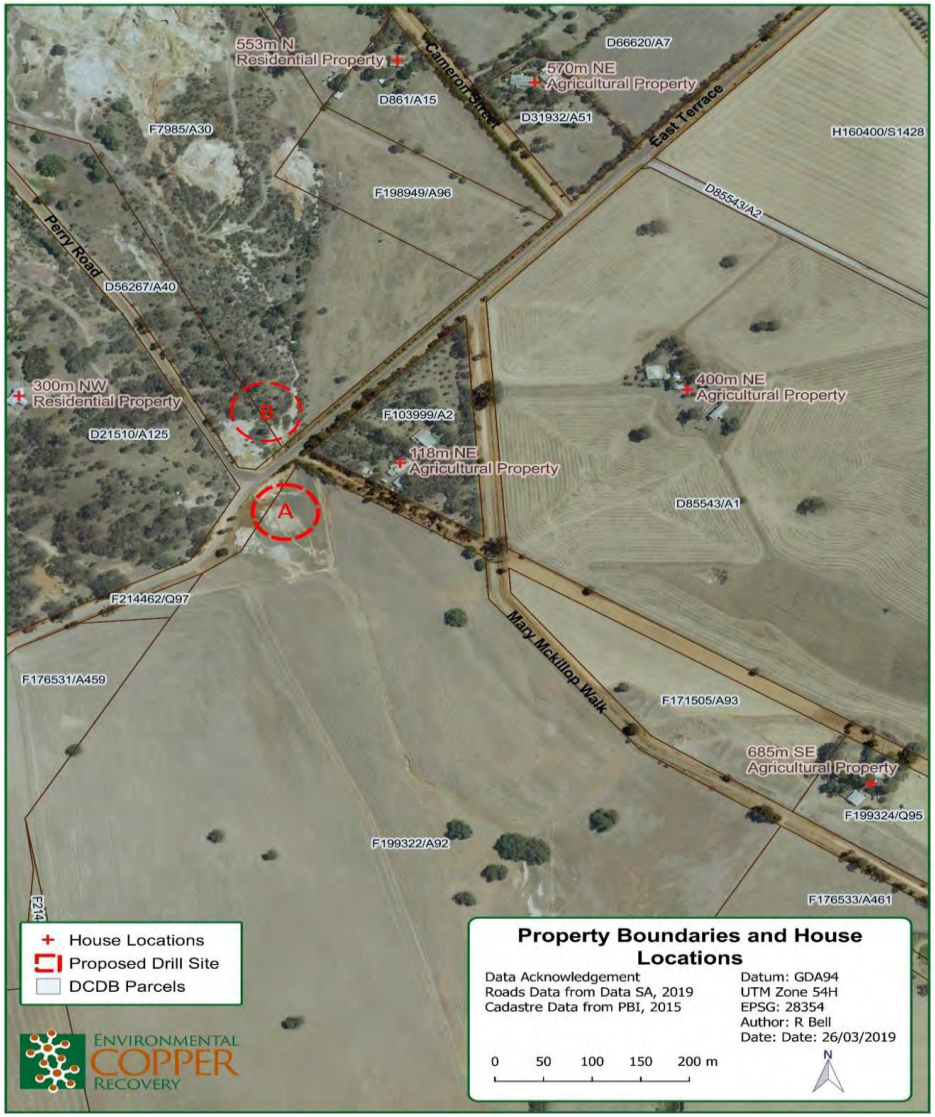


Map G SELT COMSOL Groundwater Impact

Map H Third Party Bores

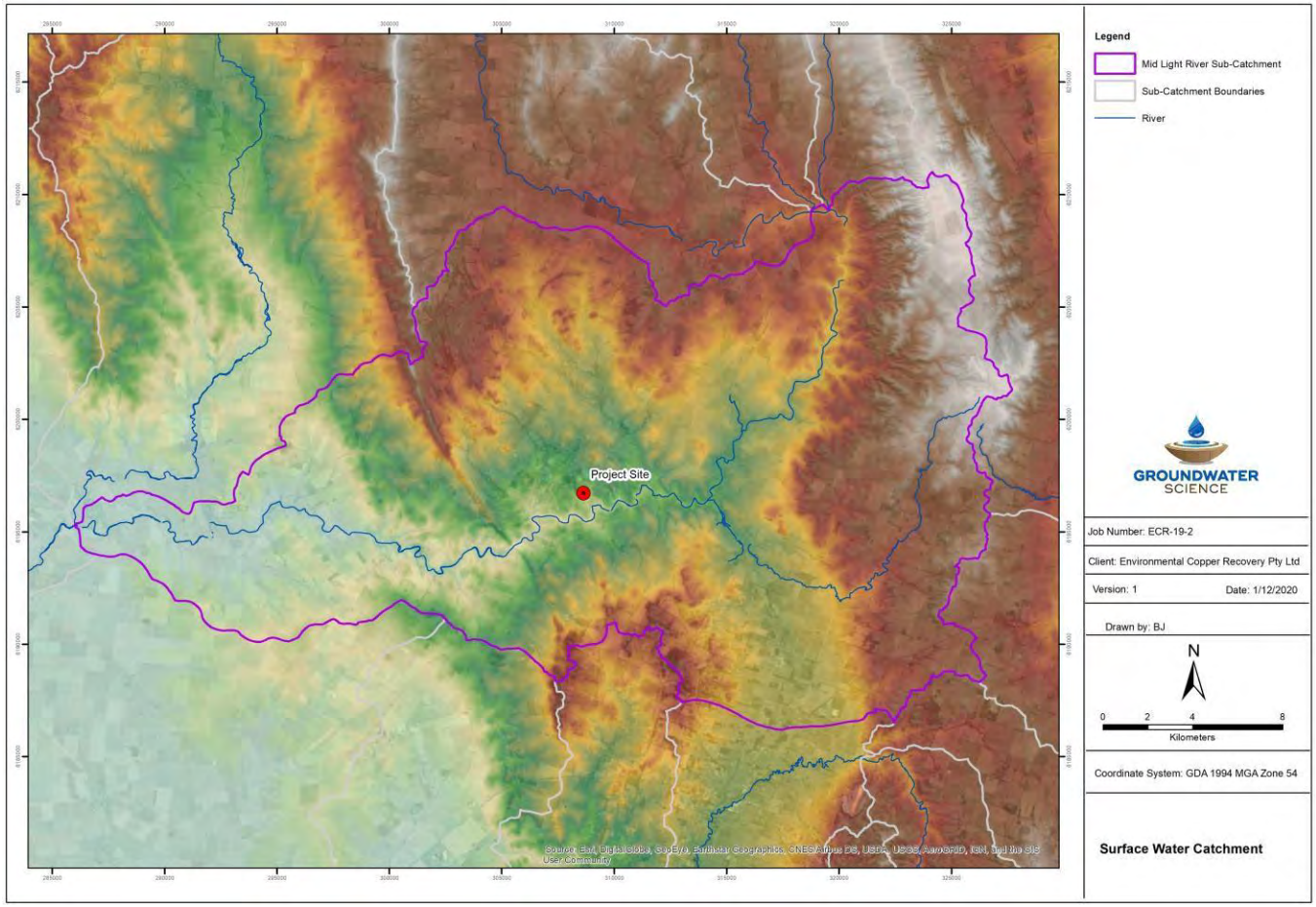


Map I Proximity to Historic buildings



Map J Land Use and Property Boundaries

Map K – Light River Pools



Map L – Exploration area and surface water catchment

FIGURES

Climate statistics for Australian locations

Monthly climate statistics

All years of record

Site information

Site name: KAPUNDA
Site number: 023307
Latitude: 34.34 °S **Longitude:** 138.92 °E
Elevation: 245 m
Commenced: 1861 **Status:** Open
Latest available data: 30 Jun 2023

Additional information

Additional site information

Nearest alternative sites

1. 023373 NURIOOTPA PIRSA (17.0km)
2. 023321 NURIOOTPA COMPARISON (17.0km)
3. 024511 EUDUNDA (24.2km)

View: Main statistics / All available | Period: Use all years of data | Text size: Normal / Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Mean maximum temperature (°C)	29.7	29.3	26.6	21.5	17.5	14.2	13.5	15.0	17.9	21.3	25.1	27.9	21.6	78	1885 1965
Mean minimum temperature (°C)	14.5	14.6	12.7	10.1	7.9	6.2	5.3	5.8	6.9	8.8	11.2	13.2	9.8	79	1885 1965
Rainfall															
Mean rainfall (mm)	20.1	20.6	23.6	37.5	53.6	57.7	59.4	61.7	54.9	46.2	31.7	26.0	492.8	162	1861 2023
Decile 5 (median) rainfall (mm)	14.9	11.9	16.4	30.2	45.0	55.1	58.1	60.8	50.6	43.2	26.8	19.2	495.8	140	1861 2023
Mean number of days of rain ≥ 1 mm	2.6	2.3	2.9	4.7	6.9	8.2	9.1	9.3	7.5	6.1	4.2	3.4	67.2	137	1866 2023
Other daily elements															
Mean daily sunshine (hours)															
Mean number of clear days														8	1957 1965
Mean number of cloudy days														8	1957 1965
9 am conditions															
Mean 9am temperature (°C)	22.4	21.1	19.6	15.5	12.0	9.4	8.6	9.9	12.8	15.3	18.5	20.8	15.5	38	1927 1965
Mean 9am relative humidity (%)	45	52	53	64	75	80	79	75	64	58	50	47	62	38	1927 1965
Mean 9am wind speed (km/h)														8	1957 1965
3 pm conditions															
Mean 3pm temperature (°C)	28.7	27.8	26.1	20.7	16.7	13.7	12.8	14.2	17.0	19.9	23.6	26.3	20.6	38	1927 1965
Mean 3pm relative humidity (%)	31	34	35	45	55	62	61	58	48	43	35	33	45	38	1927 1965
Mean 3pm wind speed (km/h)														8	1957 1965

red = highest value blue = lowest value

Figure 1 Climate information for Kapunda

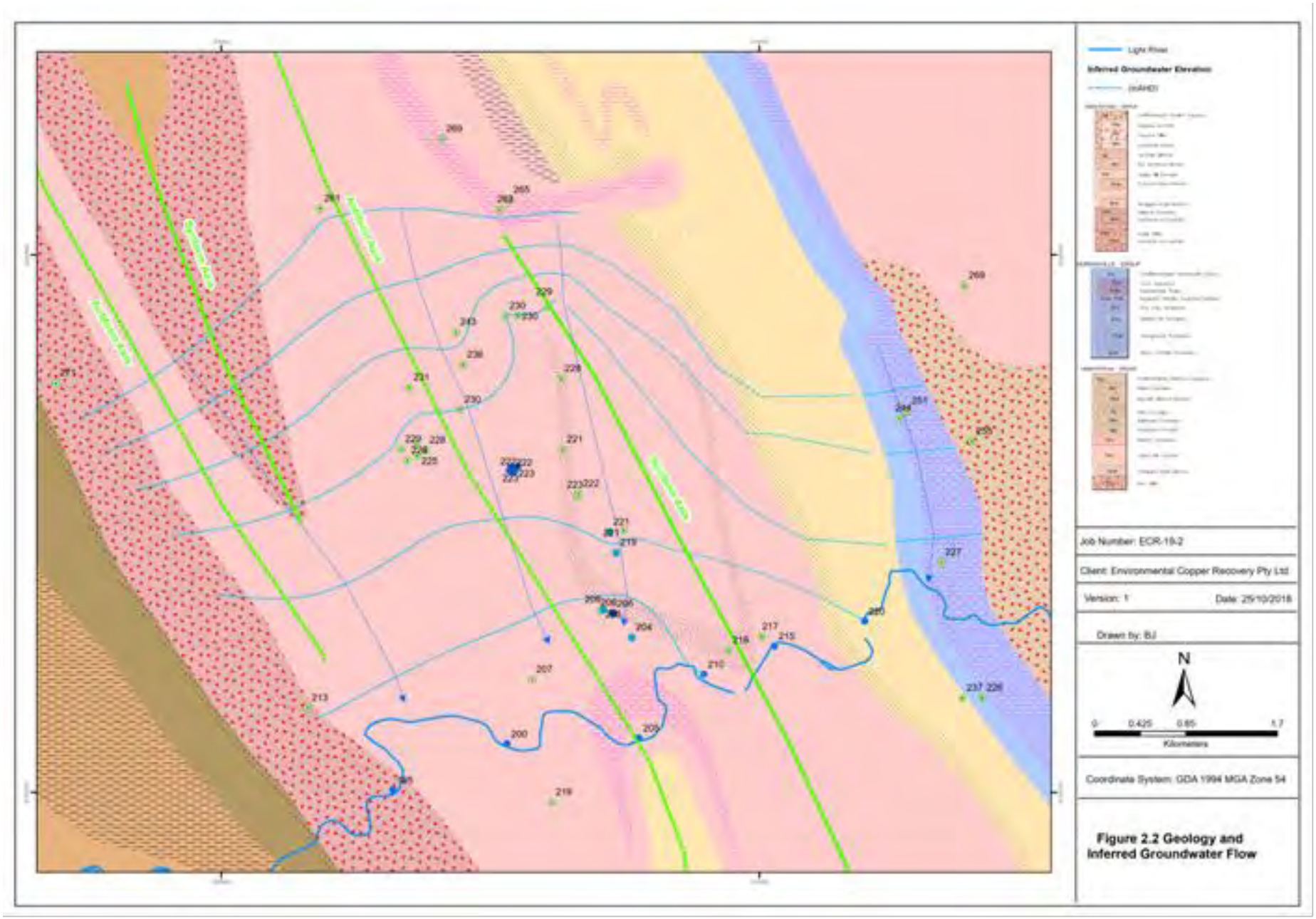


Figure 2 Regional geology and inferred groundwater flow

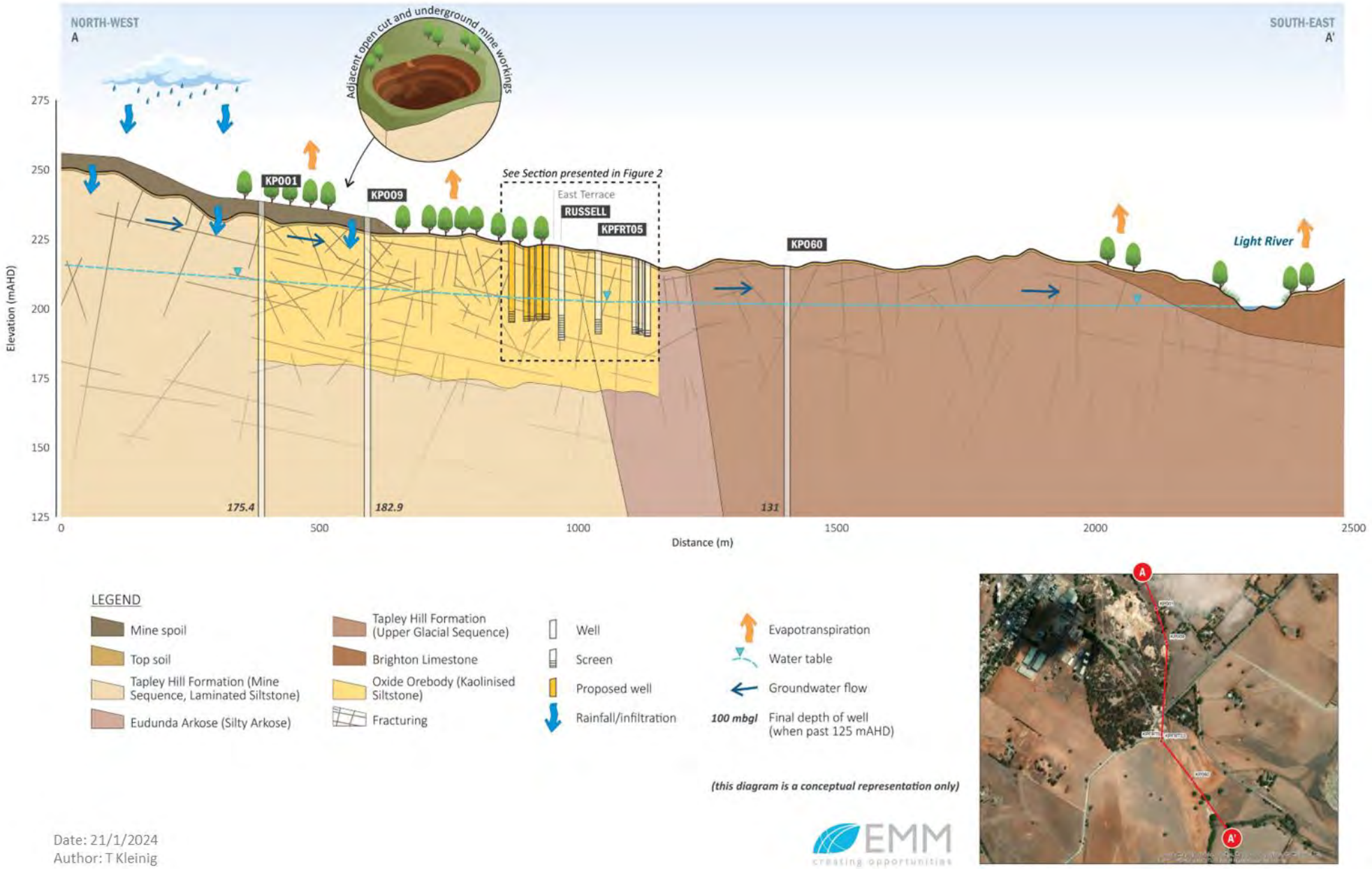


Figure 3 Regional Hydrogeological Cross Section A-A[1]

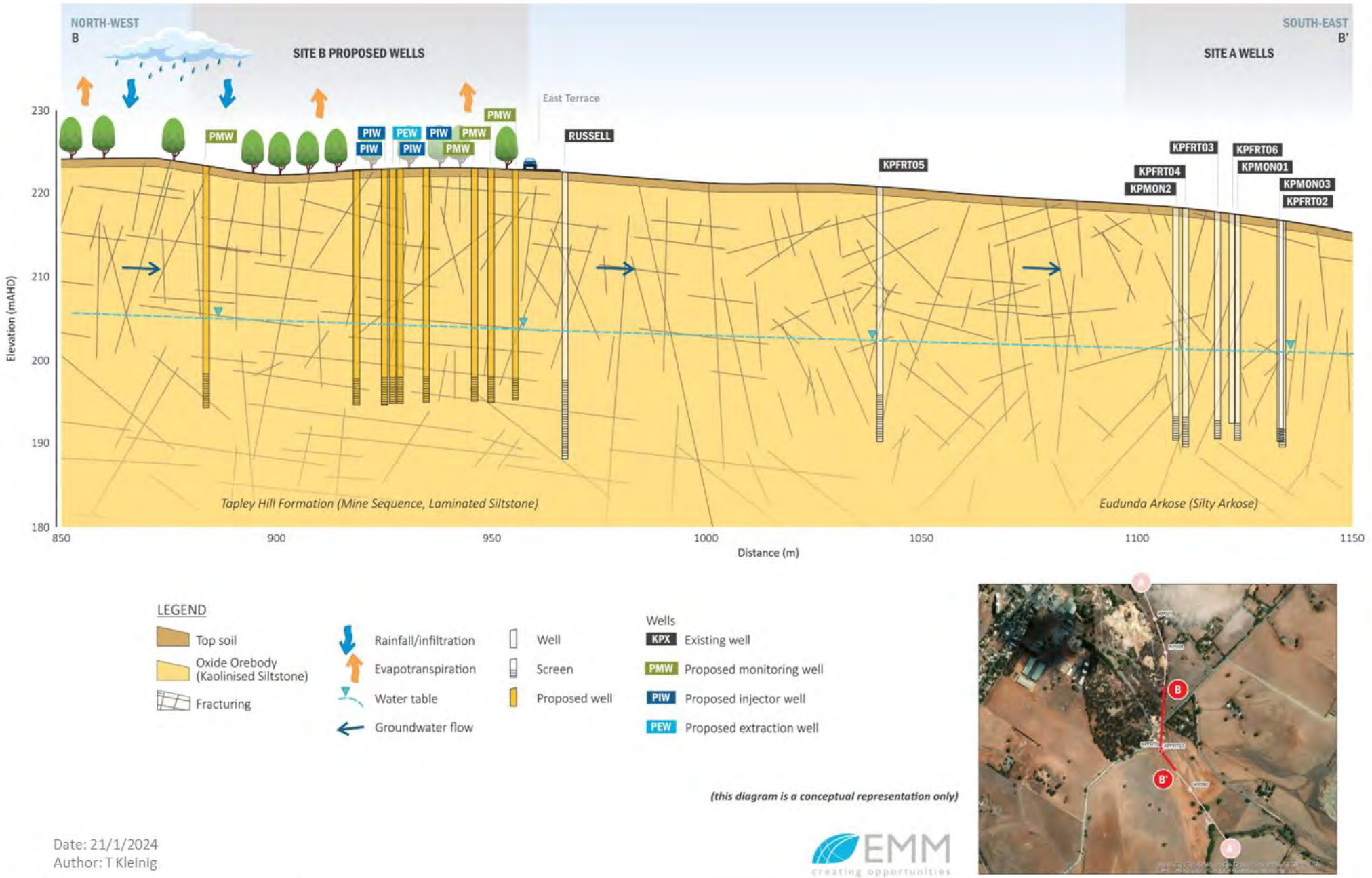


Figure 4 Regional Hydrogeological Cross Section B-B[1]

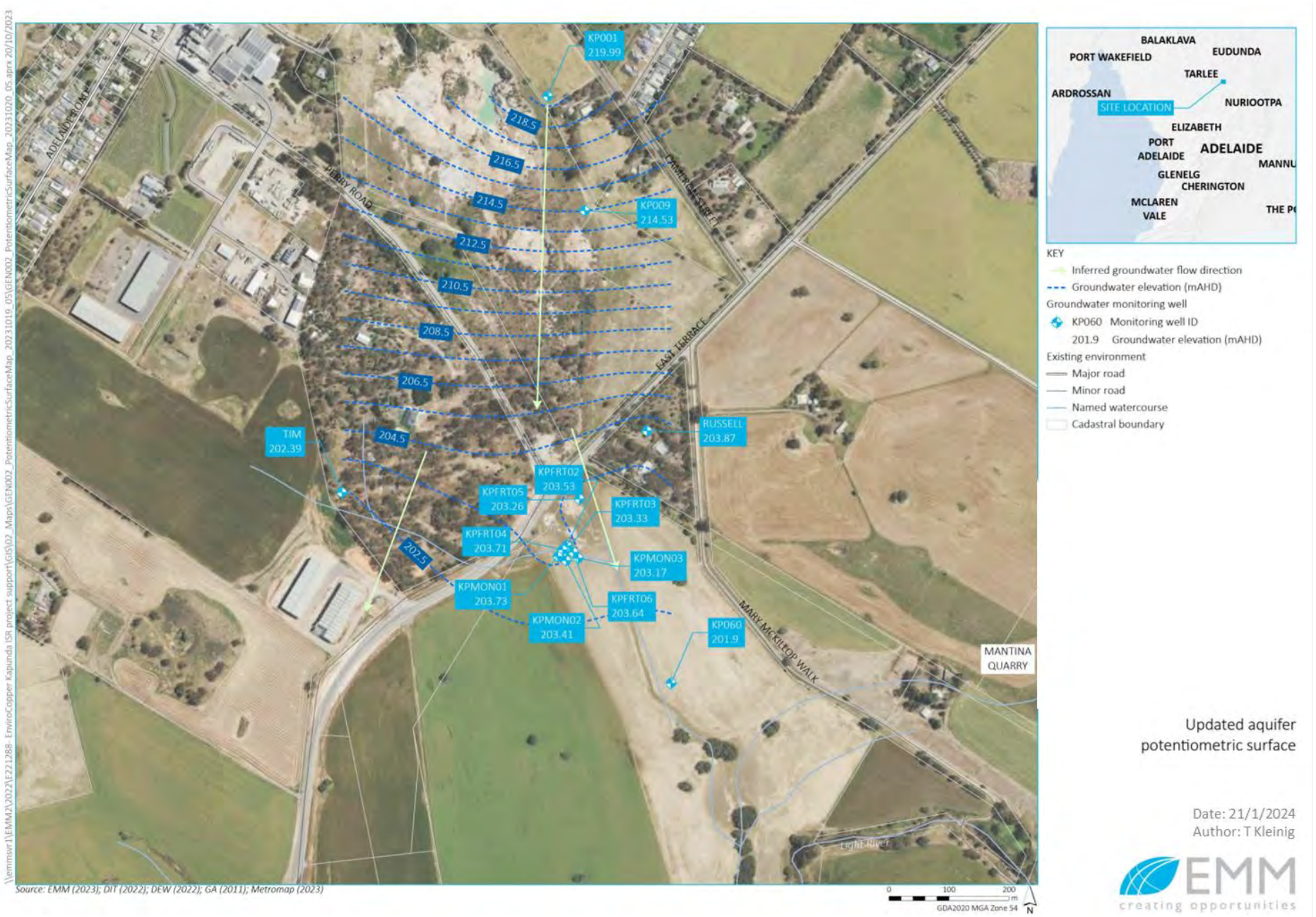


Figure 5 Potentiometric Surface Map

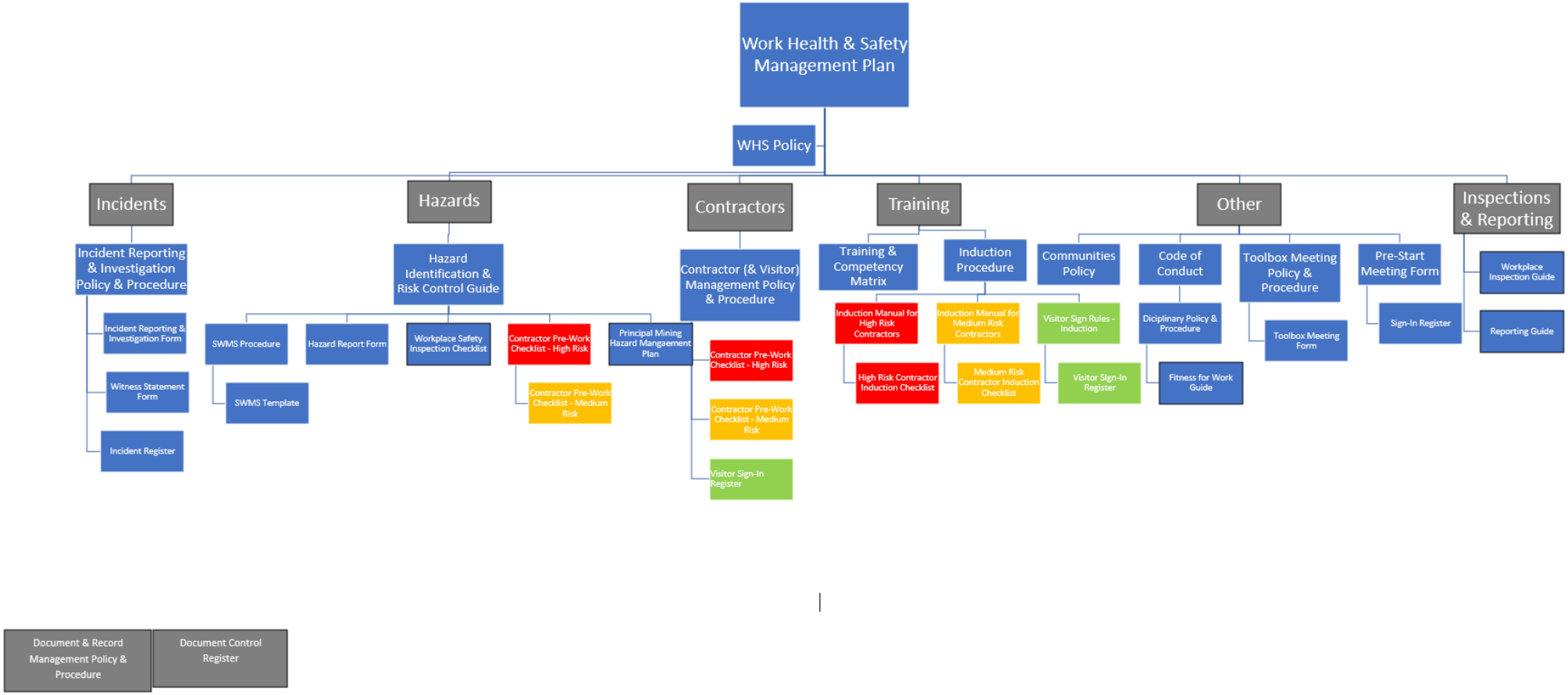


Figure 6 WHSMS Flow Diagram

Figure 7 AMT Geophysical Survey

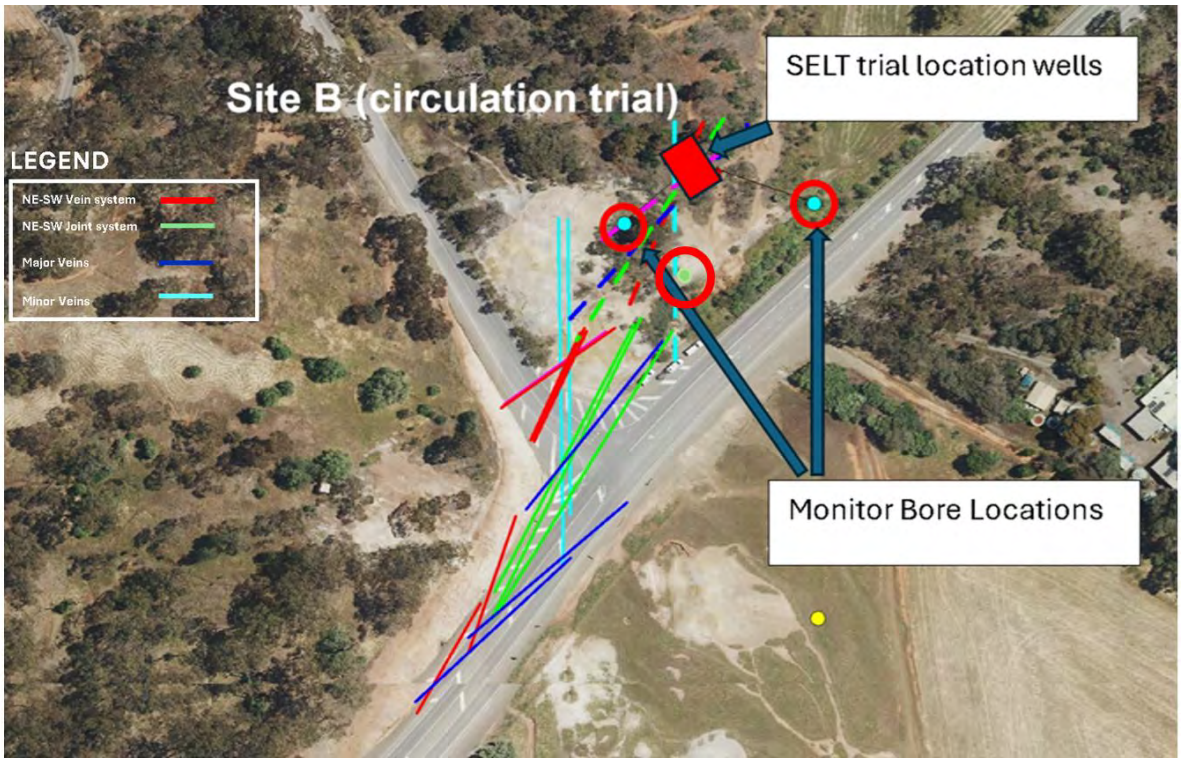


Figure 8 monitor bore locations (circled) and fractures mapped from road cutting outcrop transferred to Site B

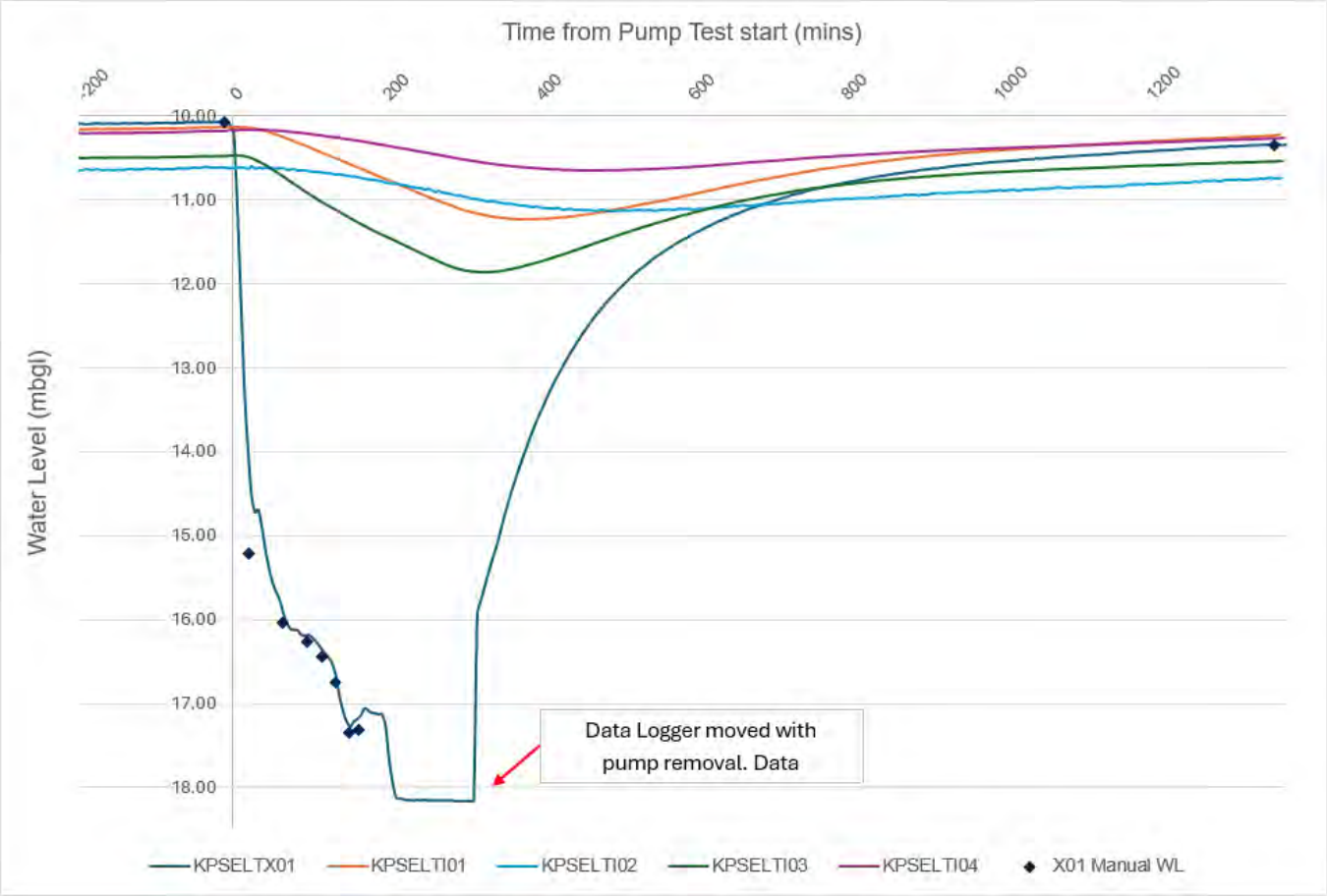
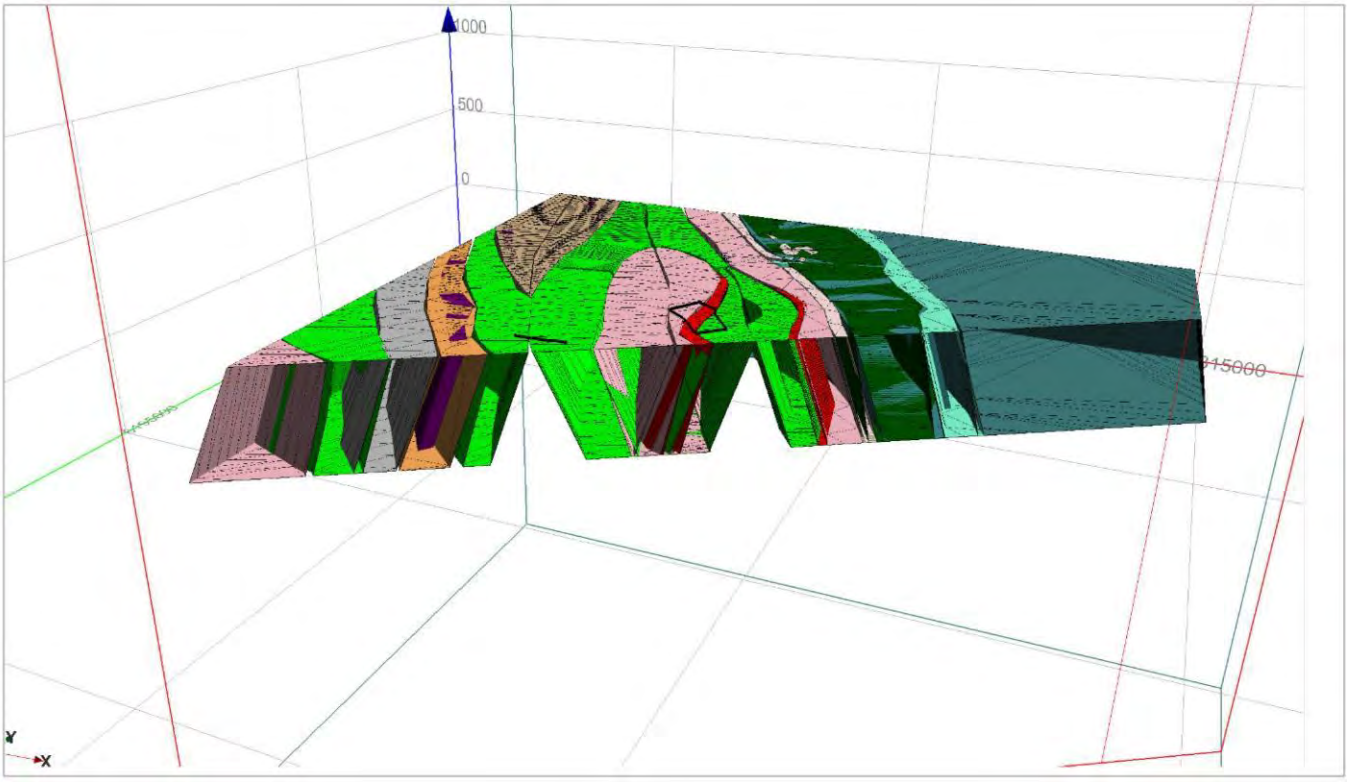


Figure 9 Second Drawdown Pump test demonstrating hydraulic connection

Figure 10- Block Diagram



Water quality indicator	No exceedance of DGV of ANZG values	Minor change	Moderate change	Major change
EC (µS/cm)	<13,000	13,000 – 19,000	19,000 – 21,000	>21,000
pH	6.5 – 8.0	8.0 – 8.5 (alkaline) 6.0 – 6.5 (acidic)	8.5 – 9.0 (alkaline) 5.5 – 6.0 (acidic)	>9.0 (alkaline) <5.5 (acidic)
DO (% saturation)	>90	80 – 90	60 – 80	<60
Copper (µg/L)	<4	4 – 7	7 – 10	>10
Zinc (µg/L)	<11	11 – 15	15 – 19	>19
Other nutrients, metals, metalloids (% change > ANZG)	0	0 – 25	25 – 50	>50

Scorecard grade	Management action
No exceedance of DGV or ANZG values	No action; continue seasonal monitoring plan
Minor change	Increased monitoring to identify source(s) and variability.
Moderate	Increased monitoring to determine source(s) and variation; if identified to be associated with ISR activities then management actions are undertaken as soon as reasonably possible to control and mitigate impacts on water quality.
Major change	Increased monitoring to determine source(s) and variation; if identified to be a major incident due to ISR activity than operations are restricted/stopped until management actions have been undertaken actions have been undertaken to control and mitigate impacts on water quality.

Figure 11: Proposed Water Quality Environmental Scorecard

SECTION K – PUBLIC RELEASE

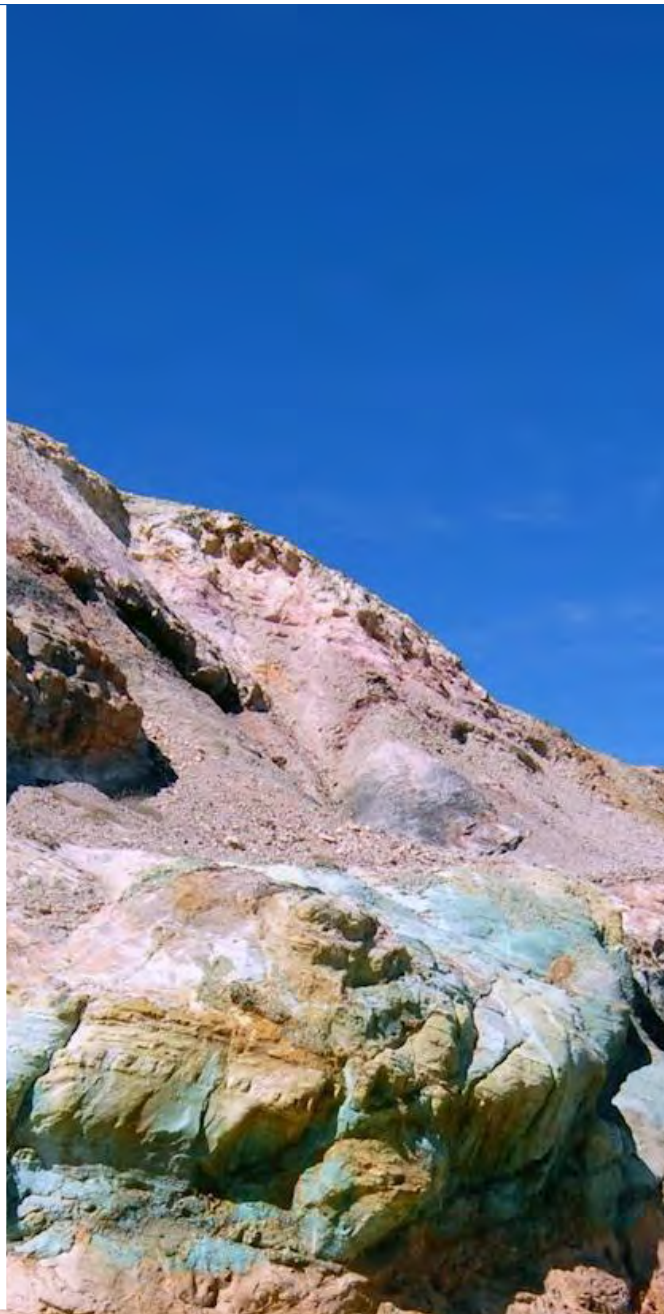
PEPR documents will be registered on the mining register and publicly released in full without the need to request consent from the tenement holder(s). Ultimately, it is the applicant's responsibility to ensure that confidential, or commercially sensitive, information is not included within the PEPR application.

SECTION L – SUBMISSION OF THE APPLICATION

An application for an Exploration PEPR or PEPR review, must be submitted in the following form, unless otherwise specified by the Director of Mines or an authorised officer:

- an electronic version of the PEPR must be submitted using the exploration PEPR template(s) provided on the DEM Minerals website,
- the electronic version must be submitted online through the DEM Minerals website using the exploration PEPR submission form,
- the electronic version must be submitted in one single Acrobat PDF file, and
- Microsoft Word-compatible files must be submitted if requested by the Director of Mines (or delegate), or other authorised officers.

ATTACHMENTS



Push Pull Test
Operational Report

Kapunda Copper ISR Project

ENVIRO COPPER
THE INVISIBLE MINE

Contents

Contents 2
Executive Summary 4
Methodology 5
Results 7
Push Pull Well – KPFRT02 9
Observation Array 10
Other Metals in PLS During Test 11
Discussion 12
Compliance 14
Rehabilitation 18
Improvements 18
Conclusion 19
References 20
Appendices: 21
Appendix A: Well Descriptions 21
Appendix B: Field Test Timeline 22
Appendix C: CSIRO Column test 25
Appendix D: Pregnant Lixiviant Solution (PLS) 26
Appendix E: Ion Exchange (IX) Test Work 27
Appendix F: ECL Soil Electricity Resistivity (ER) survey 30
Appendix G: ATS Electro Seismic survey 32
Appendix H: University of Adelaide Resistivity Survey 36
Appendix I: LWC Geochemist Workbench Modelling 36
Appendix J: ECL COMSOL Modelling 37
Appendix K: LWC Compliance Report Executive Summary 45
Appendix L: Excelsior's Gunnison Rehab 48

List of Figures

Figure 1: Extracted PLS (from KPFRT02) & copper product produced from IX solution. 4
Figure 2: Kapunda Push Pull Layout. 5
Figure 3: Push Pull Wellhouse & Trial Bores 6
Figure 4: Stainless steel pump coated in copper & extracted PLS from KPFRT02 7
Figure 5: Leading indicators for Push Pull well 10
Figure 6: Leading indicators for the Observation Array 10
Figure 7: Other metals in Push Pull well 11
Figure 8: Copper concentrate forming on plate 12
Figure 9: Concentrated liquor post Resin in Moist Mix Ion exchange processing and sample of copper concentrate produced 12
Figure 10: COMSOL modelled groundwater impact 13
Figure 11: Leading indicators for KPMON01 15
Figure 12: Leading indicators for KPMON02 16
Figure 13: Leading indicators for KPMON03 17
Figure 14: CSIRO Vesi sensor data 23
Figure 15: CSIRO Mini-column Leach & Large Particle Column test. 25
Figure 16: NGMX IX copper concentrate 26
Figure 17: ElectraMet Cu removal results. 26
Figure 18: Dynamic sorption burette & copper eluate curve. 27
Figure 19: Eluate fractions produced in a column elution. 28
Figure 20: Final IX eluate chemical assays. 28
Figure 21: Final IX eluates 29
Figure 22: Laboratory resistivity results & set-up 30
Figure 23: ECL Soil Electricity Resistivity (ER) survey 31
Figure 24: ECL collected resistivity profiles after injection/extraction showing slight decrease in resistivity within the screened interval 32
Figure 25: ATS Electro-seismic survey 33
Figure 26: ATS Electro seismic resistivity profile showing approximate estimated leach area 34
Figure 27: ATS Electro seismic resistivity profile showing approximate estimated leach area. 34
Figure 28: ATS 3D view of resistivity iso surface and approximation of COMSOL leach range 35
Figure 29: ATS 3D view of resistivity iso surface and approximation of COMSOL leach range 35
Figure 30: LWC geochemical fate transport model. 36
Figure 31: Downhole structural information generated automatically from optical logging 37
Figure 32: Stereonet plot of Borehole wireline data showing 3 main fracture orientations 37
Figure 33: Fracture spacing histograms for main sets 38
Figure 34: Modelled Fracture data plotted on XY plane 39
Figure 35: DFN model scanline sampling for 26-39m & model with primary fracture orientations highlighted 40
Figure 36: Example of simulated pressure distributions in 3 flow simulations. 40
Figure 37: Frac-sim 3D fracture DFN output & Darcy velocity orientations using test estimated test parameters. 41
Figure 38: Estimated hydraulic conductivity based on KPFRT01 fracture data 41
Figure 39: Diagram showing plan view and 3D view of Darcy velocity orientations calculated in COMSOL software 42
Figure 40: Diagram showing modelled Darcy velocity orientations and hole locations overlain over Google earth image. 42
Figure 41: COMSOL Push Pull lixiviant (Day 0, 3 & 14). 43
Figure 42: COMSOL Groundwater Impact. 43
Figure 43: COMSOL model estimate & Push Pull collected data comparison. 44

Executive Summary

As part of the Kapunda ISR exploration work, EnviroCopper Ltd (ECL) conducted a Push Pull (PP) field test in November and December 2023 under approved ePEPR2020-038. The planned test involved draining 5,000L of diluted Methanesulphonic Acid (MSA) into KPFRT02 (KP_PP1) over 5 dosing events of 1,000L each. Surrounding observation and monitoring wells were sampled at regular intervals and this solution was then extracted and assayed for copper and other metals. Geophysical studies were carried out before the test and will be replicated after the test, when possible, to assess their usefulness in mapping fluid movement.

Key results from the Push Pull test:

- The copper concentration produced by the test was in line with the CSIRO large particle column leach test for 1 Pore Volume Exchange (PVE). The average copper concentration increased from 40ppm to 140ppm, a 350% increase.
- PLS (Pregnant Lixiviant Solution) produced looks suitable for concentration by Ion Exchange (IX), local company NGMX completed initial IX resin studies, producing liquor with around 15-20 g/L copper that looks suitable for electrowinning copper cathode.
- Preliminary data shows COMSOL Multiphysics and Geochemist Workbench modelling produced meaningful flow and grade results and can be refined to model the next phase of in-ground test work.
- Resistivity based surface geophysics appears to monitor copper dissolution and therefore lixiviant movement.
- With respect to groundwater quality compliance, while individual exceedances of the 80th%ile triggers are evident in monitoring data, these are of low magnitude – i.e. they were not sustained nor statistically significant when accounting for relative percentage difference error or laboratory duplicate error and where contemplating the laboratory error control spike (LCS) [Reference: Site A: Push Pull Test Groundwater Monitoring Compliance Report FR003 (LWC 2024)] .
- The Groundwater Monitoring and Management Plan (GMMP) FR004A (LWC 2023), set out post-trial groundwater rehabilitation criteria. Groundwater chemistry data from operation wells KPFRT02, 03, 04 and 06 as well as KPMON01, 02 and 03 collected 5 June 2024 were compared to baseline (pre-trial) groundwater data. There were no significant differences between pre- and post-trial data indicating a satisfactory level of rehabilitation has been achieved (LWC 2024).

The test also provided a range of useful data and learnings that will be taken forward into the next phase of field work and will help improve subsequent field (in-ground) tests, including modifying well design and leach chemistry, and the application of low flow sampling techniques and the use of active remediation - see the improvements section of this report for more detail.

Figure 1: Extracted PLS (from KPFRT02) & copper product produced from IX solution.

Methodology

The Push Pull test process has taken several years work leading up to this test which involved:

- Drilling wells for initial hydrogeological studies (pump testing etc.)
- Carrying out a tracer test between KPFRT02 and KPFRT03 utilising Sodium Bromide.
- Biodegradability study carried out by CSIRO Department of Land and Water.
- Solute fate transport modelling using Geochemist Workbench software.
- Developing coupled hydrothermal chemical fracture flow modelling using COMSOL Multiphysics software.
- Developing a detailed Groundwater Monitoring & Management Plan (reference GMMP Version FR004A).

Once the required approvals were obtained, the Push Pull test was designed to gain the following information:

- To assess effectiveness of MSA in getting copper into solution and its biodegradability
- To compare leached copper concentration with the CSIRO laboratory column leach tests
- To evaluate if the resulting liquor was suitable to make saleable copper products
- To confirm the multi-physics modelling approach to lixiviant distribution and copper recovery
- To evaluate whether surface geophysics may be useful in monitoring fluid movement
- To assess the impact of lixiviant on the formation and the suitability of the Groundwater monitoring and management approach
- To evaluate the proposed compliance approach.

The injection, observation, and monitoring array (layout shown in Figure 2) were sampled regularly to monitor changes in pH, ORP and electrical conductivity as well as copper concentration using a handheld XRF. Field analyses were carried out along with further samples taken for analysis at primary lab Eurofins and secondary QAQC from Bureau Veritas.

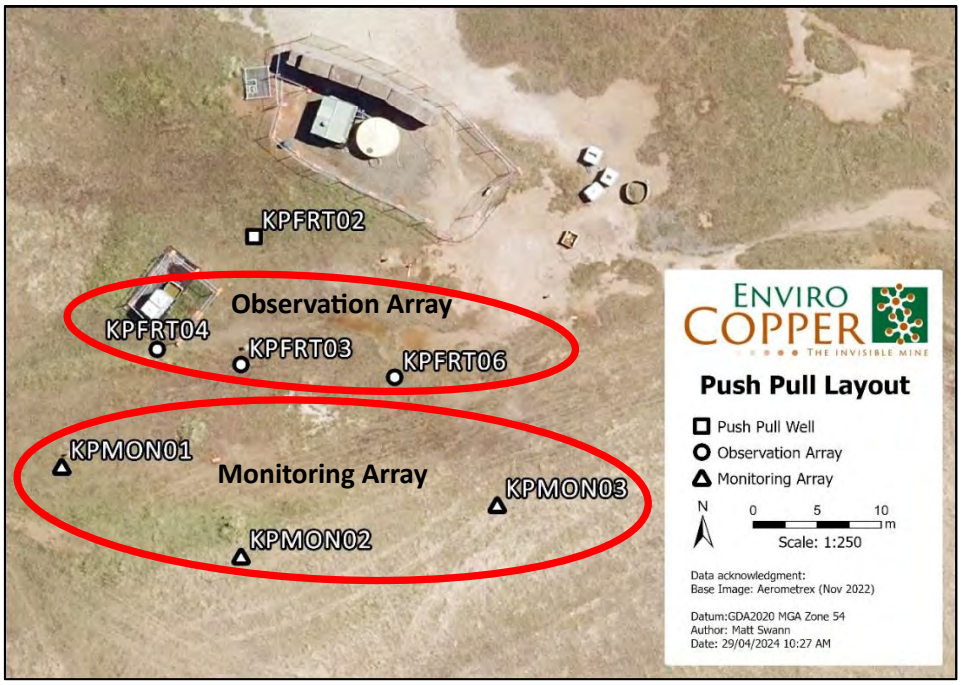


Figure 2: Kapunda Push Pull Layout.

The test program started on 22 November 2023 and ran for 23 days. The Push Pull set up consists of the wellhouse with a dosing pump and a 1000L mixing tank, where MSA is added to previously collected groundwater. Once dosed to the desired pH, it was pumped to a raised 1000L IBC to gravity drain into the screen of the well. The lixiviant was drained into KPFRT02 at a planned nominal rate of 0.2-0.4 L/s. Figure 3 below shows the well house and some of the bores used during the test. The test started on 22 November 2023 and ran for 23 days through November and December 2023. This coincided with an extended period of no recorded rainfall in the region.

Figure 3: Push Pull Wellhouse & Test Bores

Results

Over the period of the test there were a total of 5 dosing events. The injection process was much slower than expected. It took an average of 6 hours to drain 1000L of lixiviant using gravity, which is an average of 0.04L/s (2.7 L/min – 166L/hr).

The test results showed copper increasing from a background value of 40ppm up to a peak value of 140 mg/L an increase of 250% in 1 pore volume exchange. While this is slightly lower than the average for the CSIRO column tests (column leach average of 220.4 ppm) this is understandable given the fact that much better lixiviant contact is achieved with the crushed particles in a column test. See Appendix C for more detail.

MSA was highly effective at leaching copper into solution. The rate at which pH attenuated and the coincident increase in sulphate suggests that the breakdown of the substance was consistent with the findings of the biodegradability study carried out by CSIRO in 2020.

All figures below show the results for each well for the duration of Push Pull Test, including baseline data collected since 2021. As expected, as the copper concentration increases as the pH decreases in KPFRT02 over the duration of the test. The pH of the injection well (KPFRT02) fell to pH 0.7 and has since returned to pre-test levels after purging a total of 6,800L of the adjusted groundwater.

There were slight changes in observation wells (KPFRT03, 04 & 06) as predicted by the modelling, but compliance was maintained during the test program. Post test monitoring showed a return to baseline (pre-trial) conditions indicating a satisfactory level of rehabilitation. This is further discussed in the compliance section of this report and dealt with in detail in LWC July 2024.

Push Pull Well

As demonstrated in graphs below, the test proceeded as expected with the pH in the injection well decreasing as lixiviant was drained in. Conductivity and sulphate concentration increased, as did the level of copper concentration in solution.

It was noted during the test that the stainless-steel sampling pump had become coated with copper when used to transfer PLS from tank to tank (figure 4 below).

The below graphs (figures 5 & 6) demonstrate that the groundwater in the injection well has returned to baseline conditions for the leading indicators, without the need for active remediation.

Figure 4: Stainless steel pump coated in copper & extracted PLS from KPFRT02

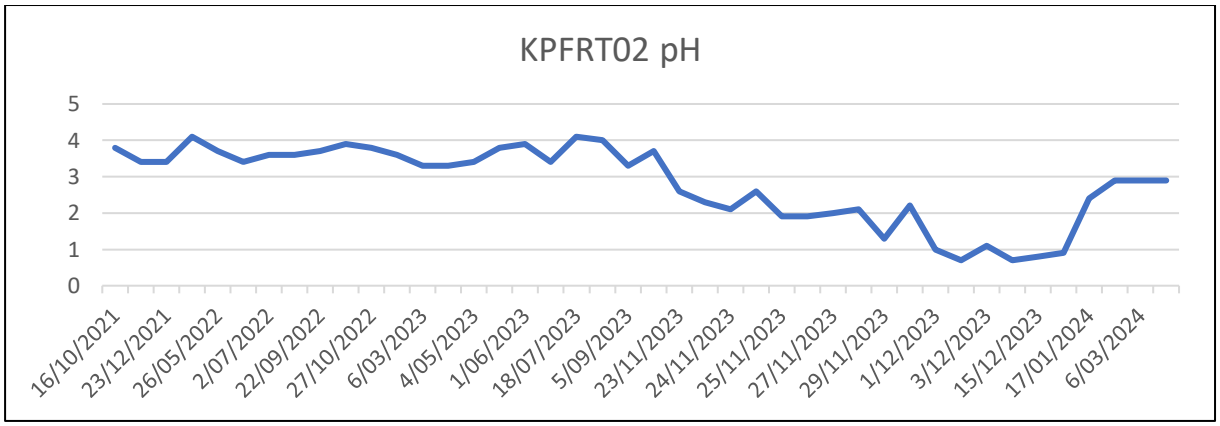
Observation Array

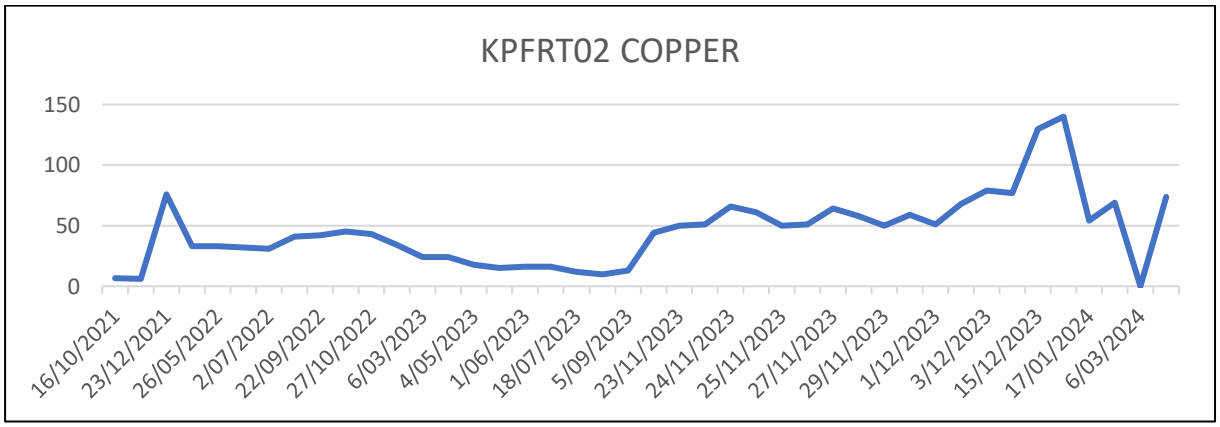
The inner observation array recorded some very slight changes to parameters including conductivity, sulphate levels and copper concentration (Figures 6) Interestingly, there is little to no change in KPFRT04. Whilst this is surprising, the changes in FRT03 and FRT06 were expected. These changes are consistent with the modelling carried out suggesting that lixiviant would just reach the observation array. It should be noted that KPFRT06 has always had significantly higher ground water copper concentrations than any other well on site at approx. 200mg/L.

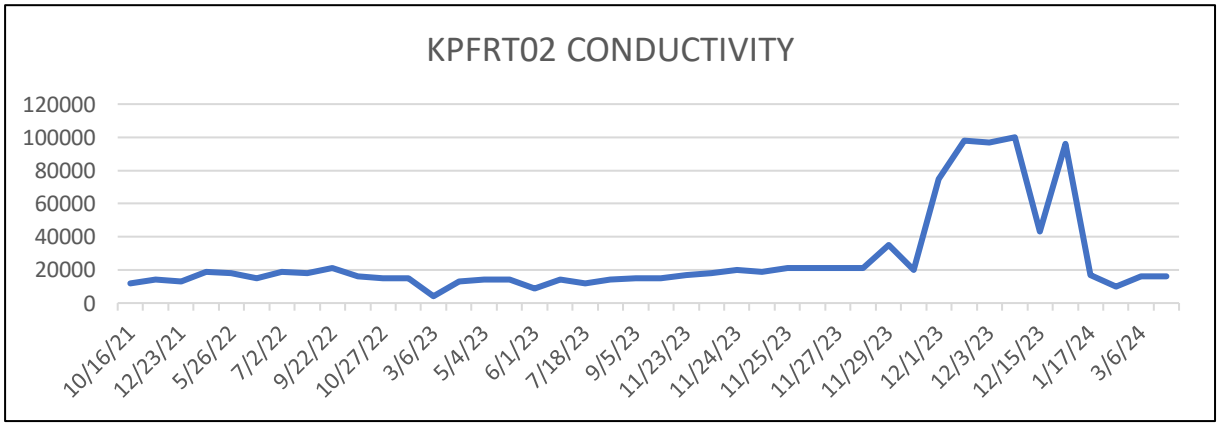
Other Metals

Whilst the main focus is copper, several other potential value metals were assessed during the test, as well as the potential for deleterious elements that may have a negative impact on a potential operation. The level of iron in solution has the potential to impact economic recovery of copper and this increased in peaks during the test. An effort will be made during the circulation test to reduce the amount of iron that goes into solution by adjusting Redox conditions through the addition of oxidant if required. Other potential value metals also went into solution, including Co, Ni and Zn. These are potentially recoverable and could add significantly to the economics of the project.

Push Pull Well – KPFRT02







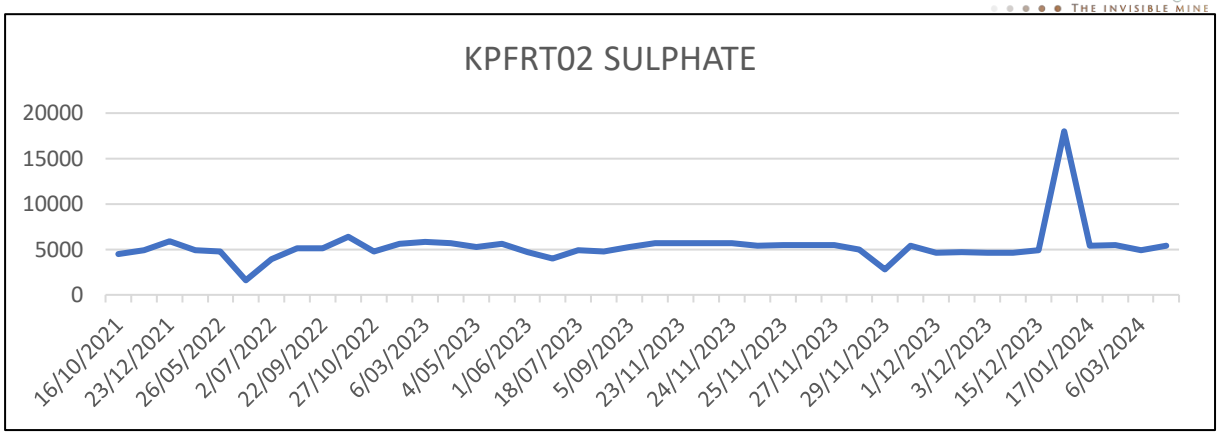


Figure 5: Leading indicators for Push Pull well

Observation Array

KPFRT03 KPFRT04 KPFRT06

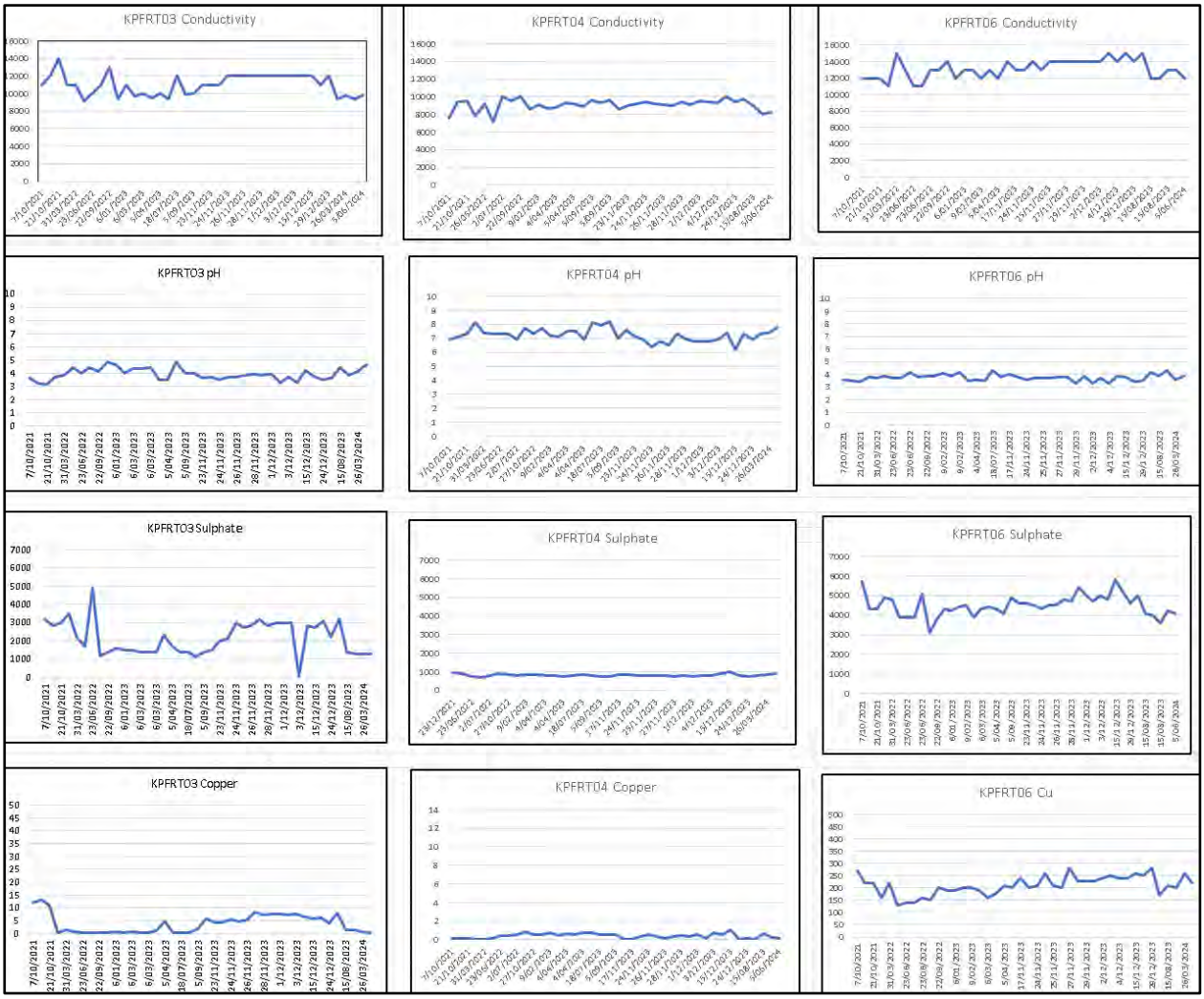
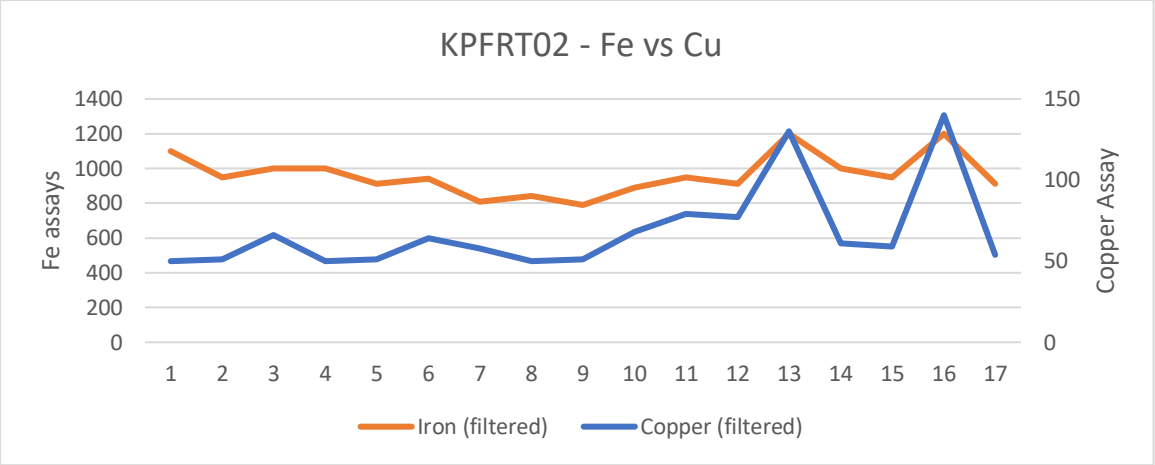
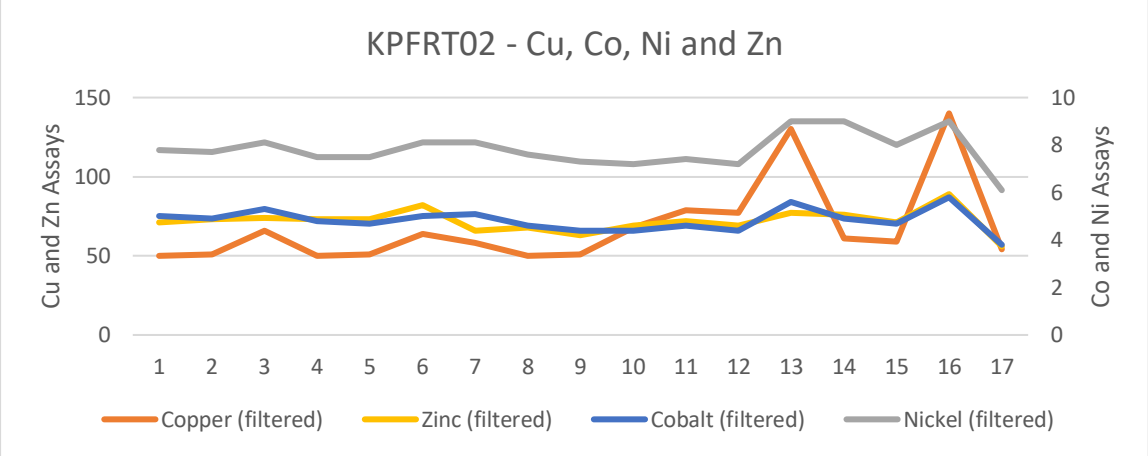


Figure 6: Leading indicators for the Observation Array

Other Metals in PLS During Test





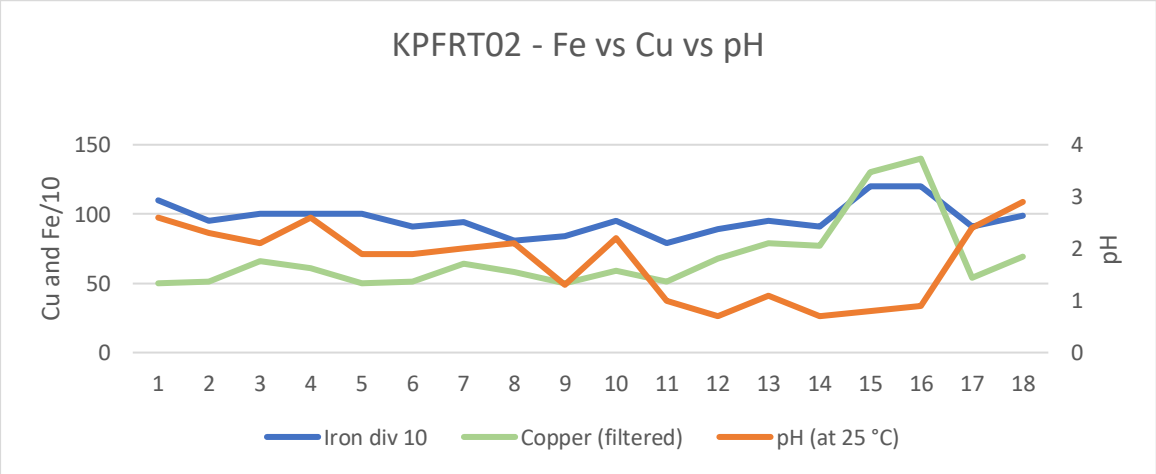


Figure 7: Other metals in Push Pull well

Discussion

Products

One of the outcomes for this test program was to explore suitable ways to process the PLS that is extracted. The solution was sent to two companies for various test work (see Appendix D for more details). Copper concentrate was produced in the field from the PLS using the traditional plating method, see figure 8 below. Mild steel with a current from a battery was placed into the PLS, which coated the steel with copper concentrate, which could be wiped off as a product.

Figure 8: Copper concentrate forming on plate

A small sample of the pregnant lixiviant was taken to NGMX, a local company and put through their "Resin in moist mix" ion exchange technology, which moved the concentration of the solution up to 20 g/L (see Appendix F). This is suitable feed grade to produce copper cathode or to crystallise copper sulphate. This solution was then used to produce a small amount of copper concentrate and to plate a small amount of copper metal (figure 9 below).

Figure 9: Concentrated liquor post Resin in Moist Mix Ion exchange processing and sample of copper concentrate produced

Geophysics

A range of geophysics and techniques (see Appendix F, G & H) were trialled to monitor fluid movement, which was a partial success. It was demonstrated that ground-based surveys have adequate depth and spatial resolution to map sub-surface resistivity. Soil resistivity surveys (Appendix F) conducted pre- and post-testing show a small but consistent decrease in resistivity around the screen area. As there was minimal fluid movement during the Push Pull test (approximately 6,800L). this method will be tested again during the upcoming circulation test which will have a larger volume of lixiviant movement.

Modelling

A digital twin model was developed by ECL using COMSOL Multiphysics (see Appendix J). This was used to predict extent of groundwater effected and estimates of PLS and copper production. A simulation of the Push Pull test was conducted and estimated to have an affected groundwater diameter of 7.5m around the injection well (see figure 10)

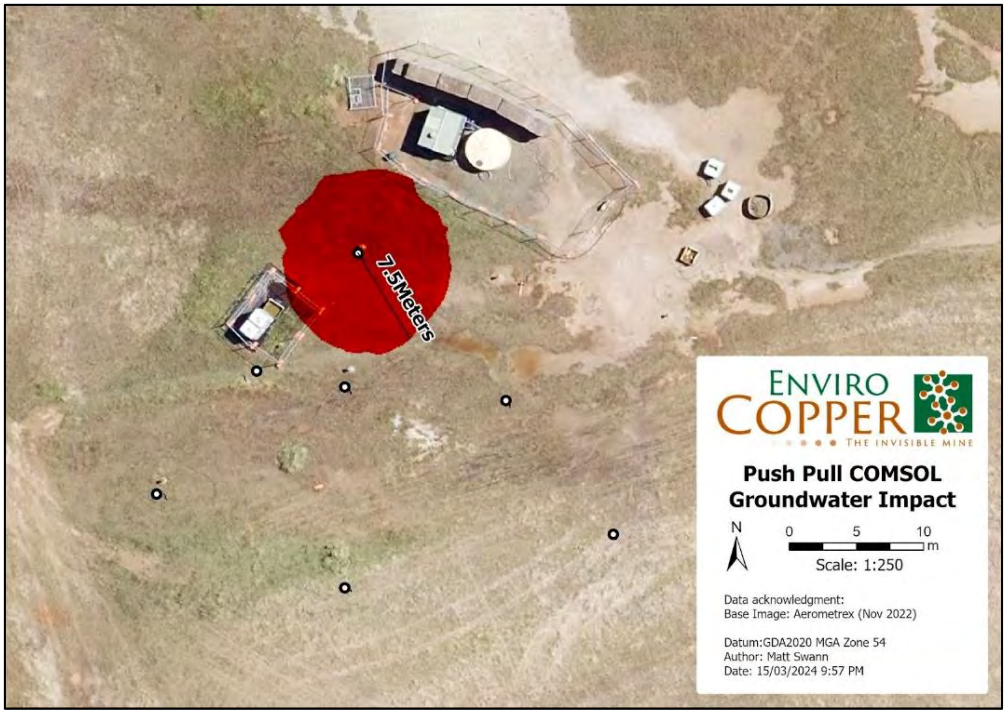


Figure 10: COMSOL modelled groundwater impact

With the completed testing, this was compared to the physical data collected, which shows no significant changes at the observation array (KPFRT03 & 04) situated 10m away from KPFRT02 (injection bore). These results of COMSOL modelling and real-world test data are also consistent with geochemical modelling that with LWC's fate transport model (see Appendix I) which estimates an extend of 5.3m. These results demonstrates that the model is reliable and with the new data will be updated and refined to better reflect the real world.

Compliance

An independent compliance report has been prepared in 'Site A: Push Pull Test Groundwater Monitoring Compliance Report (LWC July 2024) (refer appendix H).

In summary, leading indicators of non-compliance are detected by monitoring water quality (and comparison with established trigger values) at three Monitoring Wells (Monitoring Array) comprising KPMON01-03).

Individual exceedances of the 80th%ile triggers at the monitoring well array was noted. However, these exceedances were considered of low magnitude i.e. they were not sustained nor statistically significant when accounting for relative percent difference error or laboratory duplicate error and where contemplating the laboratory control spike (LCS) [LWC July 2024]. Importantly, these results do not represent a non-compliance i.e. movement of mining fluids outside the trial area.

It should be noted that monitoring data for KPMON02 indicated a transient potential non-compliance for sulfate, but on assessment results were found to be within 10% of the 80th%ile value, suggesting an ambient contribution. It was also noted that the laboratory may be reporting sulfate higher than the true value. Review of the sulfate results also suggested a recommendation to move to a low flow sampling method to reduce drawdown and mitigate the contribution of near field sulfidic oxidation to water quality. This is covered in detail in LWC July 2024 and discussed further in the Improvements section of this report.

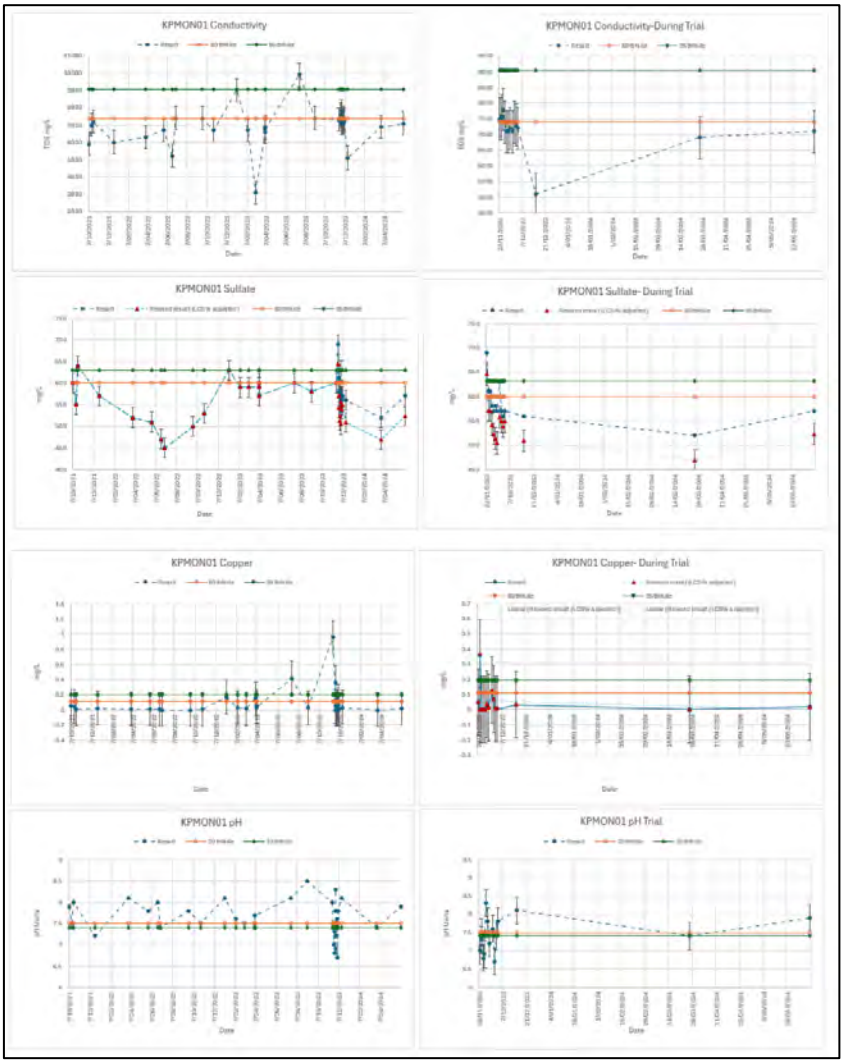


Figure 11: Leading indicators for KPMON01

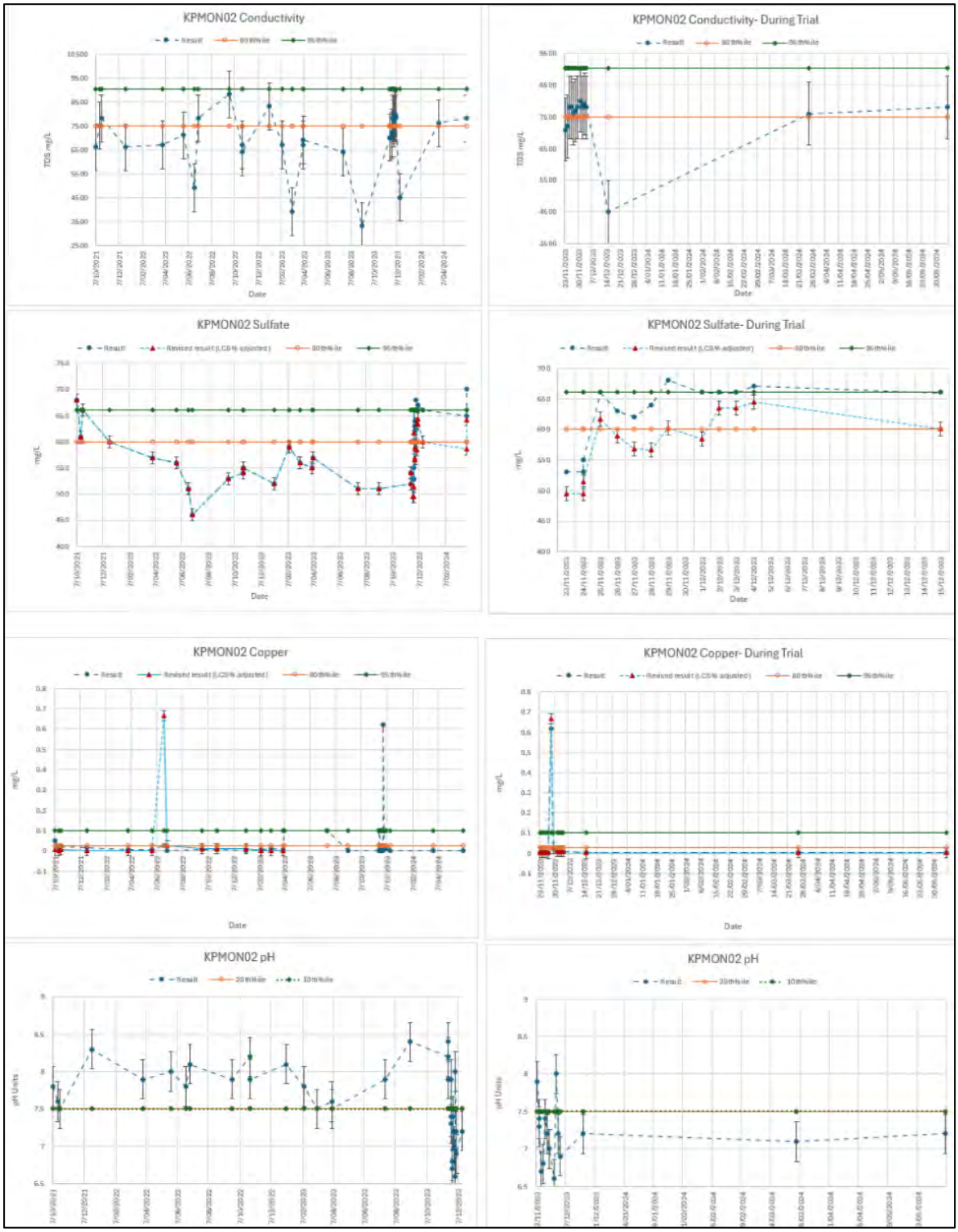


Figure 12: Leading indicators for KPMON02

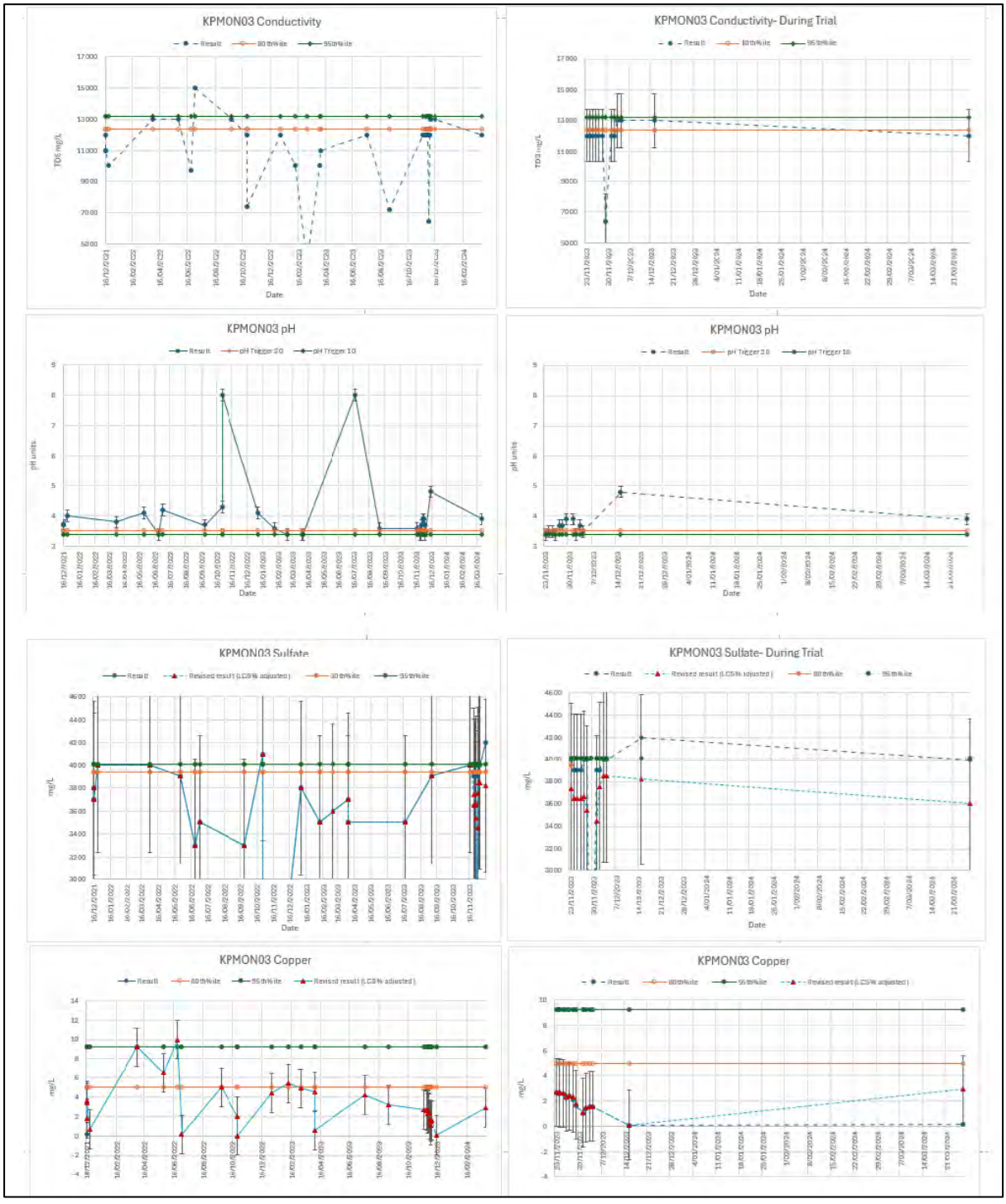


Figure 13: Leading indicators for KPMON03

Rehabilitation

The following is taken from 'Site A: Push Pull Test Groundwater Monitoring Compliance Report (LWC July 2024) (refer appendix H).

The GMMP set out post-test groundwater rehabilitation criteria:

1. Return to baseline conditions or better of all rehabilitation parameters (better is defined as lower dissolved species and higher pH).
2. Rehabilitation parameters are those that have been identified from column leach tests and geochemical modelling as modified or potentially mobilised by leaching: pH, EC, Metals: Fe, Co, Zn, Cu, Ni, Ag, Li, Mo, Cr V.

Groundwater chemistry data from operation wells KPFRT02, 03, 04 and 06 as well as KPMON01, 02 and 03 collected 5 June 2024 were compared to baseline (pre-test) groundwater data. There are no significant differences between pre- and post-test data indicating a satisfactory level of rehabilitation has been achieved.

Improvements

Several improvements are suggested for the next phase of in groundwork which will involve the circulation lixiviant:

- Incorporating modified well design for SELT given gravity drainage rate was slower than expected
- Iron concentrations in the PLS should be monitored closely and REDOX levels adjusted accordingly to keep iron levels in the PLS to a minimum while maximizing copper dissolution.
- The environmental compliance approach is valid but requires some slight modifications, with respect to the sampling method, with a lower-flow approach preferred (less than current 0.1 L/s). This is recommended to control excessive water level drawdown in wells during and between sampling events.
- Given the high natural variability of the ground water it is ECL's view that using trigger values alone may not give definitive indications of a non-compliance (excursion). To this end ECL are investigating the use of an environmental tracer during the next phase of work (circulation test program) to provide a more conclusive method of detecting a potential non-compliance (excursion of lixiviant from the test site) to help ensure environmental compliance.
- For the circulation test, ECL may adopt an active rehabilitation routine similar to that developed by the Excelsior Group for their Gunnison ISR copper operation (see Appendix I). Active rehabilitation will better suit the time frame of small-scale exploration test work, reducing the required post-monitoring time and allowing physical rehabilitation of the wells sooner.
- A review of the current Groundwater Monitoring and Management Plan (GMMP) Version FR004A is currently in-progress and will look to capture recommendations and improvements coming out this successful testing program

Conclusion

Overall, the test program was very successful on several fronts. Copper was successfully mobilised into solution, and geophysics detected the extraction of the small amount of copper and will be useful going forward. The test program also provided some valuable learnings for the next phase of in-groundwork, including changes in well design (to suit low flow gravity drainage), some changes to sample handling techniques and amendments to the compliance and monitoring procedures.

Copper in solution was increased by ~250%. Test work undertaken using IX increased the solution to 18.2 g/L, which would be a suitable end product to be used for electrowinning of copper cathode.

The geophysical modelling (such as COMSOL) proved to be reliable, other geophysical techniques to monitor fluid movement were a partial success and need further testing.

The compliance approach is valid but would benefit from some slight modifications and improvements. This will be presented in a future revision of the reference GMMP which will capture these recommendations. Compliance was maintained during the testing program and rehabilitation to pretesting conditions was satisfactorily achieved.

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Appendices:

Appendix A: Well Descriptions

KPFRT02

KPFRT02 was spudded 10m from the pilot hole on 16 November 2019. The hole was drilled 9.5-inch diameter to 22m depth. Water yield during drilling was too low to be measured and samples were not taken. Circulation was lost from 18 - 21m.

The hole was cased to 22m depth with 177mm Class 12 PVC bore casing grouted in place. The production interval was then drilled 6-inch diameter to 29m depth. A low flow rate of approximately 0.05L/s was recorded at the end of drilling. The well was developed by surge and airlift for 2 hours. The screen was run into position and air lifted once more before packing up and moving on. The final screen position was 21.5 - 28.6m.

KPFRT03

KPFRT02 was spudded 9m from the pilot hole on 17 November 2019. The hole was drilled 9.5-inch diameter to 21m depth. Water yield during drilling was too low to be measured and samples were not taken. Circulation was lost from 18 - 21m.

The hole was cased to 21m depth with 177mm Class 12 PVC bore casing grouted in place. The production interval was drilled 6-inch diameter to 29m depth.

A low flow rate was logged, approximately 0.05L/s. The well was developed by surge and airlift for 2 hours. The screen was run into position and airlifted once more. The final screen position was 21 - 29m.

KPFRT04, KPFRT06, KPMON01, KPMON02 & KPMON03

These bores were all installed by Drillsmith Pty Ltd under the supervision of a class 3 water bore driller.

The bores consist of 177mm class 12 PVC cased to a depth of 21 - 23m (varies for each well). The screen is 150mm slotted PVC and all casing is grouted to the surface.

Wells were airlifted for approximately 2 hours. after completion with flow rates of around 0.08L/s apart from KPFRT04 which produced negligible flow.

Appendix B: Field Test Timeline

22 November 2023

Dosing Event 1 was mixed to a pH 2.25. The lixiviant was mixed the previous day on the 21/11/2023. 1000L of groundwater was dosed for 50 seconds to achieve the required pH. Injection started at 11:09 but encountered slow draining rates and was intermittently stopped. The full 1000L was drained over 6 hours.

Note that on the previous day groundwater was pumped from the 10,000L holding tank to the 1000L mixing tank ready for the next dosing event. In the morning the water level had equalised in both tanks and had to be re-pumped in the morning.

23 November 2023

Dosing Event 2 was mixed on the 23/11/23 at a pH 2.2. Slow injection continued. The drawdown took 12 mins per metre of drawdown. The pipework originally extended from the wellhead into the screen of the well. This was rearranged as it was thought that this was affecting the head pressure and restricting the drain rate. The pipe was removed allowing the lixiviant to drain from the head of the well, which resolved the issue.

24 November 2023

Dosing Event 3 occurred on 24/11/23. Whilst undertaking an inspection of the dosing pump it was found two polyethylene irrigation fittings had degraded due to acid use. These were replaced with brass fittings and flushed with clean water each use. A pH 1.49 was achieved and with a dose time of 185 seconds at dosing rate of 6mL/s. Draining started at 12:31 pm.

27 November 2023

Dosing Event 4 occurred on 27/11/23, at pH 1.09. Injection began at 9:41am. A total of 50 L of MSA has been used over the four dosing events. Note modifications on the mixing tank were suggested and an end cap was added to the junction to prevent spillage.

28 November 2023

A severe weather event occurred on Tuesday 28/11/23 with thunderstorms and BOM Kapunda West (Kaplee) station recorded 22.4mm rain over two days. There were minimal variations in the data and SWL due to the groundwater recharge.

1 December 2023

A new pH metre was used from 1/12/23 and earlier samples from 28/11/23 onwards were re-measured. The pH of KPMON03 was re-measured at 5.5, instead of 3.5. The new pH is considered

correct, as it is supported by data from the CSIRO Vesi sensors that record live ground data, shown below at an approximate pH 5.3 (Refer figure 14).

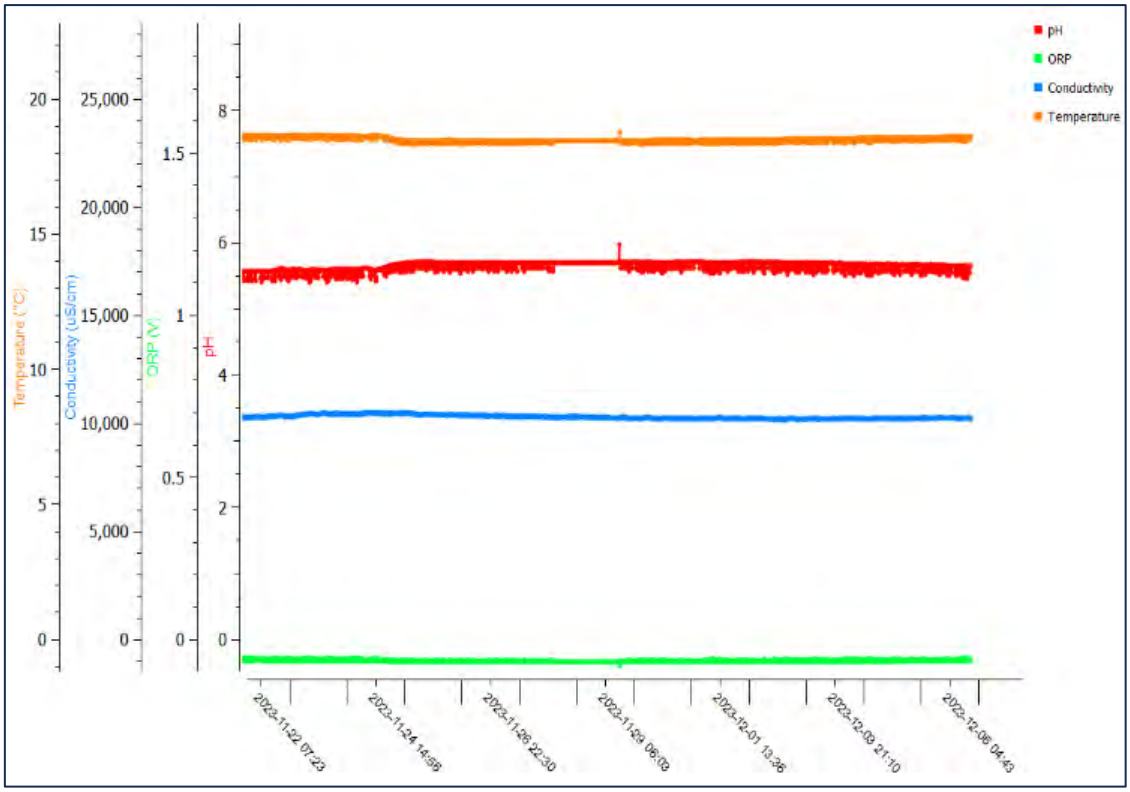

Figure 14: CSIRO Vesi sensor data

6 December 2023

Extraction from KPFRT02 started on 6/12/23 at 9:50 am. Over 6 hours 600L was purged into a separate IBC. The first 100L extracted would be lixiviant in the casing, but as more fluid was extracted, the formation water was drawn in and the pH and Cu concentrations increased.

7 December 2023

Pumping continued from 8:50 am for 3 hours until a total of 800L was extracted. Dosing Event 5 occurred on 7/12/23 using the previously pumped 800L and was dosed for 15 mins to pH 1.26. Injection started at 1:26 pm. Approximately 20L of MSA was used to achieve this pH.

10-11 December 2023

Another significant weather event occurred. BOM Kapunda West (Kaplee) station recorded 35.8mm rain over three days, with the highest rainfall on 10/11/2023 of 24.2mm.

12 December 2023

Extraction began from KPFRT02 at 9:30 am. A total of 750L was pumped over 7.5 hours. Note the stainless-steel pump was left in the IBC from the last extraction event. Cu had plated the pump where it was submersed in the low pH extracted water and oxidised above the water level.

19 December 2023

A Soil Electricity Resistivity (ER) survey was conducted. The aim is to undertake two surveys, one before and one after extraction of the lixiviant from the test.

20 –22 December 2023

Extraction process started. Purged approximately 900L total over 2 days.

January 2023
On the January 11, 240L was sent externally for various test work. 200L to NGMX to test a new IX pilot plant and 40L to Bureau Veritas to undertake settling tests. 25/01/24, another 200L was sent to NGMX which concentrated the solution to 25g/L. In January a total of 4800L of groundwater was purged as part of rehabilitation. On 17/01/2024, a sample was sent to Eurofins for assay. Results received indicated Cu at 54ppm and pH of 2.4 (PP_170124_KPFRT02).

February 2024

A total of 5800L was purged and sampled. The results showed a pH 2.9 and Cu 69 ppm (PP_080224_KPFRT02). These values were still different from baseline values.

March 2024
A total of 6800L was purged and sampled on 6/03/24. Assay results showed Cu to be very low (0.008ppm), with pH showing no change at 2.9 (PP_060324_KPFRT02). The calculated charge balance value of -11.35% was considered poor and interpreted to be due to the low heavy metal concentration (Al, Cu, Fe, Pb) compared to previous assays.

Another round of sampling occurred on 26/02/2024. KPFRT02 pH assay results reported at 2.9 for the 3 months consistently. The other wells are consistent with no changes and KPMON02 is still on the same trend with lower pH and higher conductivity and sulphate than baseline.

Appendix C: CSIRO Column test

Based on the mini-column and large column leach tests, the use of acidic leach reagents allow for attractive levels of copper extraction from various Kapunda samples with reasonable levels of acid consumption. As expected, lower extractions are achieved for sulfide-rich samples. A range of elements were leached from the gangue minerals. These elements varied based on the sample source, and the solution concentrations appeared to decrease when IX resin was used. The gangue element solution concentrations will need to be monitored and controlled by subsequent downstream solution purification during operation at site.

The Copper solution grade after 1 pore volume exchange (PVE) using MSA is shown in table 2 below.

Column Test	PVE	Cu ppm
1	1	34.6
2	1	410
3	1	218
4	1	219

Table 2: CSIRO column leach results for 1 PVE

The Push Pull results showed copper increasing from a background value of 40ppm up to a peak value of 140 mg/L an increase of 250% in 1 pore volume exchange. While this is slightly lower than the average for the CSIRO column tests (column leach average of 220.4 ppm) this is understandable given the fact that you get much better lixiviant contact with the crushed particles in a column test.

Figure 15: CSIRO Mini-column Leach & Large Particle Column test.

Appendix D: Pregnant Lixiviant Solution (PLS)

Samples of the PLS solution were sent to various companies for test work:

- Bureau Veritas for a settling test. Using 20g of soda ash in 4L of PLS, the pH changed to 8 in 10-15 minutes. This settled Cu from initial values of 113 mg/L to <1 mg/L and Fe from 1240 mg/L to <1 mg/L. See results in *"EnviroCopper Process Liquor Staged Neutralisation with Soda Ash (AN0903), Bureau Veritas, January 2024"*
- NGMX Australia used tailored IX resin columns to concentrate the solution. This process successfully concentrated Cu in solution from an initial value of 107 mg/L to 18,247 mg/L. This quantity is viable to produce copper cathode through electrowinning. Details of results are discussed below. See results in *"Test Work Program for Copper Recovery from ISR Solutions – Lab Test Report, NGMX, January 2024".*

Figure 16: NGMX IX copper concentrate

- ElectraMet uses tailored carbon electrode filter cartridge technology to remove specific metals of varying concentrations from solutions. The lab scale solution demonstrated effective removal for both samples without adjustment or optimisation. The waters were processed through in a single-pass operation to achieve study goals. ElectraMet's lab system processed the copper down to < 1 ppm for both samples, well below the specified target of < 5 ppm.
  The final effluent results (shown figure 16) were 0.9 ppm for the LIX MSA sample and 0.033 ppm for the high copper groundwater sample. The final effluent of both tests remained clear and colourless. No inefficiencies were observed during the testing and high efficiencies are anticipated to be achieved with a commercial-scale system.

Sample	Metal	pH	Initial Cu (ppm)	Final Cu Elate (ppm)	Removal Efficiency (%)
LIX MSA	Cu2+	1.4	111	0.9	99.189
Cu Groundwater	Cu2+	3.45	243	0.033	99.986

Figure 17: ElectraMet Cu removal results.

Appendix E: Ion Exchange (IX) Test Work

NGMX (2024) has undertaken IX methodology trials using PLS from the Push Pull field test. The results are discussed briefly here.

Ion exchange resins

Two resins were used in the bench top sorption / elution tests: imino diacetic (IDA) resins from two manufacturers - IDA-1 and IDA-2. IDA resins are copper selective resins. IDA-1 was used in the column sorption trials. Weak acid cation (WAC) resin was used to investigate the possibility to remove iron from the ISL solution prior to copper recovery.

Isotherm tests

The isotherm sorption and elution (desorption) tests were conducted with different resin to solution ratios. The resin to solution ratios varied from 1:5 to 1:1000. The bottles with certain amounts of resin and solution were rotated on the bottle roller for 24 hours.

After the tests the loaded resin samples were separated from solutions and eluted in 100 mL plastic jars with 10% solution of sulphuric acid. Both barren solutions and eluates were analysed for copper and other dissolved metals.

Dynamic tests

The dynamic sorption tests were conducted by passing the supplied ISL solutions through a burette filled with fresh resin (shown below). The amount of resin used in these tests was 50 mL. This amount is called a bed volume (BV). The volume of solution passed through the burette (barren solution or sorbate) could be measured in millilitres or bed volumes. The samples of sorbates were collected by 4 bed volumes and each sample was analysed for copper and other metals.

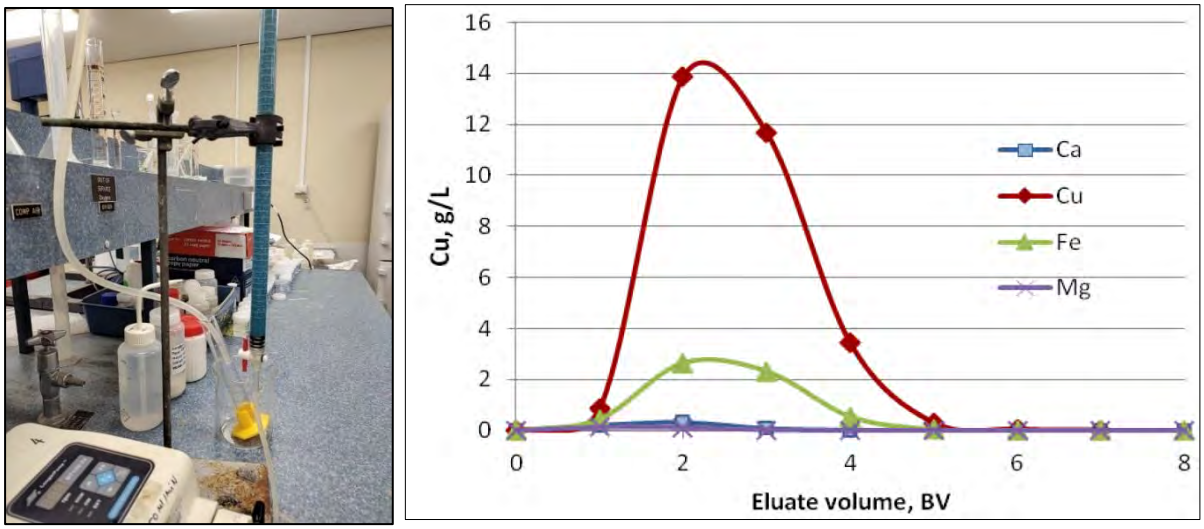

Figure 18: Dynamic sorption burette & copper eluate curve.

The dynamic elution was performed in a similar way as the dynamic sorption tests and conducted by passing the eluent (10% sulphuric acid) through the burette with loaded resin. The eluate samples (shown below) were collected by 1 bed volume (50 mL). The samples were analysed for copper and other metals.

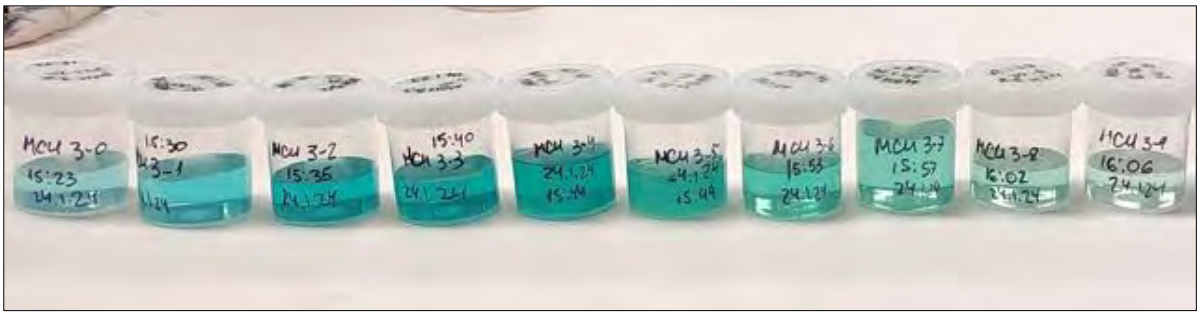

Figure 19: Eluate fractions produced in a column elution.

Continuous mini pilot plant trials

Larger volumes of ISL solutions were passing through a mini pilot plant (MPP). The MPP consists of two 2L columns, two peristaltic pumps, feeding and collecting vessels, and flexible silicone tubes. The columns were filled with 1L of IDA resins. Samples of sorbates were collected after each column from every 3 litres of sorbate. Samples of eluates were collected from every 0.2 litres of eluate. Final eluate results are below:

	Al	Ca	Co	Cu	Fe	Mg	Mn	Na	Ni	Pb	Zn
Eluate 1	116.8	66.5	1.53	18,247.8	3,286.1	30.5	0.5	56.3	12.8	227.4	68.4
Eluate 2	1,260.85	464.1	84.1	13,167.7	1,948.3	143.8	3.2	127.8	129.9	153.4	1,032.1

Figure 20: Final IX eluate chemical assays.

Results

1. The tested ISL solutions can be characterised by rather low copper concentration (107-120 mg/L) and high iron concentration (714-1,013 mg/L).
2. It was demonstrated that under such conditions we need to pass over 100 BVs of ISL solution to saturate the resin with copper. At the same time iron loading on the resin is high.
3. Two options have been tested in the MPP to reduce the iron loading on resin and its presence in eluates. A better option by now is to push iron out of resin by high copper concentration solutions. It enables high copper concentration and reduced iron in eluate.
4. The comparison of different ion exchange resins in isotherm tests showed that both IDA resins showed very similar copper loading capacity and selectivity. The IDA resin 2 demonstrated slightly higher copper loading, while the loading of impurities, especially of iron was high too. The selection of the resin should include both technical and economic evaluation.
5. Further trials could be planned to optimise the copper sorption and improve the purity of the eluates.

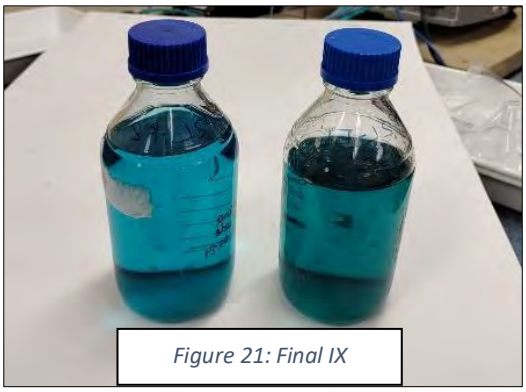

Figure 21: Final IX

This produced a concentrated eluate of 18.2 g/L which is likely to be suitable for either electrowinning or crystallisation of copper sulphate.

Appendix F: ECL Soil Electricity Resistivity (ER) survey

There have been several papers (Salem 2010) that have suggested that either Wenner arrays, Schlumberger arrays or vertical resistivity soundings can be used to gain information about groundwater. From this lab scale testing was carried out by out using high silica sand and standard solutions of copper sulphate mixed to defined concentrations has shown that resistivity can decrease by as much as 40%-60% as copper concentration of water is increased.

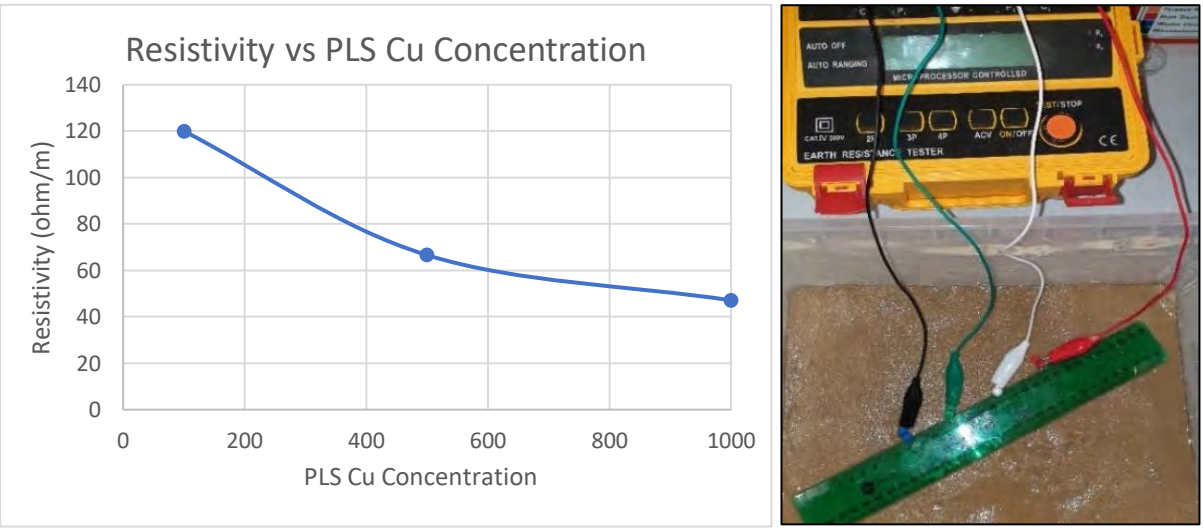

Figure 22: Laboratory resistivity results & set-up

EnviroCopper then carried out a traditional ground-based resistivity survey with 2 perpendicular lines centred above the injection well. This survey used the Wenner 2 pole method and below (Figure 22) shows the location of lines. The aim of this is to do two surveys, one before and after extracting the lixiviant from the test. Using the above papers and lab results the hypothesis is that the copper that has been extracted would show a change in resistivity around the screen of the injection bore.

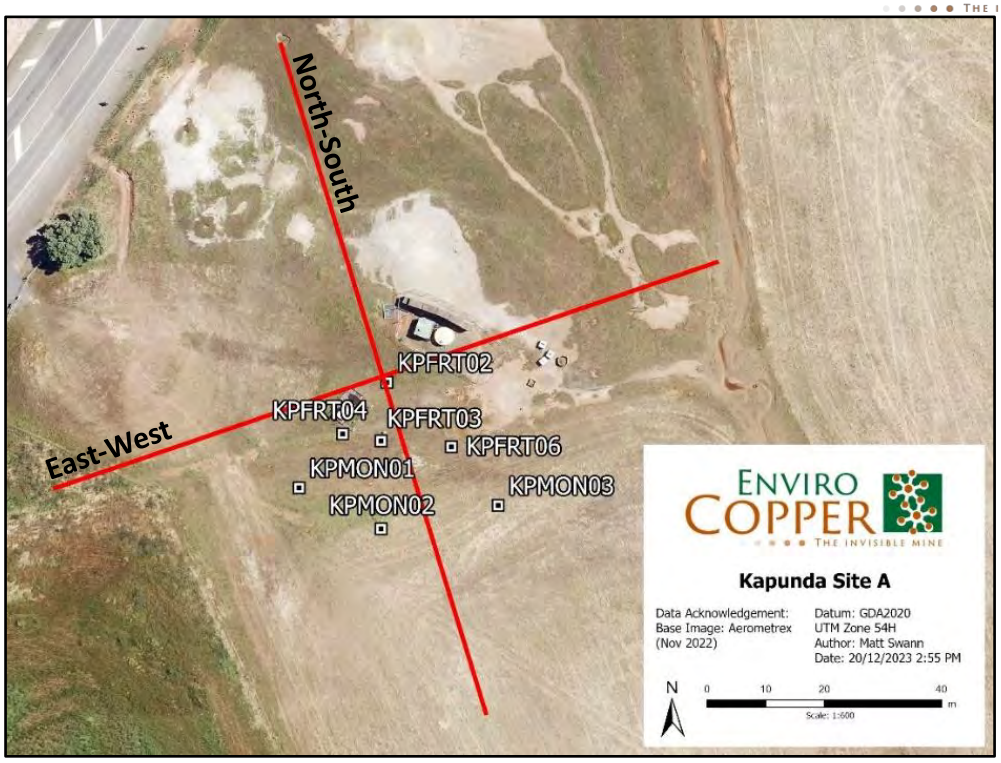

Figure 23: ECL Soil Electricity Resistivity (ER) survey

The results (shown in Figure 23) show the downhole resistivity near KPFRT02 pre- and post-test. It can be seen that show a small but consistent decrease in resistivity around the screen area, which potentially may be used to monitor lixiviant movement. As there was minimal fluid movement during the Push Pull test this method will be tested again during the upcoming circulation test.

A SPACING (M)	BEFORE EXTRACTION (19/12/23)	AFTER EXTRACTION (05/06/24)	SCREENED AREA DIFFERENCE
0.5	36	134	
1	30.8	320	
1.5	30	47.3	
2	30.5	42.6	
3	32.1	39.8	
4	33.1	36.8	
7.5	35.1	36.9	
10	34.6	33.9	
15	25.8	25.4	
20	18.9	19	0.1
22	17.2	16.6	-0.6
24	15.7	15.5	-0.2
26	14.6	14.2	-0.4
28	13.8	13.8	0
30	13.5		
40	11.6	10.8	

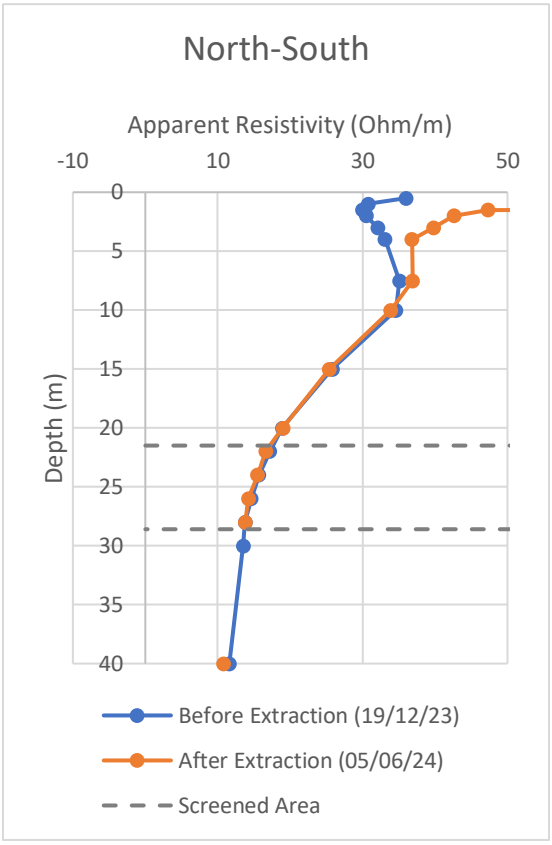

Figure 24: ECL collected resistivity profiles after injection/extraction showing slight decrease in resistivity within the screened interval

Appendix G: ATS Electro Seismic survey

Electro Seismic surveys are a relatively new technique, developed by AquaTronics Solutions (ATS). This method primarily is used to estimate aquifer properties of a survey area. The principle behind this method uses the electro-seismic effect, as explained by Du Preez (2005), which occurs when a seismic wave moves through a fluid-saturated porous medium, causing relative motion between the solid medium and fluid. This motion generates shearing between ions in the fluid and the solid matrix, leading to the creation of electrical potentials and streaming currents within the medium.

This method involves the use of a grounded dipole antenna, made up of two stainless steel rods inserted into the ground, two meters apart. The seismic source consists of a sledgehammer hitting a steel plate on the ground struck at intervals of 10 seconds for a total of 15 strikes at each station. As the seismic wave passes through different geological interfaces with varying electrical and mechanical properties, an imbalance in streaming currents occurs, producing an induced electric field. This process converts some seismic energy into electric field energy, which is then received at the surface by the grounded dipole antenna as an extremely weak (nano-volt level) audio signal.

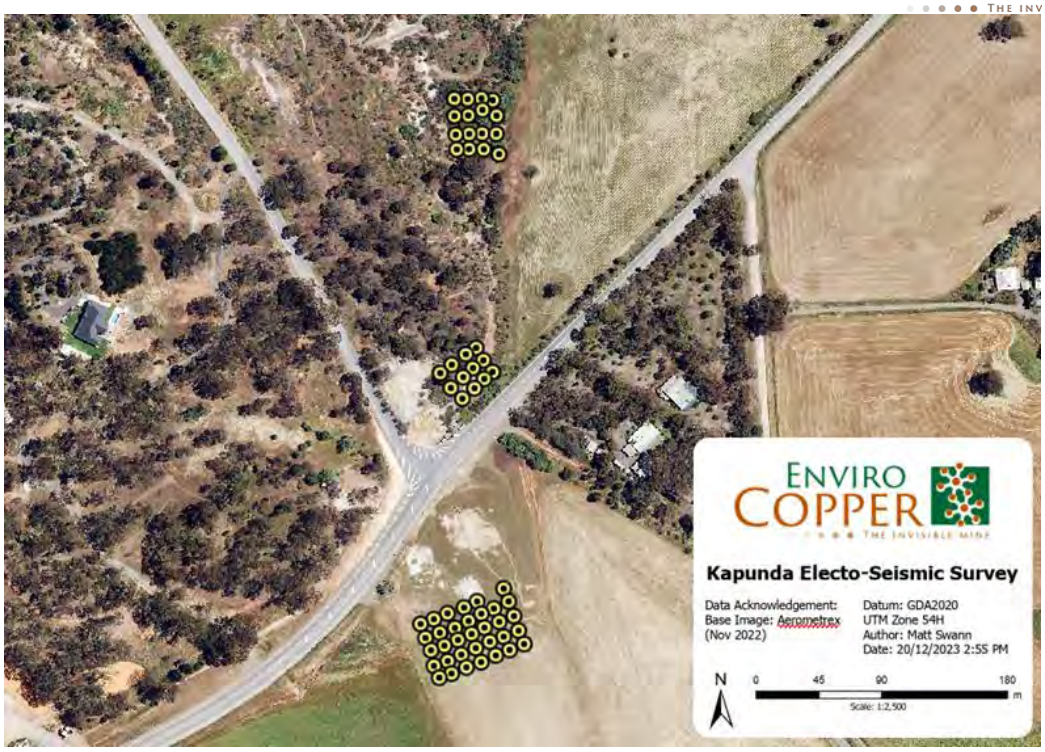

Figure 25: ATS Electro-seismic survey

The audio data is imported into ATS's software which, using various filters, calculates aquifer properties and constructs a 3D model. Below (Table 3) is a summary of the average of the calculated parameters:

Density (kg/m3)	2002.76
Porosity (%)	20.32
Diffusivity (m2/s)	0.00674
Hydraulic Conductivity (m/day)	0.00292
Transmissivity (m2/day)	0.000249
Permeability (Darcy)	3.504

Table 3: Table showing ATS parameters for ES survey

The model was used to interpret aquifer classification to infer sedimentary boundaries and weathering profiles (Figure 14). The weathering profile is shallow, with the transition seen between 15m and 25m.

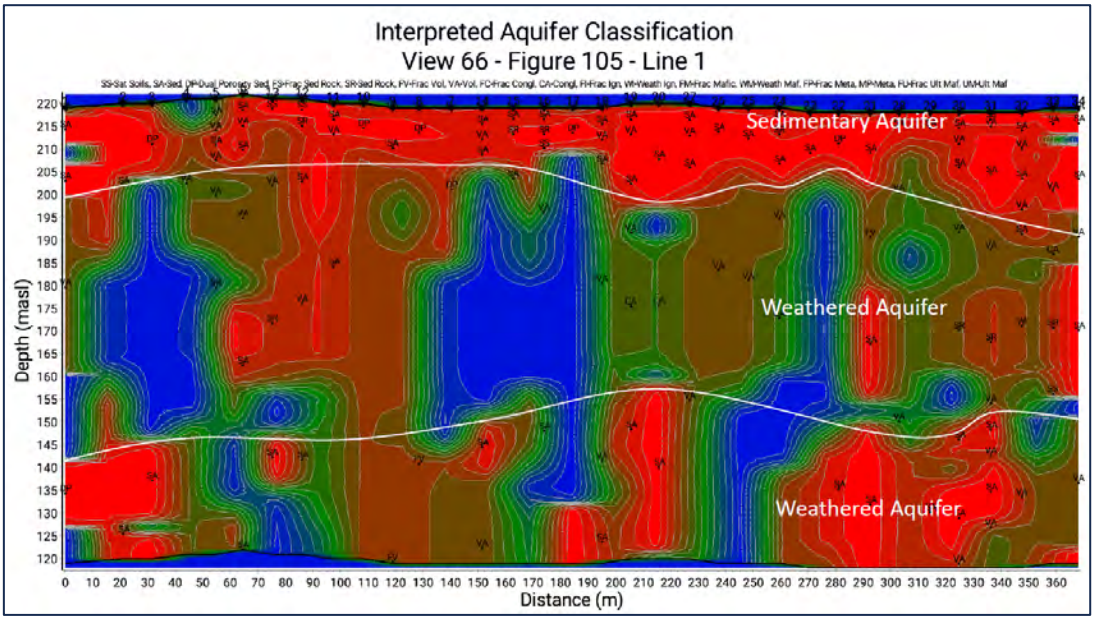

Figure 26: ATS Electro seismic resistivity profile showing approximate estimated leach area

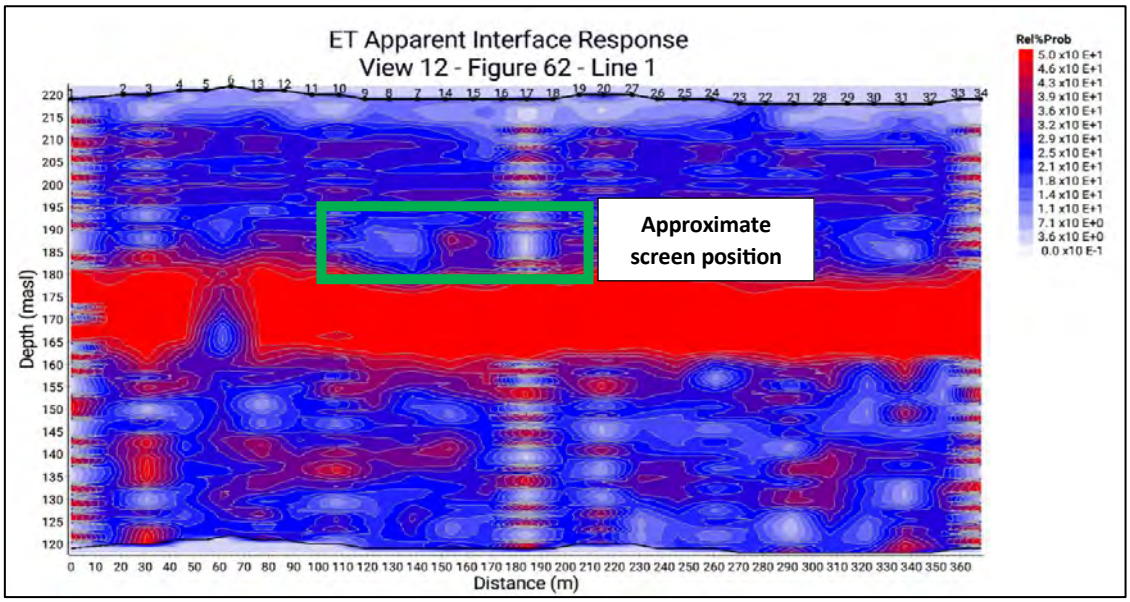

Figure 27: ATS Electro seismic resistivity profile showing approximate estimated leach area.

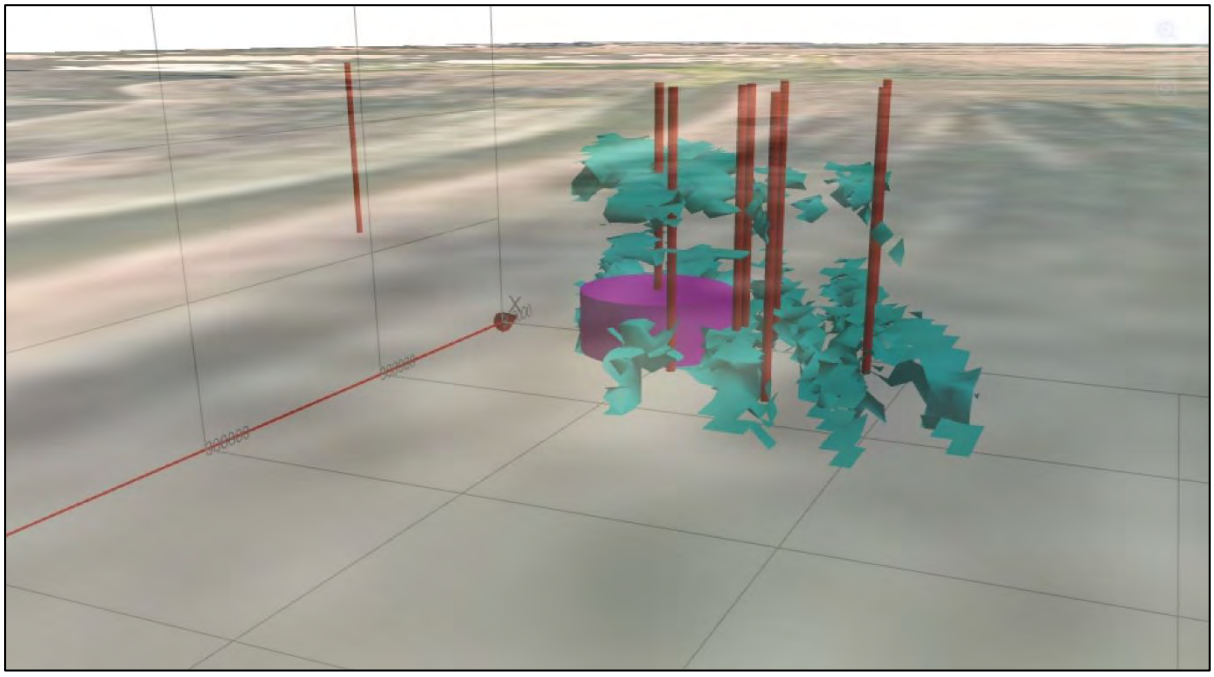

Figure 28: ATS 3D view of resistivity iso surface and approximation of COMSOL leach range

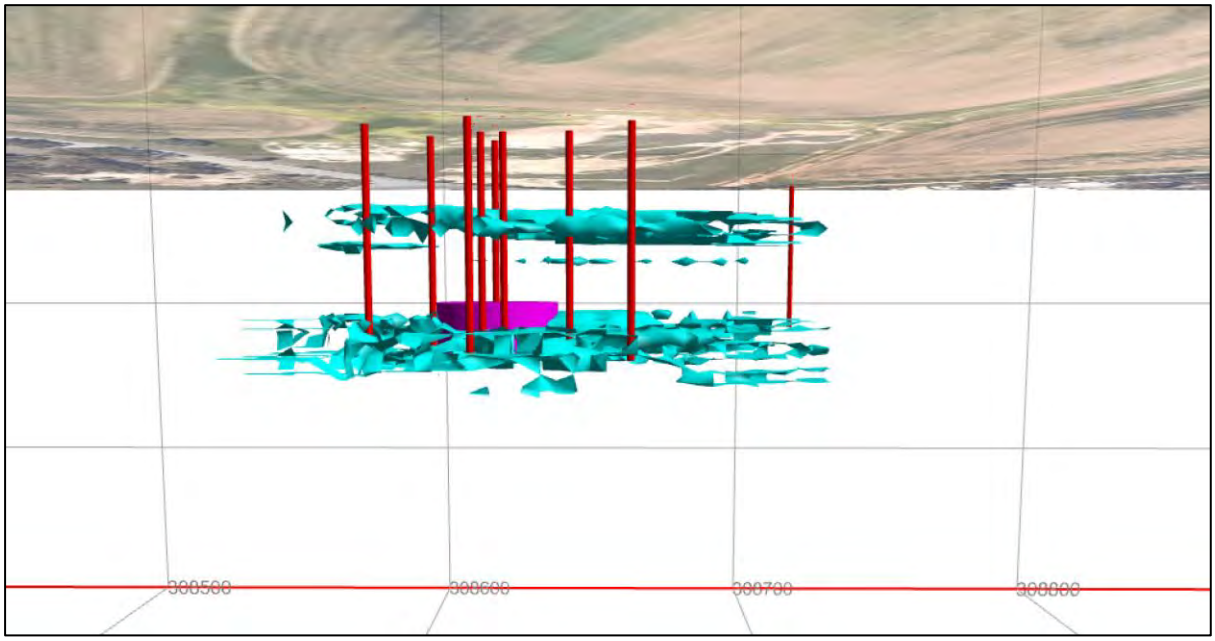

Figure 29: ATS 3D view of resistivity iso surface and approximation of COMSOL leach range

Appendix H: University of Adelaide Resistivity Survey

In trials undertaken by the University of Adelaide previously, it was demonstrated that ground-based resistivity potentially has adequate depth and spatial resolution to map sub-surface resistivity with time. However, in the current project phase, the amount of fluid and small change in fluid conductivity meant that any change was below detection levels. The natural variability (noise) was larger than any potential bulk change in the Earth.

This result is useful as a demonstrator technique, and something that can be investigated further at a later date. The University of Adelaide has previously worked with Heathgate on downhole and cross-hole resistivity tomography and have suggested that this kind of resistivity monitoring is best done downhole, rather than from the surface.

Appendix I: LWC Geochemist Workbench Modelling

Land and Water Consulting (LWC) established a geochemical fate transport model to access transport of copper and other pH sensitive metals for the Push Pull test (*see Conceptual Site Model and Predictive Assessment Kapunda ISR Hydrogeochemistry Support for SELT August 2021*)

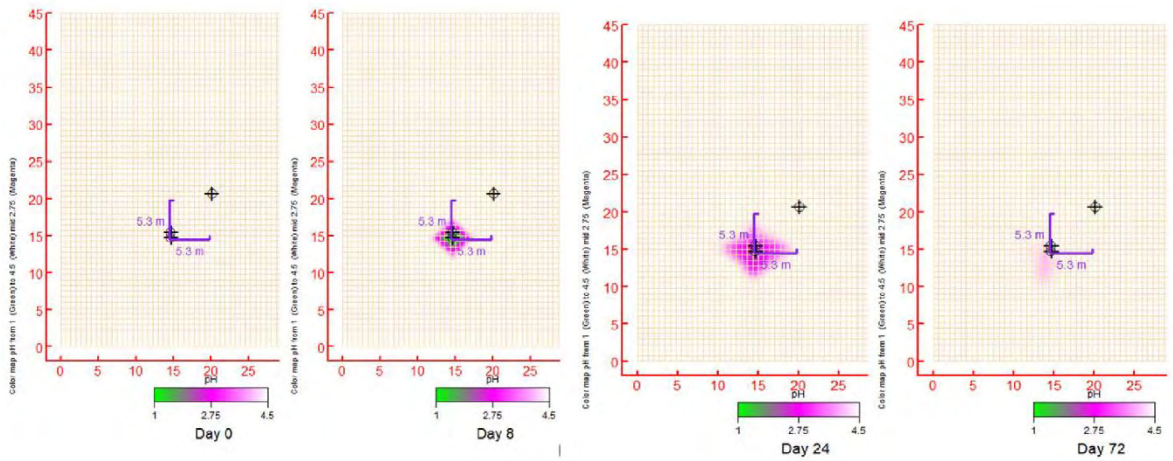

Figure 30: LWC geochemical fate transport model.

Figure 29 shows predictions made by the LWC model, highlighting the pH and copper differences in the groundwater. The model estimates that the affected area would be approximately 5.3m laterally from the injection well. Therefore, changes would not be observable in the monitoring array (KPMON01-03) and the observation array (KPFRT03,04&06).

Appendix J: ECL COMSOL Modelling

As part of the environmental impact study, ECL simulated the extent of the groundwater that would be to be affected in the Kapunda Cu-ISR trials. Using COMSOL Multiphysics the migration of lixiviant parameters such as fluid flow and copper production were modelled. The physics packages predominately used are *Darcy's Law* (dl) and *Transport of Diluted Species in Porous Media* (tds), for fluid flow mechanics and *Domain ODEs and DAEs* (dode) to model copper dissolution and lixiviant migration which will demonstrate groundwater impact.

Fracture modelling

KPFRT01 was drilled in 2019 and logged by Borehole wireline with a range of tools including down hole optical and acoustic logging in order to assess fracture numbers and orientation. The images below show some of the output from the logging .

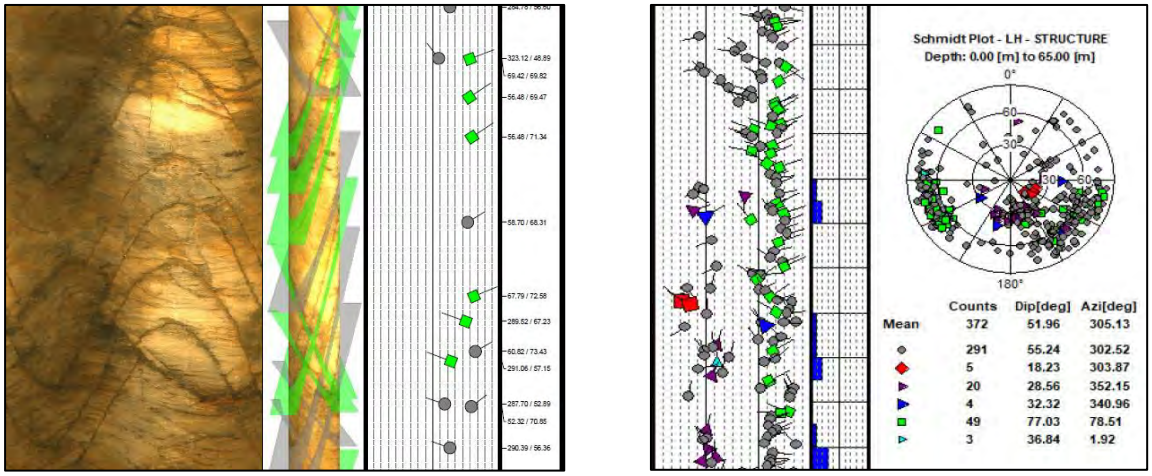

Figure 31: Downhole structural information generated automatically from optical logging

Output from the logging data includes a table of facture type, count and aperture. 3 main fracture orientations were identified (figure 31), this fracture data was exported as a table and analysed to calculate fracture spacing and aperture distributions.

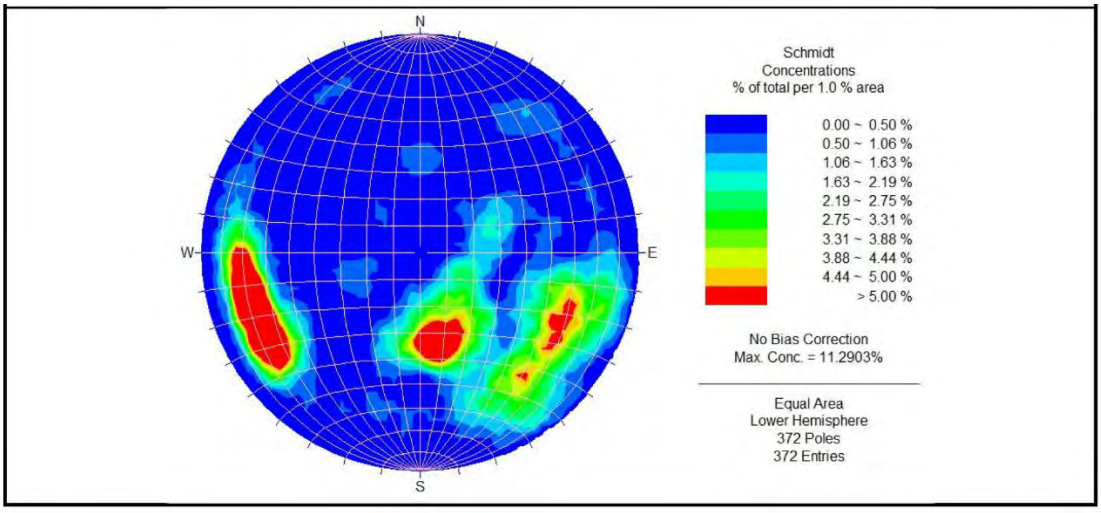

Figure 32: Stereonet plot of Borehole wireline data showing 3 main fracture orientations

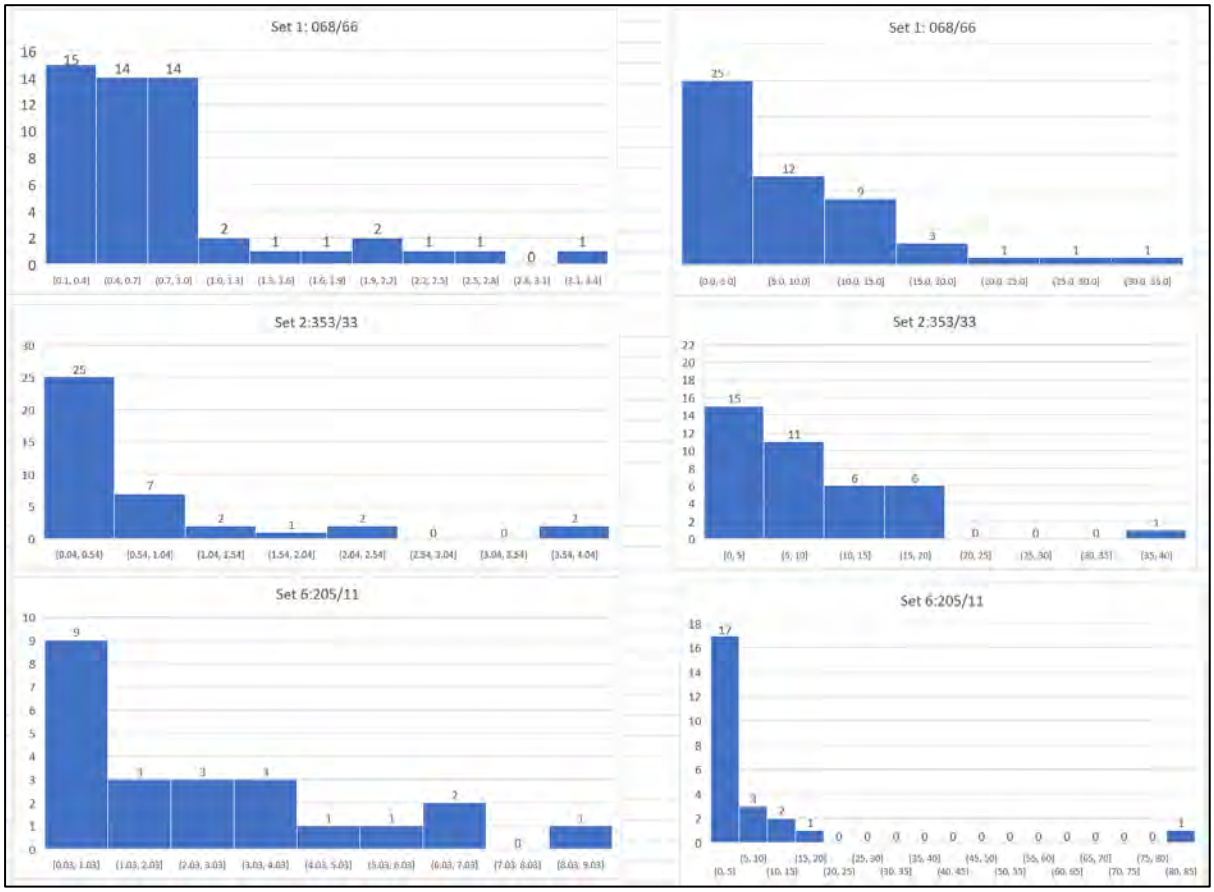

Figure 33: Fracture spacing histograms for main sets

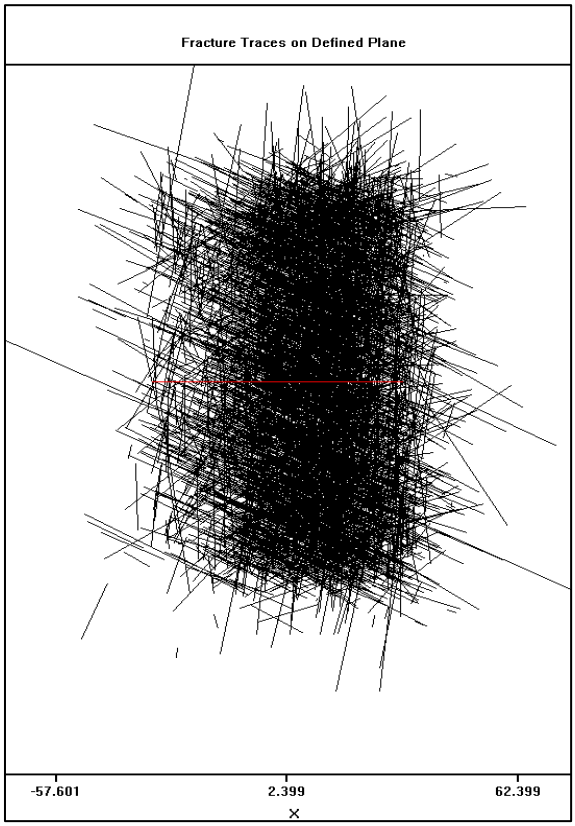

Figure 34: Modelled Fracture data plotted on XY plane

Calculation of Discrete Fracture Network model, Permeability Tensors and Darcy Flow Velocities

The following is a summary of the modelling process taken from an ECR internal report "Estimation of the Kapunda Fracture Model and Hydraulic Conductivity Model" and briefly explains the process of modelling fractures and determining Darcy velocity directions.

For the estimation of the fracture model, fracture density data is collected (via downhole imaging), this data is then used to create a Discrete Fracture Network model (DFN). The hydraulic conductivity model is estimated from the DFN models (or DFN model parameters). The permeability of a block can be estimated by simulating fluid flow through the DFN model in COMSOL.

Through simulations of various DFN models, a relationship between the block permeability and the fracture point intensity (P30) is derived for each zone, which is then used to estimate the hydraulic conductivity of each block.

Discrete Fracture Network (DFN) model

The discrete fracture network model can be derived from the estimated fracture density model (P10 model) and the fracture sets distribution (histograms above). For DFN model generation, fracture point density in 3D space (P30) is required. As P30 is difficult, if not impossible, to measure, it is usually estimated through calibration of P10. Specifically, a DFN model with assumed P30 are generated first with the estimated parameters for fracture size and orientation.

Scanline sampling is then performed for this DFN model to obtain the P10 value, which is shown in Figure below as an example. This scanline-sampled P10 value is compared with the estimated P10 value from the P10 model, based on which the P30 of the DFN model is adjusted till the scanline-sampled P10 value is close to the estimated P10 value.

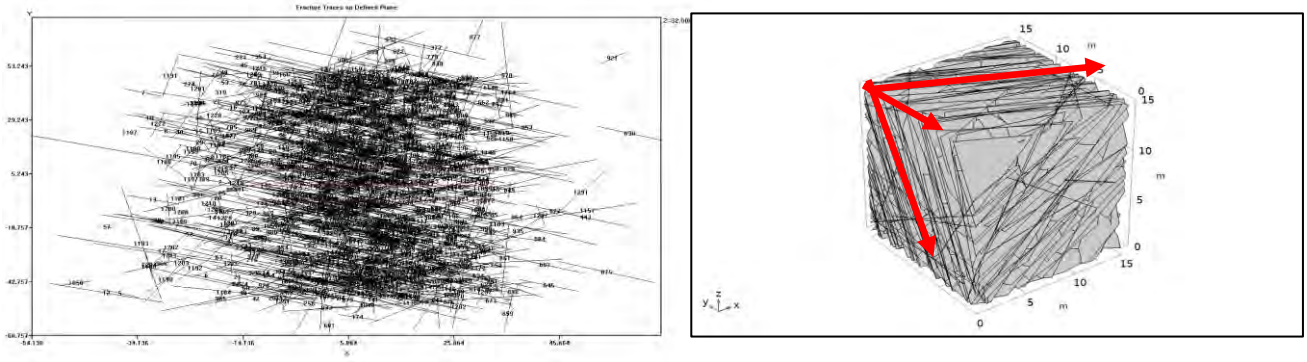

Figure 35: DFN model scanline sampling for 26-39m & model with primary fracture orientations highlighted

Once the DFN model is built, fluid flow simulations in three directions are carried out and the permeability tensor for simulated results calculated.

Fluid flow simulation is carried out using COMSOL software, the physics node used in COMSOL for this process is fracture flow where fractures are treated as 2D surfaces in COMSOL and hence the fracture boundaries are edges. The permeability of each fracture is pre-estimated using the embedded cubic law where the fracture aperture can be user-defined. Three simulations for fluid flow through fractures in the DFN model are run with hydraulic gradient in x, y and z directions respectively.

For flow simulation with hydraulic gradient in the x direction, pressure p1 and p2 are applied at the fracture edges intersecting face x- and face x+ respectively; the pressure gradient is linear and is given by p1, p2 and the block dimension in x direction, which is applied at the boundaries of z-, z+, y- and y+ faces. The same boundary conditions are set for the other two flow simulations with pressure gradient directions altered to y and z directions respectively. The simulated pressure distribution in the three flow simulations are shown below.

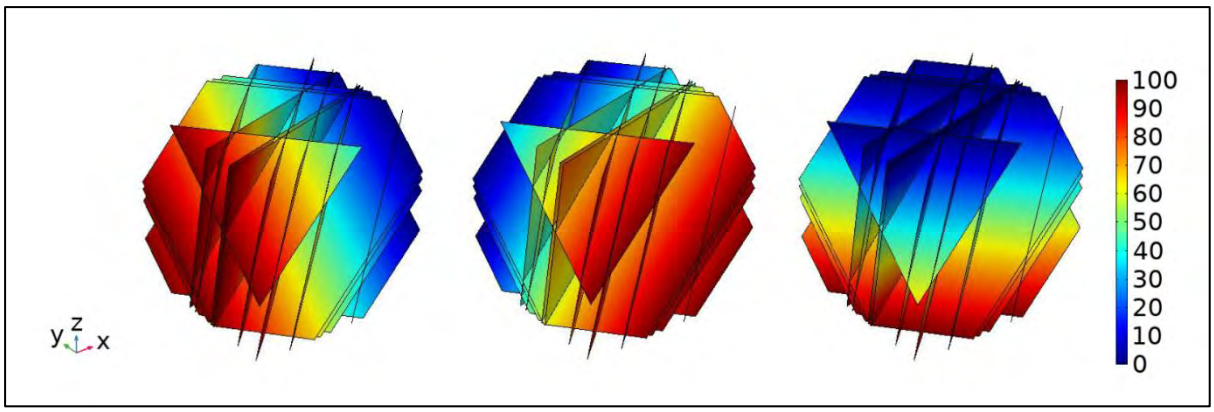

Figure 36: Example of simulated pressure distributions in 3 flow simulations.

Treating the DFN block as an ECPM, the block permeability tensor can be derived from the flow simulation results based on Darcy's law (ignore gravitational term):

$$\boldsymbol{q} = -\frac{\boldsymbol{k}}{\mu}\nabla p$$

where $\boldsymbol{q}$ is the flow velocity vector consists of x, y and z components (q_x, q_y, q_z), $\boldsymbol{k}$ is the permeability tensor (with nine components), μ is the fluid viscosity and p is the pressure.

$$K = K_{ei}\begin{Bmatrix} \sum_{i=1}^{N}(1-\sin^2\beta_i\sin^2\gamma_i) & -\sum_{i=1}^{N} sin\beta_i cos\beta_i \sin^2\gamma_i & -\sum_{i=1}^{N} sin\beta_i sin\gamma_i cos\gamma_i \\ -\sum_{i=1}^{N} sin\beta_i cos\beta_i \sin^2\gamma_i & \sum_{i=1}^{N}(1-\cos^2\beta_i\sin^2\gamma_i) & -\sum_{i=1}^{N} cos\beta_i sin\gamma_i cos\gamma_i \\ -\sum_{i=1}^{N} sin\beta_i sin\gamma_i cos\gamma_i & -\sum_{i=1}^{N} cos\beta_i sin\gamma_i cos\gamma_i & \sum_{i=1}^{N}(1-\cos^2\gamma_i) \end{Bmatrix}$$

Permeability tensor based on the Cubic Law:

β: dip direction; γ: dip angle; Ap: Aperture; SP: spacing

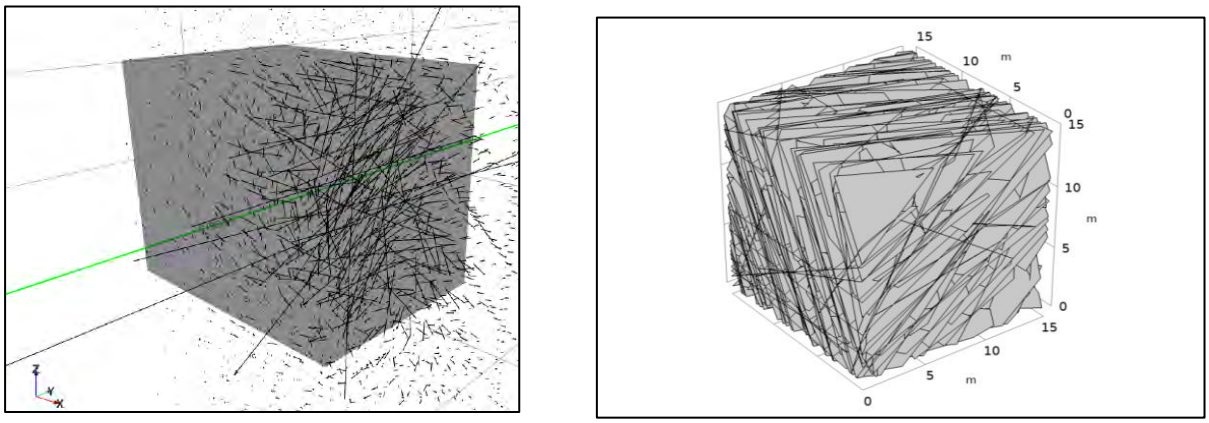

Figure 37: Frac-sim 3D fracture DFN output & Darcy velocity orientations using test estimated test parameters.

Depth intervals (m)	Hydraulic cond.	Principal directions	
	HK123 (m/day)	dip direction	dip angle
0-13	0.003	17	64
	0.007	144	16
	0.009	240	19
13-26			
	0.023	269	1
	0.041	178	49
	0.058	360	41
26-39			
	0.034	248	27
	0.130	115	53
	0.157	350	23
39-52			
	0.090	194	63
	0.112	98	3
	0.181	7	27
52-65			
	0.059	268	7
	0.068	169	49
	0.102	4	40

Figure 38: Estimated hydraulic conductivity based on KPFRT01 fracture data

Initial COMSOL Simulation

A simulation of the fracture model using the estimated hydraulic conductivities from figure 37 and an injection flow rate of 0.1 L/s was carried out using COMSOL software

The results show a flow regime with a slight NNE-SSW bias (see figures below)

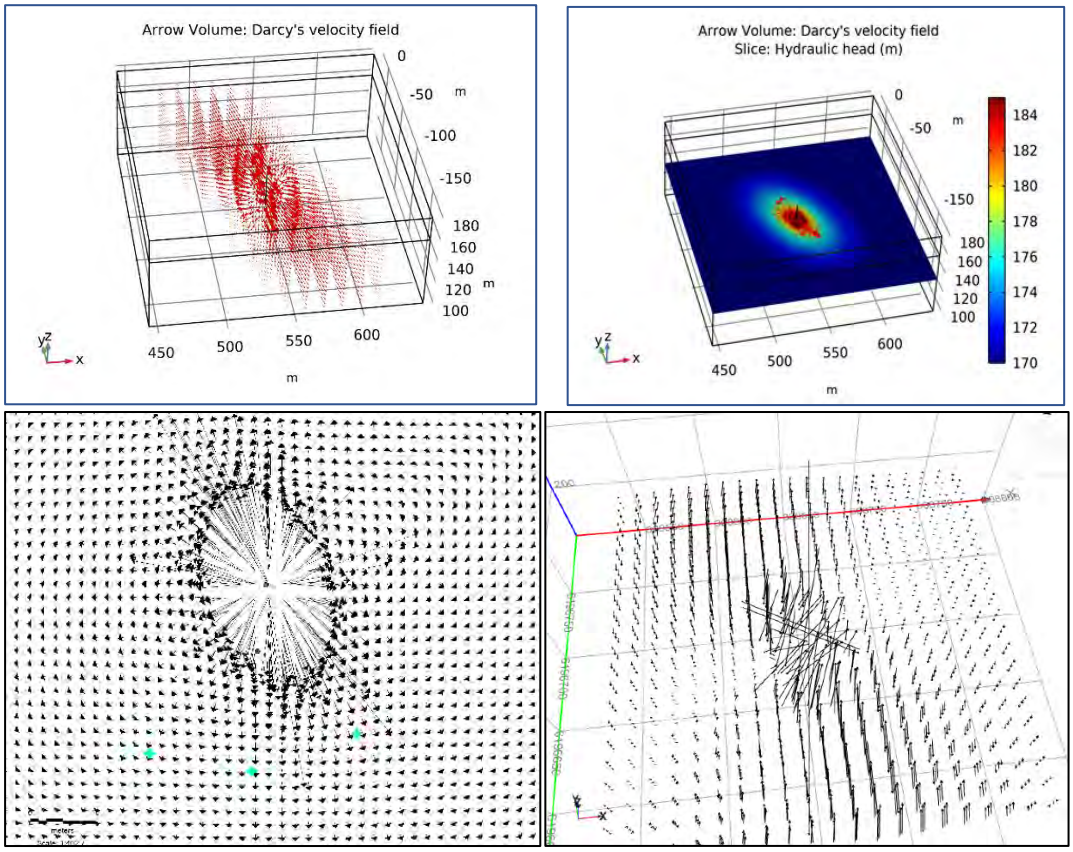

Figure 39: Diagram showing plan view and 3D view of Darcy velocity orientations calculated in COMSOL software

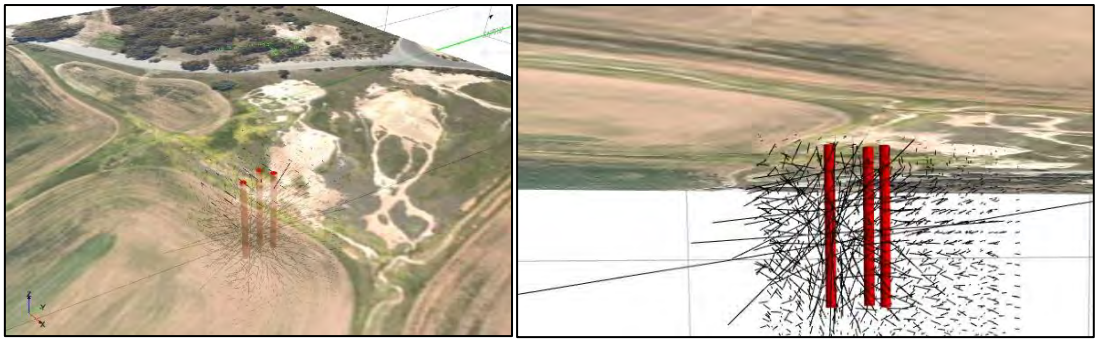

Figure 40: Diagram showing modelled Darcy velocity orientations and hole locations overlain over Google earth image.

Push Pull COMSOL Simulation

This model is simulated by importing the Push Pull site layout and simulating over the estimated time of the trial. Modelling the lixiviant concentration (Parameter: c_acid) gives the best representation of the area of impacted groundwater for the site. Figure 40 shows the extent of the lixiviant plume extending over times 0, 3 & 14 days.

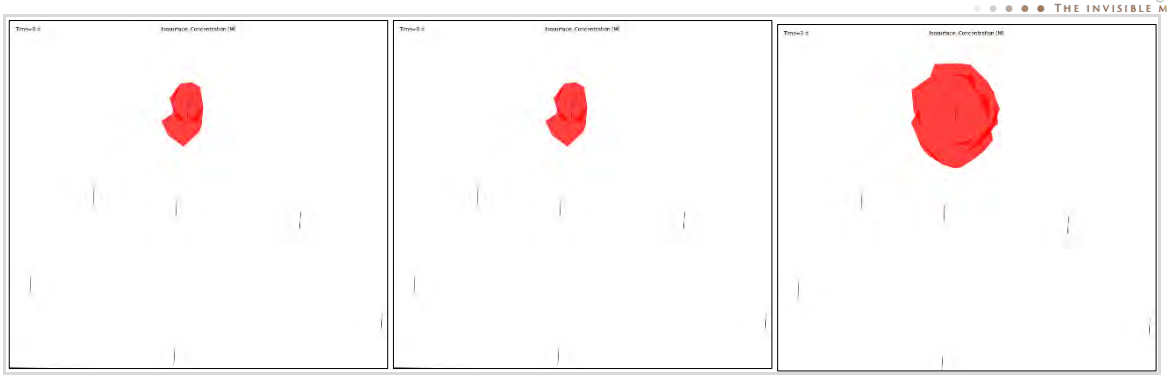

Figure 41: COMSOL Push Pull lixiviant (Day 0, 3 & 14).

The COMSOL results were overlaid on a site map (below Figure 41) which shows the extent of the affected area. The radius was calculated at approximately 7.5m from the injection well and does not reach the observation wells.

Figure 42: COMSOL Groundwater Impact.

Below (Figure 42) is a comparison of COMSOL's pH and Cu in solution estimates vs. Push Pull test assay results. Comparing the results collected during the test with the modelling produced meaningful results, and the model itself will need to be updated with these real-world results. Note the COMSOL model's injection and extraction process are constant throughout the test. In the field test these were done as dosing events, and each can be seen as spikes in the data. Overall, the trends are similar between the two. The Cu does not spike as high as the COMSOL estimates, as it is thought that there are more Cu sulphides and iron in the solution than were estimated in the model data, which inhibits the PLS peak.

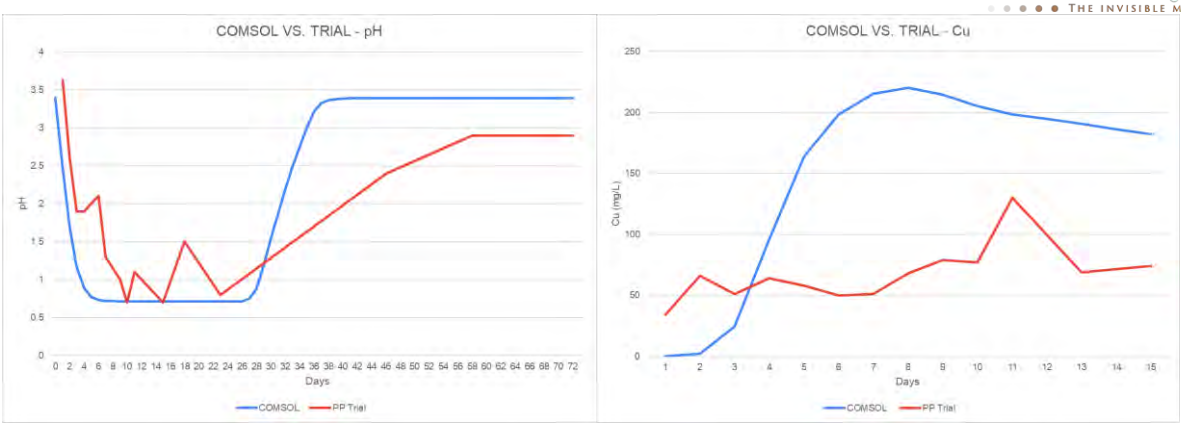

Figure 43: COMSOL model estimate & Push Pull collected data comparison.

Appendix K: LWC Compliance Report Executive Summary

The following was extracted from *"Push Pull Test – Groundwater Monitoring Report, Land Water Consulting, James Fox"*.

LWC
Land and Water Consulting

EXECUTIVE SUMMARY

CONTEXT

Land & Water Consulting (LWC) was previously engaged by Environmental Copper Recovery (EnviroCopper) to prepare a Groundwater Monitoring & Management Plan (GMMP)1 for the Copper In-Situ Recovery project located on privately owned land to the south of the Kapunda Historic Mine, within the township of Kapunda and approximately 80 km north-east of Adelaide, South Australia ('the Site').

EnviroCopper is exploring the potential for In-Situ Recovery (ISR) of copper and gold. This exploration program is focussed on conducting a Site Environmental Lixiviant Trial (SELT) via a 'Push/ Pull (PP) Well' to assess the extent of the ISR mineral deposit through in-ground test work.

The GMMP set out the groundwater monitoring and sample analysis methodology and schedule to formulate a robust baseline assessment of current pre-activity groundwater conditions such that any excursion of mining fluids or alteration to the natural hydrogeochemistry as a function of SELT activities (i.e. a non-compliance) can be identified and (where necessary) corrected.

COMPLIANCE

A non-compliance is the identification of excursion of mining related chemicals/ parameters from Site A, that may affect the baseline groundwater and any associated receptors. An 'Excursion' is defined in the ePEPR as: 'the movement of lixiviant outside the trial area'. The trial area is defined as 100 m radius around the PP Well.

Leading indicators of an excursion are detected by monitoring excursion control parameters (comparison of reported concentrations to trigger values) at three Monitoring Wells located 25 m down hydraulic gradient from the Push/Pull Well (KP_PP1) at Site A:

- KPMON01
- KPMON02 and
- KPMON03.

Previous work involving predictive modelling of the SELT process predicted a lateral extent of around 7 m from the PP Well.

As the project is located down hydraulic gradient of the Kapunda Historic Mine, the quality of the groundwater is very variable. The acidity of the groundwater (and consequently dissolved metals content) varies considerably across the project area, due to localised oxidation of pyrites (associated with historical mining) producing sulfuric acid and solubilising metals. Consequently a 'blanket' trigger value per chemical substance for the project area is impractical – based on the elevated concentrations of key metals in the central project area where the SELT will occur, trigger values would be impractically high and would not detect excursion from the ISR operation.

Consequently, an intra well trigger value derivation approach was previously agreed with the Department for Energy and Mining (DEM) in 2022.

---

[1] NJ 01 06 Kapunda ISR GMMP FR004A Issue

Individual exceedances of 80th%ile triggers are evident, though these are of low magnitude – i.e. they were not sustained nor statistically significant when accounting for relative percent difference error or laboratory duplicate error and where contemplating the laboratory control spike (LCS).

Further, when the compliance criterion (Section 2.6) is applied only sulfate in monitoring well KPMON02 indicates a transient potential non-compliance occurred, noting both conductivity and pH have no data point around the 14 day mark post initial 'exceedance' (Table 5-4). Sulfate in water from KPMON02 was within 10% of the 80th%ile value suggesting possible ambient contribution rather than a gross excursion of mining fluids.

Table 5-1 Summary of exceedances / compliance

	KPMON01		KPMON02		KPMON03	
Parameter	Compliance with GMMP?	Compliance with DES (2021)?	Compliance with GMMP?	Compliance with DES (2021)?	Compliance with GMMP?	Compliance with DES (2021)?
copper	☑	☑	☑	☑	☑	☑
sulfate	☑	☑	x	☑	☑	☑
conductivity	☑	☑	_	☑	☑	☑
pH	☑	☑	_	☑	☑	☑

Though sulfate in KPMON02 provides the only outright noncompliance in the dataset, sulfate in wells KPMON01 to 03 is shown to be generally over reported by the laboratory noting persistent exceedance of 100% recovery in the laboratory control spikes. The laboratory may be generally reporting sulfate higher than true value.

Although prescribed in the GMMP, due to operational requirements low flow sampling was not applied as the groundwater sampling method – therefore there is likely to have been excessive water level drawdown in each well during and between sampling events:

- The lithology is very dynamic and known to be hosting sulfidic species particularly around 26 m depth onwards[2] with malachite (copper phase) in oxidised zones. Wetting and drying scenarios on the micro scale in and around the water table may produce some contributory oxidation of sulfidic species and concomitant generation of acidity, which would then influence the pH of the water column.
- Consequently, adherence to using low flow sampling as prescribed in the GMMP is recommended to minimise or even mitigate the contribution of near field sulfidic oxidation to water quality analytical results (this may also contribute some sulfate).
- In addition it is recommended that water level data and is collected and provided with chemistry data to determine notable changes in water level during sampling that may indicate changes in hydrogeochemistry as a function of water table variation.

[2] According to drill records for KPFRT01 – 03 – no logs available for KPMON series wells.

REHABILITATION

The GMMP set out post-trial groundwater rehabilitation criteria:

1. Return to baseline conditions or better of all rehabilitation parameters (better is defined as lower dissolved species and higher pH).
2. Rehabilitation parameters are those that have been identified from column leach tests and geochemical modelling as modified or potentially mobilised by leaching: pH, EC, Metals: Fe, Co, Zn, Cu, Ni, Ag, Li, Mo, Cr V.

Groundwater chemistry data from operation wells KPFRT02, 03, 04 and 06 as well as KPMON01, 02 and 03 collected 5 June 2024 were compared to baseline (pre-trial) groundwater data.

There were no significant differences between pre and post-trial data indicating a satisfactory level of rehabilitation has been achieved.

Appendix L: Excelsior's Gunnison Rehab

The following is extracted from "Gunnison Copper Project UIC Permit Application, 2017. Appendix F, Wellfield Closure Strategy. Cochise County, Arizona, USA". It describes the rinsing procedure initiated at wellfield closure to ensure a shorter and more predictable groundwater rehabilitation timeframe, while ongoing monitoring standards are adhered to.

3.2.8 Wellfield Closure Strategy

Closure of the wellfield will include rinsing to remove residual PLS and well abandonment, as discussed in the sections below. The closure strategy consists of the following elements:

- Rinsing
- Well plugging and abandonment
- Report preparation
- Post-closure monitoring

3.2.8.1 Rinsing

A rinsing closure strategy is proposed for the wellfield. After copper recoveries drop below the economic cutoff, ISR in a given production block will be deemed complete and the block will be rinsed using fresh groundwater until applicable water quality standards are met. A flow chart that summarizes the closure strategy is provided as Figure A-18.

Based on geochemical modeling by Duke HydroChem (Attachment H-2), the following 3-step rinsing strategy is proposed:

- Rinse three (3) pore volumes (based on a 3% fracture porosity of the ore body)
- Rest
- Rinse two (2) pore volumes

Step 1 will result in a mix of 5% PLS and 95% groundwater after rinsing with three pore volumes, based on core tray and column testing documented in a rinsing report by Clear Creek (Attachment H-3). The mechanism by which solute is removed during Step 1 is advective flow, i.e. flushing of the fractures.

Step 2 allows the solution to be neutralized as silicate and carbonate minerals are altered. Solute concentrations will be controlled by precipitation of secondary minerals and complexation (sorption) on hydrous ferric oxide surfaces. The resting period will continue until pH of the resident solution is circumneutral and all regulated constituents are at or below AWQSs and MCLs. The geochemical model results indicate that these conditions would be attained after a resting period of approximately one year (Attachment H-2).

Step 3 is a final rinse of two pore volumes. This step will facilitate removal of any constituents that might still be present at or near regulatory limits. Similar to Step 1, the solute removal mechanism of Step 3 is flushing.

Site A: Push Pull Test – Groundwater Monitoring Compliance Report

Kapunda In-Situ Copper Recovery

EnviroCopper

July 2024

Document Status

Version	Doc type	Reviewed by	Approved by	Date issued
FR001	Report	Dr James Fox		9 May 2024
FR002	Final – text update			12 June 2024
FR003	Final – Rehab			19 July 2024

Project Details

Project Name	Kapunda In-Situ Copper Recovery
Project Location	Site A: Push Pull Test – Groundwater Monitoring Compliance Report
Client	EnviroCopper
Client Project Manager	Charlie Johnston
LWC Project Manager	James Fox
LWC Project Director	Emily Picken
Author	James Fox
File Reference	NJ 01 06 Kapunda ISR PP Report FR003

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conductivity	☑	☑	-	☑	☑	☑
pH	☑	☑	-	☑	☑	☑

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Definition of Acronyms

AF	Assessment Factor
AHD	Australian Height Datum
ALS	Australia Laboratory Services
ANZG	Australian New Zealand Guidelines
ANZECC	Australian New Zealand Environment Conservation Council
ARMCAZ	Agriculture and Resource Management Council of Australian and New Zealand
ASC	Assessment of Site Contamination
BGL	Below Ground Level
BOM	Bureau of Meteorology
BV	Bureau Veritas
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CPEC	Chemicals of Primary Environmental Concern
CRC-P	Cooperative Research Centres – Projects
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEM	Department of Energy & Mining
DES	Department of Environment and Science
DEW	Department for Environment and Water
DHG	Down Hydraulic Gradient
DO	Dissolved Oxygen
DQO	Data Quality Objective
DR	Draft Report
EC	Electrical Conductivity
EnviroCopper	Environmental Copper Recovery
EPA	Environment Protection Authority
E-PEPR	Exploration Program for Environment Protection and Rehabilitation
EV	Environmental Value
FR	Final Report
GC-MS	Gas Chromatography - Mass Spectroscopy
GDE	Groundwater Dependent Ecosystem
GMMP	Groundwater Monitoring & Management Plan
GSS	Geochemists Spreadsheet (an application within GWB)
GWB	Geochemists Work Bench
HMTV	Hardness Modified Target Value
ISR	In-Situ Recovery
ITRC	Interstate Technology and Regulatory Council
LOR	Limits of Reporting
LWC	Land and Water Consulting
LNAPL	Light Non-Aqueous Phase Liquid
LPCT	Large Particle Column Leach Test
mg/L	milligrams per litre
µg/L	micrograms per litre
MSA	Methanesulfonic Acid
mV	milli volts
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	National Resource Management Ministerial Council
NYNRMB	Northern and Yorke Natural Resources Management Board
ppm	parts per million
QA/QC	Quality Assurance/ Quality Control
REE	Rare Earth Element
RPD	Relative Percentage Difference
SA EPA	South Australian Environmental Protection Authority

SELT	Site Environmental Lixiviant Trial
STP	Standard Temperature and Pressure
SWL	Standing Water Level
TDS	Total Dissolved Solids
TRH	Total Recoverable Hydrocarbons
TV	Target Value
U.S. EPA	United States Environment Protection Agency
U.S. NRC	United States Nuclear Regulatory Authority
WAP	Water Allocation Plan
WHSMP	Workplace Health and Safety Plan
WQEPP	Environment Protection (Water Quality) Policy
WQO	Water Quality Objective
XRD	X-Ray Diffraction

CONTENTS

EXECUTIVE SUMMARY 1

1 INTRODUCTION 8

1.1 Overview 8
1.2 Context 9

2 GROUNDWATER COMPLIANCE PROTOCOL 10

2.1 Objective 10
2.2 Compliance approach 10
2.3 Monitoring well network 13
2.4 Intra well trigger values 15
2.5 KP060 values 16
2.6 Comparison to baseline orientated management objectives 17
2.7 Actions on non-compliance 18
2.8 Corrective action 19
2.8.1 Immediate control 19
2.8.2 Contingency 19
2.8.3 Rehabilitation 20
2.8.4 Rehabilitation Method 20
2.9 Reporting 21

3 PUSH / PULL MONITORING 22

4 QUALITY ASSURANCE / QUALITY CONTROL 23

4.1 Overview 23
4.2 Field duplicates 23
4.3 Laboratory quality assurance/ control 24
4.4 Censored data 26
4.5 Charge balance 26

5 COMPLIANCE 29

5.1 KPMON01 30
5.2 KPMON02 32
5.3 KPMON03 34
5.4 Summary 35

6 REHABILITATION 37

7 REFERENCES 38

FIGURES 40

APPENDICES

Appendix A TRIGGER VALUES
Appendix B FIELD SHEETS
Appendix C LABORATORY REPORTS
Appendix D CHARGE BALANCE
Appendix E RELATIVE PERCENT DIFFERENCE
Appendix F COMPLIANCE ASSESSMENT TABLES
Appendix G REHABILITATION ASSESSMENT

LIST OF FIGURES (REAR)

Figure 1 – Site Locality Plan
Figure 2 – Site Layout Plan and Monitoring Plan – Groundwater Monitoring Well Locations

LIST OF FIGURES

Figure 2-1 Summary of identification of non-compliance and actions required 13

LIST OF TABLES

Table 5-4 Summary of exceedances / compliance 2
Table 2-1 Monitoring well network 14
Table 2-2 Number of data points per well (to date) 15
Table 2-3 Analytes requiring use of tier 2 LOR (same as 80th percentile) 15
Table 2-4 Trigger values for KP060 water (mg/L) 17
Table 3-1 Wells sampled during the PP test 22
Table 4-1 Duplicates collected 24
Table 4-2 Summary of data quality requirements and quality review for PP test 25
Table 4-3 Laboratory Control Spike (LCS) and Spike Recovery 26
Table 4-4 Summary of charge balance per sample per well 27
Table 4-5 Review comments on significant charge balance error 28
Table 5-1 Summary of leading indicator compliance in water from KPMON01 during / after trial 31
Table 5-2 Summary of leading indicator compliance in water from KPMON02 during / after trial 33
Table 5-3 Summary of leading indicator compliance in water from KPMON03 during / after trial 35
Table 5-4 Summary of exceedances / compliance 35

1 INTRODUCTION

1.1 Overview

Land & Water Consulting (LWC) was previously engaged by Environmental Copper Recovery (EnviroCopper) to prepare a Groundwater Monitoring & Management Plan (GMMP) for the Copper In-Situ Recovery (ISR) project located on privately owned land to the south (and down hydraulic gradient) of the Kapunda Historic Mine, within the township of Kapunda and approximately 80 km north-east of Adelaide, South Australia ('the Site' or 'the exploration site'). A site locality plan is provided as Figure 1 (at rear). The Light River is located approximately 610 m south-east of Site A.

EnviroCopper is exploring the potential for In-Situ Recovery (ISR) of copper and gold. This exploration program is focussed on conducting a Site Environmental Lixiviant Trial (SELT) to assess the extent of the ISR mineral deposit through in-ground test work.

A groundwater monitoring and sample analysis methodology and schedule is applied to detect any excursion of mining fluids or alteration to the natural hydrogeochemistry as a function of SELT activities (i.e. a non-compliance) can be identified and (where necessary) corrected.

The purpose of the GMMP is to:

1. Prescribe the monitoring and sample analysis methodology and schedule required to formulate a robust baseline assessment of current pre-activity groundwater conditions.
2. Formulate groundwater chemical substance trigger values for the SELT, that if exceeded, may indicate excursion of mining fluids or alteration to the natural hydrogeochemistry as a function of SELT activities (i.e. a non-compliance).
3. Define how a non-compliance is identified.
4. Prescribe actions required on identification of a non-compliance.

The GMMP was prepared in accordance with relevant South Australian legislation and policies, including the following:

- *Environment Protection Act 1993; and*
- *Environment Protection (Water Quality) Policy 2015* (WQEPP).
- *Mining Act (1971)*
- *Landscapes SA Act (2019)*

The GMMP also considers technical guideline information provided in:

- DES (2021) *Using Monitoring Data to Assess Groundwater Quality and Potential Environmental Impacts*;
- SA EPA (2016a) *Regulatory Monitoring and Testing - Monitoring Plans Requirements*;
- SA EPA (2019a) *Guidelines for the Assessment and Remediation of Site Contamination*; and
- SA EPA (2019b) *Guidelines for Regulatory Monitoring and Testing – Groundwater Sampling*.

1.2 Context

EnviroCopper aims to utilise ISR to extract copper from underground mineral deposits. The ISR process involves injecting a specifically selected lixiviant through a well into the desired ore body to leach the copper into a soluble form. This solution is then pumped to the surface, where the concentrated copper can be recovered for processing (U.S. NRC, 2021) – refer to Section 2.6 for further information.

Baseline metals analysis undertaken by EnviroCopper has shown a significant local variability between wells in both pH and metal ion concentration in solution. This variability is more than likely attributable to the variable pH and the proximity of metal/ sulfide rich veins and fractures to some of the wells, noting that the Site is located down hydraulic gradient of the historic Kapunda copper mine.

This variability means that the statistical treatment suggested to be applied in the EnviroCopper (2021) Exploration Program for Environment Protection and Rehabilitation (E-PEPR) results in some metal (Al, As, Cd, Cr, Co, Cu, Fe, Pb, Li, Mo, Ni, Se, U, Zn) concentrations already exceeding rehabilitation criteria before lixiviant is added (i.e. the values for the metals are already higher than the calculated rehabilitation criteria).

On the basis of the variability of groundwater parameters and chemical substances in groundwater across the project area, a 'blanket' trigger value per chemical substance for the project area is impractical – based on the elevated concentrations of key metals in the central project area where the SELT will occur, trigger values would be impractically high and would not detect excursion from the ISR operation.

Consequently, an intra well trigger value derivation approach was previously agreed with the Department for Energy and Mining (DEM) in 2022. This approach identifies the 80th percentile for each chemical substance in groundwater at each of the eight groundwater monitoring wells. The percentile is calculated from 10 – 16 data points, depending on the data available for each well.

2 GROUNDWATER COMPLIANCE PROTOCOL

2.1 Objective

Monitor groundwater associated with the proposed activity to be able to detect/ identify changes in chemical composition of the groundwater that may indicate/ represent excursion of rich (or barren) lixiviant from the activity area (Site A).

2.2 Compliance approach

The characteristics of the existing groundwater composition beneath the Site, and in the surrounding area, are important in assessing the current groundwater quality and potential risks to the quality of the groundwater into the future.

In order to demonstrate that background groundwater quality has not been affected by an activity, there is a need to compare data collected before, during and after the activity commenced. This requires detailed baseline assessments to be undertaken to obtain an accurate picture of water quality within the aquifer prior to activities commencing. The baseline assessments should also establish natural groundwater quality and variability in order to confidently attribute any potential contamination to a specific activity (DES, 2021).

For the purpose of applying control charts to groundwater quality assessment, control limits can be developed from either inter-bore or intra-bore data. Inter-bore control limits are derived from hydraulically up-gradient reference bore data, and potentially, data from other background bores.

Intra-bore control limits are derived from historical measurements collected from the same compliance bore. These can also be considered as pre-disturbance baseline data. The type of comparison that is most appropriate often depends on the local hydrogeological conditions (ITRC, 2013). Given the natural variability in groundwater composition reported at the Site, and the historically modified disturbed nature of the groundwater (due to historical mining), intra-well control limits are considered to be relevant.

The compliance approaches recommended in DES (2021) for groundwater quality assessment are based on comparing a number of consecutive sample tests at each compliance well to a limit based on percentile calculations.

This approach is aimed at reducing the probability of a false positive, or what is referred to as a false non-compliance in regard to regulation, while ensuring sufficient sensitivity to detect potential impacts. The approach is based on combining ANZECC/ARMCANZ (2000) methodology, adapted control charting approaches and statistics around applying one or two limit types (or triggers).

DES (2021) presents a two tiered trigger non-parametric approach that compares a rolling median of an individual chemical substance in water from individual monitoring wells (“intra-well comparison”) against triggers that are calculated based on the long-term 80th percentile (Limit A/ Tier 1 trigger) and three consecutive individual exceedances of the long-term 95th percentile (Limit B/ Tier 2 trigger). The triggers are static and not calculated on a rolling basis.

In general, the first Baseline (also referred to as Baseline A) is the 80th percentile of site-specific groundwater data. Baseline A is applied to five consecutive test samples. The second Baseline is the 90th percentile (also referred to as Baseline B) of site-specific groundwater data and is applied to three consecutive test samples. Each limit is a set value for the period of the compliance and would only be changed if the initial site-specific data used to derive the values were inadequate.

Both limits provide a statistically robust method for detecting change. Given the requirement to test five consecutive samples, Limit A is seen as a method for detecting gradual change over the medium term (i.e.

one to two years). Limit B, which is tested over three consecutive samples, will potentially provide detection of change over a shorter term, particularly if the change is significant. The period of time required to detect change for each limit will depend on sampling frequency.

Based on the approach outlined above, the period of time to detect change could range from three months through to a year. In some circumstances (for example, where there are high ecological values), the sampling frequency and the number of consecutive samples applied in this approach may be varied depending on site-specific conditions.

For several analytes reporting below LOR consistently, the 80th percentile is very low and will (likely) be below LOR when using for future comparative purposes.

In this case any analyte during operations (SELT) reporting above LOR for the first time is treated as an exceedance and the non-compliance route followed – refer Table 5-5.

Consequently, taking into account the potential lag affect around Limit A prescribed by DES (2021), an abridged version of the DES (2021) approach will be implemented, which is designed to rapidly identify any potential excursion over a 21 day assessment period.

The identification of exceedances during the SELT is as follows, in order to not incur long lead times on excursion identification:

The following frequency is adopted:

1. Obtain samples from the nine wells (including KP060) during and immediately after and then 1, 3, 7, 14 and 21 days after the SELT.
    a. Laboratory turnaround times for the first month must be no longer than 4 business days from sampling.
    b. Laboratory turnaround times for the months after the first month must be no longer than 7 business days from sampling.
2. The maximum estimated natural groundwater flow velocity is up to 15 m per year. This means that impacts to groundwater quality may take more than 12 months to be detected at the three monitoring wells (KPMON01, KPMON02, KPMON03). As such, three additional groundwater sampling events must be undertaken for these three monitoring wells at 18, 24 and 30 months 'post SELT'.
3. Review the quality of the current sampling and analysis data (CSAD) in terms of precision and accuracy (as per methodology provided in Section 6.6).
4. Review the charge balance of the CSAD with objective of charge balance error being +/- 5%. Where not in this range, investigate the possible causes. Metals analysis (dissolved) must be included in the charge balance calculation to ensure an accurate outcome.
5. Check CSAD against data collected to date:
    a. If analyte in CSAD has always had results below LOR and the result for that analyte is a result above the LOR, and the LOR is the same or less than the LOR reported to date, this is a potential exceedance.
    b. If analyte in CSAD has always had results below LOR and the result for that analyte is less than the LOR, and the current LOR is the same or less than the LOR reported to date, this is NOT a potential exceedance.

c. If analyte in CSAD has had results above and below the LOR to date, or always above the LOR, then compare the current result to the 80th percentile. If the current result is the CSAD is above the 80th percentile then there is a potential exceedance.

6. If a potential exceedance is identified from one data point, then at any point during/ post SELT, the following protocol will be applied:

    a. Re-sample all wells no more than three days after receipt of the data batch incorporating the potential exceedance (Test 2).

    b. Re-sample all wells no more than seven days after receipt of the data batch incorporating the potential exceedance (Test 3).

    c. If all three data points then exceed the relevant criterion (LOR or 80th percentile) then an exceedance is deemed to have occurred.

7. Where an exceedance is identified, the company (Enviro-Copper) will notify DEM of the exceedance and stating the corrective action that will be applied, within 7 business days of exceedance identification occurring.

8. Corrective action must be applied within 7 business days of notification.

Baseline values (80th percentile) are derived from intra-well site-specific data following the steps described in Section 5.5.4 of the GMMP for data quality analysis and the derivation of trigger values.

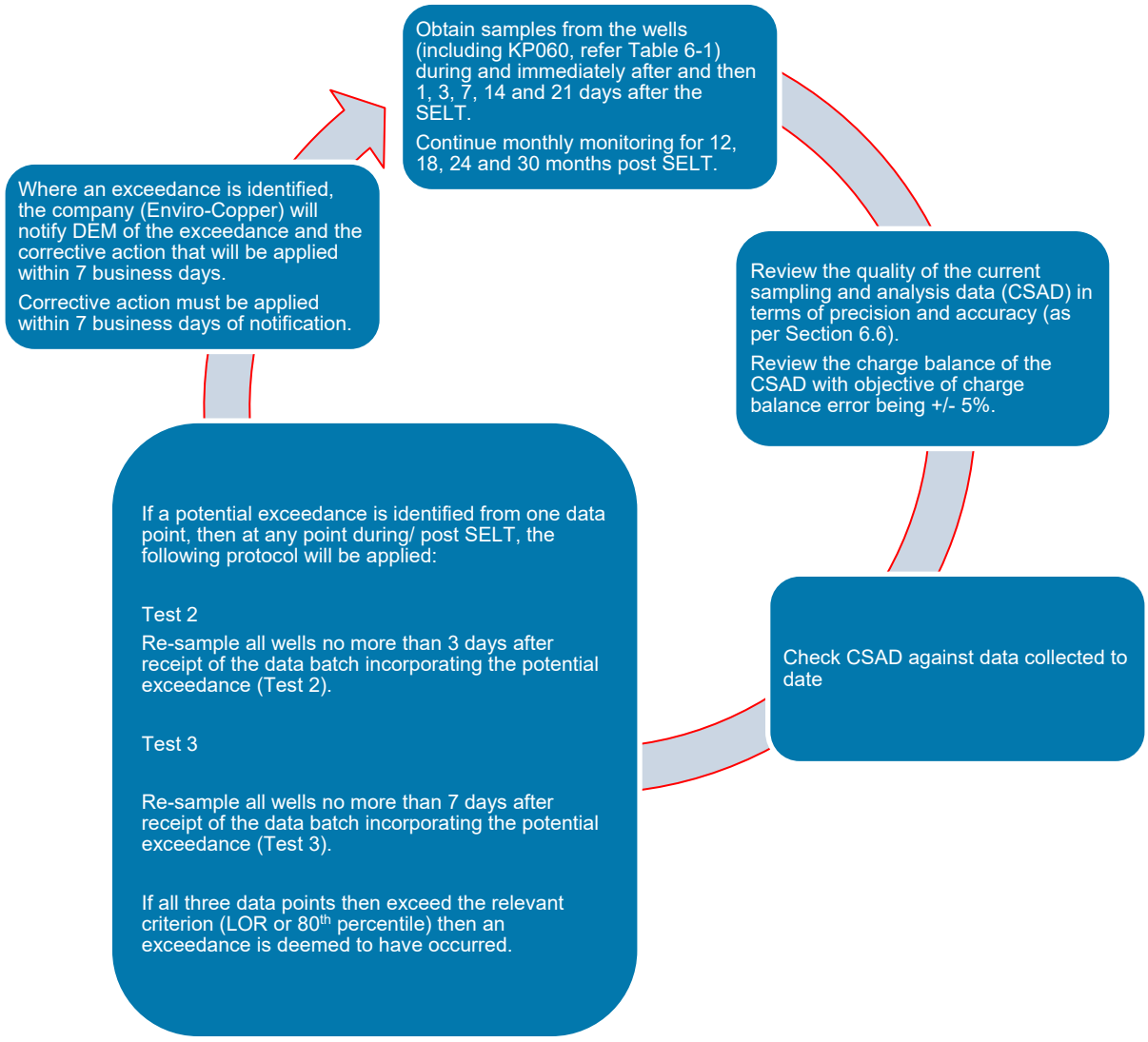


Figure 2-1 Summary of identification of non-compliance and actions required

2.3 Monitoring well network

The monitoring wells listed in Table 2-1 were listed IN Table 6-1 of the GMMP to be sampled in accordance with the methodology provided in Section 6.3 of the GMMP and at the frequency prescribed in Section 6.2 of the GMMP.

Table 2-1 Monitoring well network

Groundwater monitoring well	Relative location	Rationale	Requires Trigger value Approach
KP009	Up hydraulic gradient/ background	Background/ ambient – moderately disturbed groundwater influenced by former Kapunda copper mine	No – background/ ambient well exhibiting variability in metal concentrations
KPFRT02	Adjacent/ surrounding the test well	Very close to Site A push-pull test well/ surrounding the test well – detection of short range excursion/s	Yes
KPFRT03			Yes
KPFRT04			Yes
KPFRT05			Yes
KPFRT06			Yes
KPMON01	Down hydraulic gradient of Site A	Assessment of intra well-changes – detection of general excursion/s	Yes
KPMON02			Yes
KPMON03			Yes
KP060	Sentinel (geographically)	Located at some distance from the push pull test well, beyond KPMON01 – 03	Yes

Table 2-2 Number of data points per well (to date)

Monitoring well	Number of data points
KPFRT02	15
KPFRT03	15
KPFRT04	13
KPFRT05	10
KPFRT06	16
KPMON01	11
KPMON02	11
KPMON03	12

2.4 Intra well trigger values

For several analytes reporting below LOR consistently, the 80th percentile is very low and will (likely) be below LOR when using for future comparative purposes (Table 2-3).

In this case, any analyte during operations (SELT) reporting above LOR for the first time should be treated as an exceedance and the non-compliance route followed.

Statistical data summaries for each well are presented as Appendix A.

Table 2-3 Analytes requiring use of tier 2 LOR (same as 80th percentile)

Monitoring Well	mercury	silver	molybdenum	vanadium
KPFRT02	✓	✓	**NO**	**NO**
KPFRT03	✓	✓	✓	✓
KPFRT04	✓	✓	✓	✓
KPFRT05	✓	✓	✓	✓
KPFRT06	✓	✓	✓	✓
KPMON01	✓	✓	**NO**	**NO**

KPMON02	✓	✓	**NO**	**NO**
KPMON03	✓	✓	✓	✓

2.5 KP060 values

This monitoring well is located 300 m south of Site A between the Site and the Light River, therefore is counted as a geographical sentinel well, though it is acknowledged that the geological unit is a fractured aquifer (previous assessment in the PEPR phase inferred this well is suitably located in a fracture).

The water sampled from this well has elevated salinity (~4500 mg/L), which is around 50% of the river salinity (data made available for June and July 2020 shows the river to have a high TDS load of around 9,500 mg/L (river water quality data is presented in Appendix A)).

KP060 has only been sampled twice and therefore 80th percentiles for chemical data cannot be formulated. Instead, data will be compared to either laboratory LOR or half of the average Light River chemical data value where such data exists.

The hardness of the river water infers that the hardness modified trigger value (HMTV) are relevant for select metals in relation to ANZG (2019) default toxicant guideline values (but this does not include copper as ANZG (2019) states should that this should not be modified). Copper concentrations are elevated above the ANZG (2019) default copper criterion for 95% protection freshwater ecosystem species in the river water.

Water from KP060 is to be compared to the KP060 specific criteria set out in Table 5-6.

Table 2-4 Trigger values for KP060 water (mg/L)

Element	Trigger Value	Notes
aluminium	0.0085	0.5 Light River Average Value
antimony	LOR	LOR
arsenic	LOR	LOR
barium	LOR	LOR
beryllium	0.002	LOR
boron	0.5	0.5 Light River Average Value
cadmium	0.0015	0.5 Light River Average Value
chromium	0.00045	0.5 Light River Average Value
Chromium (VI)	LOR	LOR
cobalt	0.0002	0.5 Light River Average Value
copper	0.0022	0.5 Light River Average Value
iron	0.0285	0.5 Light River Average Value
Iron (ferrous)	0.0285	0.5 Light River Average Value
lead	0.0008	0.5 Light River Average Value
lithium	0.25	10% of ANZECC long term Irrigation
manganese	0.0114	0.5 Light River Average Value
mercury	LOR	LOR
molybdenum	LOR	LOR
nickel	LOR	LOR
selenium	LOR	LOR
silicon	LOR	LOR
silver	LOR	LOR
strontium	LOR	LOR
uranium	LOR	LOR
vanadium	LOR	LOR
zinc	LOR	LOR

2.6 Comparison to baseline orientated management objectives

The data collected from the monitoring was treated as follows:

1. Review the quality of the current sampling and analysis data (CSAD) in terms of precision and accuracy (as per methodology provided in Section 6.7).
2. Review the charge balance of the CSAD with objective of charge balance error being +/- 5%. Where not in this range, investigate the possible causes. Metals analysis (dissolved) must be included in the charge balance calculation to ensure an accurate outcome.
3. Check CSAD against data collected to date:

a. If analyte in CSAD has always had results below LOR and the result for that analyte is a result above the LOR, and the LOR is the same or less than the LOR reported to date, this is a potential exceedance.

b. If analyte in CSAD has always had results below LOR and the result for that analyte is less than the LOR, and the current LOR is the same or less than the LOR reported to date, this is NOT a potential exceedance.

c. If analyte in CSAD has had results above and below the LOR to date, or always above the LOR, then compare the current result to the 80th percentile. If the current result is the CSAD is above the 80th percentile then there is a potential exceedance.

4. If a potential exceedance is identified from one data point, then at any point during/ post SELT, the following protocol will be applied:

   a. Re-sample all wells no more than seven days after receipt of the data batch incorporating the potential exceedance (Test 2).

   b. Re-sample all wells no more than 14 days after receipt of the data batch incorporating the potential exceedance (Test 3).

   c. If all three data points then exceed the relevant criterion (LOR or 80th percentile) then an exceedance is deemed to have occurred.

Baseline values (80th percentile) are derived from intra-well site-specific data following the steps described in Section 5.5.4 for data quality analysis and the derivation of trigger values.

Tests (samples) on the exceeding well(s) are collected in triplicate (primary, intra laboratory and inter laboratory duplicates) to assess accuracy and precision of the analyses and any potential analytical errors that may have contributed to the exceedance.

2.7 Actions on non-compliance

A non-compliance is the identification of excursion from Site A that may affect the baseline groundwater and any associated receptors. An ‘Excursion’ is defined in the ePEPR as: ‘the movement of lixiviant outside the trial area’. The trial area is defined as the 25 m radius around the Push/Pull Well.

Leading indicators of an excursion will be detected by monitoring excursion control parameters and comparing them to the established intra-well trigger values at Monitoring Wells KPMON01, KPMON02 and KPMON03 located 25 m down hydraulic gradient from the Push/Pull Well (KP_PP1) at Site A.

Key excursion control parameters for comparison to trigger values as set in the e-PEPR are as follows:

- pH
- EC
- Copper
- Sulfate

However, trigger values are defined for all analytes on an intra-well basis in the baseline sampling to date such that all analytes as listed form excursion control parameters.

The identification of exceedances of trigger values (non-compliance) during the SELT shall be as follows, in order to not incur long lead times on excursion identification:

1. Where an exceedance is identified, the company (Enviro-Copper) will notify DEM of the exceedance and the corrective action that will be applied within 7 business days of discovering the exceedance.

2. Corrective action to mitigate the non-compliance must be applied within 7 business days of identification of the exceedance.
3. Tests must be completed **after implementation of corrective action of the non-compliance** on the well(s) reporting the non-compliance. These must be completed as follows:
    a. Day 7 – on day of corrective action occurring immediately after such action (i.e. 1 days after implementation of the corrective action)
    b. Day 10 after exceedance discovery (i.e. day 3 after implementation of the corrective action)
    c. Day 13 after exceedance discovery (i.e. day 6 after implementation of the corrective action)
    d. Day 16 after exceedance discovery (i.e. day 9 after implementation of the corrective action)
    e. Day 21 after exceedance discovery (i.e. day 14 after implementation of the corrective action)
    f. Day 30 after exceedance discovery (i.e. day 23 after implementation of the corrective action)
    g. Return to monthly testing
4. Continue the monitoring program.

2.8 Corrective action

2.8.1 Immediate control

If trigger values / conditions are exceeded at any Monitoring Well, the following actions will be taken:

1. Injection of lixiviant ceases.
2. Extraction commences from the Push/Pull Well (KP_PP1) and continues until the chemistry at the affected Monitoring Well returns to below trigger value controls.
3. No further injection is undertaken, and the trial is completed and rehabilitated.

2.8.2 Contingency

If excursion management does not result in correction of the excursion, and trigger value controls concentration limits continue to be exceeded in one of the Monitoring Wells (KP_MON01-03), even after the extraction has continued to the point that lixiviant is removed from the Push/Pull Well to meet the rehabilitation criteria, then the extraction pump will be moved to the impacted monitoring well and groundwater will be pumped until the groundwater chemistry at the Monitoring Well returns to below trigger value controls.

All pumped groundwater will be disposed of by a licensed wastewater contractor, to a suitably licenced facility.

Sentinel wells are to be installed at the 100 m compliance boundary from Site A in the event that an exceedance is identified at one of the monitoring wells. Such wells are to be installed on the same fracture/ faults as the existing wells but at 100 m distance rather than 25 m distance.

An additional sentinel well must also be included to monitor the quality of water recharging the Light River, as directed by the project hydrogeologist as this requires the determination of a suitable location that has confirmed hydraulic connectivity to Site A and the Light River.

2.8.3 Rehabilitation

The rehabilitation criteria for the site are:

1. Return to baseline conditions or better of all rehabilitation parameters (better is defined as lower dissolved species and higher pH). Baseline is defined above under the heading “Baseline Groundwater Sampling”.
2. Rehabilitation parameters are those that have been identified from column leach tests and geochemical modelling as modified or potentially mobilised by leaching: pH, EC, Metals: Fe, Co, Zn, Cu, Ni, Ag, Li, Mo, Cr V.

2.8.4 Rehabilitation Method

Active rehabilitation comprises extraction of lixiviant from the Push/Pull Well until rehabilitation criteria are met at the Push/Pull Well, and the Observation Wells KPFRT02 and KPFRT03.

If rehabilitation is not progressing at an acceptable pace, then emergency actions are:

1. If not remediated in 10 days: Pumping from Observation wells in addition to Push/Pull Well to achieve high flow rates and larger area of extraction until full rehabilitation parameters return to baseline at all wells.
2. If not remediated in 30 days: Injection of clean (mains) water into observation and/ or monitoring wells while pumping from Push/Pull Well to flush formation until rehabilitation parameters return to baseline at all wells.
3. Complete in accordance with monitoring at timescale set in Section 6.2 (and 6.5).

2.9 Reporting

All data must be collected and actioned as per Section 6.3, 6.4 and 6.5 of the GMMP.

The GMMP requires that a short signed and dated written CSAD report acknowledging each data collection event and the outcome must be prepared within 7 business days of review of the CSAD.

The CSAD report must compare CSAD to the trigger values and categorically state that corrective action is or is not required or that corrective action has been undertaken and has been succesful in correcting the non-compliance and that rehabilitation criteria as set out in Section 6.6.3 has been achieved.

A close out report must be completed post SELT monitoring period – i.e. no later than one month after the completion of the 30 month post SELT event (or earlier if agreed go by DEM).

Such close out report is to include the following:

- details of groundwater monitoring program methodology and scope of works;
- construction details and logs of any new or replaced groundwater monitoring wells;
- results of groundwater gauging, field parameter measurement and laboratory sample analysis, including field gauging/ sampling sheets, NATA certified laboratory reports and COC records;
- discussion of laboratory and field QA/QC and analytical data validation;
- data summary tables – field and laboratory results;
- interpretation of the data, including the quality of the groundwater with respect to relevant EVs and groundwater quality objectives, quality control and assurance and outlier, LOR and charge balance reviews and interpretation of groundwater elevation contours;
- graphical and tabulated outputs of all monitoring data during and post SELT in relation to the trigger values;
- Overall comaprison of CSAD to the trigger values and statements with respect to corrective action that has or has not been required and/ or where corrective action has been undertaken that it has been succesful in correcting the non-compliance and that rehabilitation criteria as set out in Section 6.6.3 has been achieved.
- Close out conclusions and statement that the rehabilitation criteria as set out in Section 6.6.3 has been achieved; and
- recommendations (if required).

3 PUSH / PULL MONITORING

Monitoring occurred as per the dates listed in Table 3-1. There are 16 data points for KPFRT03, KPFRT04, KPFRT06, KPMON01, KPMON02, and KPMON03. There are 18 data points for KPFRT02 as this well was sampled also on 17 January 2024 and 8 February 2024.

KPFRT05 was not sampled and KP060 was dry.

Field sheets are presented in Appendix B.

Primary and intra duplicate samples were submitted to Eurofins and the inter laboratory was Bureau Veritas (BV).

Table 3-1 Wells sampled during the PP test

DATE	KPFRT02	KPFRT03	KPFRT04	KPFRT05	KPFRT06	KPMON01	KPMON02	KPMON03	KP060
23/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
24/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
24/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
24/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
25/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
26/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
27/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
28/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
29/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
29/11/2023	☑	☑	☑	X	☑	☑	☑	☑	X
1/12/2023	☑	☑	☑	X	☑	☑	☑	☑	X
2/12/2023	☑	☑	☑	X	☑	☑	☑	☑	X
3/12/2023	☑	☑	☑	X	☑	☑	☑	☑	X
4/12/2023	☑	☑	☑	X	☑	☑	☑	☑	X
15/12/2023	☑	☑	☑	X	☑	☑	☑	☑	X
15/12/2023	☑	☑	☑	X	☑	☑	☑	☑	X
17/01/2024	☑	X	X	X	X	X	X	X	X
8/02/2024	☑	X	X	X	X	X	X	X	X

4 QUALITY ASSURANCE / QUALITY CONTROL

4.1 Overview

The quality of the analytical data is assessed with reference to the following issues:

- sampling techniques;
- preservation and storage of samples upon collection and during transport to the laboratory;
- sample holding times;
- analytical procedures;
- laboratory LOR;
- field QC sample results;
- charge balance assessment
- outlier assessment (statistical – unexpectedly low?)
- laboratory QA procedures and QC sample results; and
- the occurrence of apparently unusual or anomalous results.

4.2 Field duplicates

The typical RPD which can be expected from acceptable field duplicates is <30-50% of the mean concentration of the analyte, where the results are greater than ten times the LOR.

When using the results from duplicate sample pairs, the higher result is adopted as a conservative approach. When the RPD for detected constituents is ≥30% the representativeness of the sample results must be considered.

Duplicate samples that return a large RPD for high concentrations of analytes when compared with the LOR are potentially indicative of a problem with the sampling methodology and may warrant further investigation and/or training. The converse is true when samples return a large RPD for low concentrations of analytes that are close to the LOR of the analytical procedures employed – in these situations the large RPD is less indicative of potential methodological problems but does warrant further scrutiny with future sampling efforts.

Duplicates were collected on 24 and 29 November and 15 December 2023 as per Table 4-1. Set A comprised a primary sample, intra and inter duplicate consistent with the requirements of the GMMP. Set B and C comprised inter duplicate only.

Table 4-1 Duplicates collected

Duplication Set	Date	Type
A	24/11/2023	Primary
	24/11/2023	Intra
	24/11/2023	Inter
B	29/11/2023	Primary
	29/11/2023	Inter
C	15/12/2023	Primary
	15/12/2023	Inter

A total of 87 samples were collected and analysed for the PP Test monitoring. At the prescribed rate of 1 duplicate per 20 primary samples, this requires a total of six duplicate sets.

A total of 21 primary samples were duplicated with an inter duplicate. A total of seven samples were duplicated with an intra duplicate and inter duplicate. The number/ ratio of duplication was acceptable.

All duplicate sets per monitoring well were assessed for RPD – refer Appendix E.

Many primary and inter duplicate analyses exceeded the 30% tier 1 limit largely due to differences in LOR between the primary laboratory (Eurofins) and the inter laboratory (BV). Exceedances between primary and intra duplication occurred at a much lower rate as they operate to the same LOR.

4.3 Laboratory quality assurance/ control

Laboratory quality assurance was generally unremarkable although primary report 1048099-W listed poor spike recovery for cobalt, copper and zinc, inferring the reported result may not capture the full magnitude of the concentration (Appendix C).

QA/QC review of field and laboratory data is presented in Table 4-2.

Laboratory control spike (LCS) and spike recovery data is presented in Table 4-3.

Table 4-2 Summary of data quality requirements and quality review for PP test

Component	Frequency	Acceptance Criteria	Review Comments
Field duplicate (intra-lab)	1 in 20 primary samples or 1 per batch	RPD <30% if results >10 x LOR	Satisfactory ratio. RPD are vary variable and often a result of difference in LOR between primary and inter laboratory.
Secondary duplicate (inter-lab)	1 in 20 primary samples or 1 per batch	RPD <30% if results >10 x LOR	Satisfactory ratio. RPD are vary variable and often a result of difference in LOR between primary and inter laboratory.
Rinsate Blanks	1 per day per item of field equipment interfacing with environmental media	<LOR	Not collected – non-compliance
Trip Blanks	1 per esky or 1 per batch	<LOR	No required as not volatiles in schedule.
Method Blanks	1 per batch	<LOR	Acceptable
Laboratory Duplicates	1 in 20 primary samples or 1 per batch	RPD <50% if results >10 LOR	Acceptable
Matrix spikes	1 per batch	Recovery 70 -130% (phenols 30 – 130%)	Acceptable
Laboratory control sample spikes	1 per batch	Recovery 70 -130% (phenols 30 – 130%)	Acceptable
Surrogate spikes	Each analysis undertaken by GC-MS (all organics except TRH >C_{10})	Recovery 50 – 150% (phenols 20 – 130%)	Acceptable

Table 4-3 Laboratory Control Spike (LCS) and Spike Recovery

Laboratory Report #	Date	Parameter	Laboratory Control Spike Recovery (%)	Spike Recovery (%)	Duplicate RPD (%)	Duplicate RPD (%)	Duplicate RPD (%)	Duplicate RPD (%)
		Copper	97	64	4.3	1.3	<1	4.1
		Conductivity	-	-	<1	<1	-	-
1048099-W	23-25 Nov	Sulfate	**107**	-	<1	1.6	1	-
		Copper	-	-	-	-	-	-
		Conductivity	97	-	<1	-	-	-
1049319-W	27-Nov	Sulfate	**109**	-	<1	2.3	-	-
		Copper	93	93	11	<1	-	-
	28 Nov - 1	Conductivity	98	-	<1	2.9	<1	-
1050046-W	Dec	Sulfate	**113**	**122**	<1	4.3	-	-
		Copper	96	97, 93, 91*	2	2	<1	-
		Conductivity	100	-	<1	-	-	-
1051308-W	2-4 Dec	Sulfate	**104**	-	<1	-	-	-
		Copper	98	83	6	-	-	-
		Conductivity	86	-	12	-	-	-
1054689-W	15-Dec	Sulfate	**110**	-	<1	<1	-	-
		Copper	88	84	<1	-	-	-
		Conductivity	**108**	-	-	-	-	-
1061174-W	17-Jan	Sulfate	**105**	-	<1	-	-	-
		Copper	91	**105**	<1	-	-	-
		Conductivity	**102**	-	3.6	-	-	-
1068023-W	8-Feb	Sulfate	**105**	-	<1	-	-	-
		Copper	94	**103**	<1	-	-	-
		Conductivity	**102**	-	1.5	-	-	-
1076374-W	6-Mar	Sulfate	**102**	99	2.5	-	-	-

*multiple spike recoveries reported

4.4 Censored data

Laboratory results reporting as below the limit of reporting (censored data) was treated as being at / of the limit of reporting provided and processed using Kaplan Meier technique within Pro UCL (version 5.2).

4.5 Charge balance

Each sample from each well was assessed for charge balance (Appendix D). Samples reporting a charge balance greater than +/- 5% were highlighted for review. A summary of individual charge balance is presented as Table 4-3.

Table 4-4 Summary of charge balance per sample per well

DATE	KPFRT02	KPFRT03	KPFRT04	KPFRT06	KPMON01	KPMON02	KPMON03
23/11/2023	-2.54	-3.59	-2.79	-4.50	-1.08	-1.62	-0.73
24/11/2023	3.61	-0.99	5.82	5.88	5.44	2.84	5.01
24/11/2023	-4.95	-2.51	-6.09	-0.86	-3.42	-5.92	-6.34
24/11/2023	-4.72	-2.72	-6.25	0.81	-2.31	-4.82	-2.07
25/11/2023	-3.02	-2.10	-2.26	-2.29	-1.85	-4.08	-1.16
26/11/2023	-4.76	1.24	-1.40	-0.58	-0.41	-3.40	-1.16
27/11/2023	-4.41	-3.53	-3.34	-0.03	-4.57	-3.02	-1.86
28/11/2023	-8.70	-2.67	-2.74	-3.10	-6.31	-3.90	-5.35
29/11/2023	5.15	-1.49	5.32	8.02	1.76	4.58	4.68
29/11/2023	**20.65**	-4.15	8.77	-5.17	-6.46	-6.45	**51.27**
1/12/2023	-8.08	**72.99**	-2.75	-2.64	-4.76	-1.51	**-26.31**
2/12/2023	-2.67	-2.53	**-19.19**	0.00	**-21.11**	-3.41	-0.39
3/12/2023	-2.56	-2.47	**-28.45**	1.58	-4.58	-4.27	-1.80
4/12/2023	-0.26	4.48	-3.11	-0.71	-0.32	-2.45	0.05
15/12/2023	7.47	4.62	-1.83	-3.30	0.96	4.10	2.26
15/12/2023	**-31.34**	1.10	2.76	6.71	4.41	4.97	7.35
17/01/2024	5.06						
8/02/2024	-0.65						
# of > +/-5%	6	1	7	4	4	2	6

Most samples had acceptable charge balance (<+/- 5%). Several samples marginally exceeded the applied limit but were less than 9% - therefore marginal quality but not entirely unexpected given the dynamic acidic environment.

Several samples reported significant charge balance error (bold text in Table 4-4), and these were individually assessed. Review comments for these samples are provided in Table 4-5.

Table 4-5 Review comments on significant charge balance error

DATE	KPFRT02	KPFRT03	KPFRT04	KPMON01	KPMON03
29/11/2023	20.65*				51.27~
1/12/2023		72.99^			-26.31~~
2/12/2023			-19.19#	-21.11$	
3/12/2023			-28.45##		
15/12/2023	-31.34**				

Key

*	Low anion balance compared with rest of the well dataset (-132) – highlights sulfate as being around half of average sulfate value. Stoichiometric correction from S to SO_4^{2-} provides revised sulfate value of 4,676 mg/L which is aligned with the average SO_4^{2-}concentration in this well.
**	High anion balance compared with rest of the well dataset (-132) – highlights sulfate as being around three times average sulfate value. Stoichiometric correction from SO_4^{2-} to S provides revised sulfate as S value of 5,940 mg/L which is aligned with the average SO_4^{2-}concentration in this well.
^	Low anion balance compared with rest of the well dataset (-22 vs. average of ~140) – highlights chloride and sulfate as being very low compared to average values. No stoichiometric correction evident. Suspect sampling error.
#	High anion balance compared with rest of the well dataset – highlights bicarbonate as being around eight times average value. No stoichiometric correction evident. Suspect analytical or transcription error.
##	High anion balance compared with rest of the well dataset – highlights sulfate as being around three times average value. Stoichiometric correction provides average level sulfate – suspect analytical error.
$	High anion balance compared with rest of the well dataset – highlights bicarbonate as being around eight times average value. No stoichiometric correction evident. Suspect analytical or transcription error.
~	Low anion balance compared with rest of the well dataset – highlights chloride and sulfate as being very low compared to average values. No stoichiometric correction evident. Suspect sampling error.
~~	Low cation balance compared with rest of the well dataset – highlights sodium as being very low compared to average values. No stoichiometric correction evident. Suspect sampling error.

5 COMPLIANCE

Leading indicators of an excursion are detected by monitoring excursion control parameters (comparison of reported concentrations to trigger values) at three Monitoring Wells located 25 m down hydraulic gradient from the Push/Pull Well (KP_PP1) at Site A:

- KPMON01
- KPMON02; and
- KPMON03.

Key excursion control parameters for comparison to trigger values as set in the e-PEPR are as follows:

- pH
- EC
- Copper
- Sulfate

As prescribed in Section 2.6, If a potential exceedance is identified from one data point, then at any point during/ post SELT, the following protocol is applied:

a. Re-sample all wells no more than seven days after receipt of the data batch incorporating the potential exceedance (Test 2).

b. Re-sample all wells no more than 14 days after receipt of the data batch incorporating the potential exceedance (Test 3).

c. If all three data points, then exceed the relevant criterion (LOR or 80th percentile) then an exceedance is deemed to have occurred.

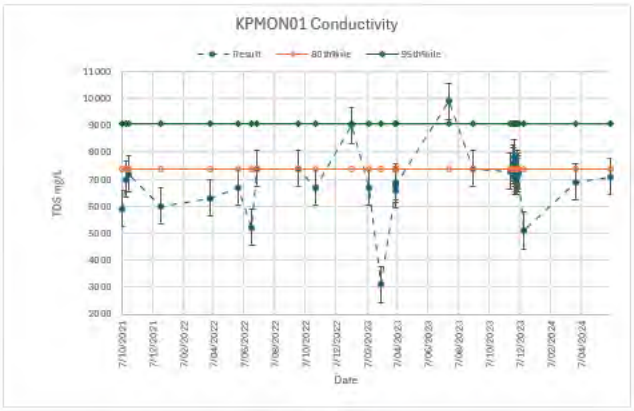
Since completion of the GMMP, an additional five data points (temporally) had been collected, providing a total of 19 datapoints for key indicators in water from each primary monitoring well, from which to formulate percentiles.

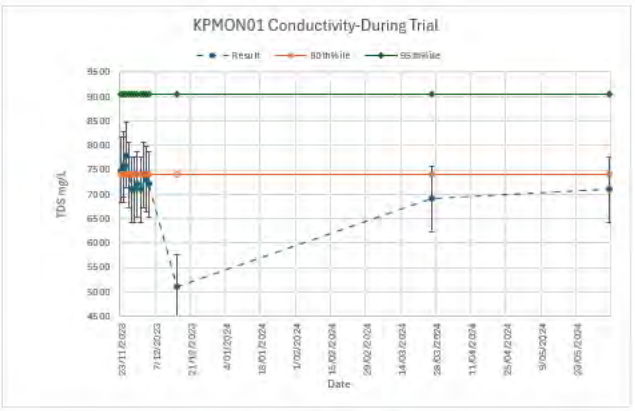
Consequently the percentiles were recalculated to account for all data points up to the push pull test.

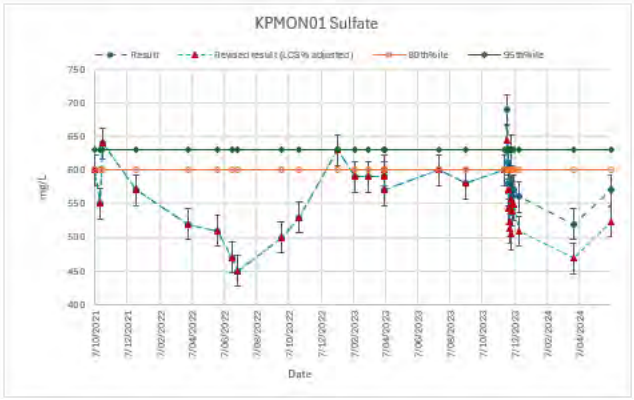
Monitoring data collected from the start of the Push Pull test was screened against the respective intra well 80th%ile and 95th%ile - The screening tables and summary sheets for all wells are presented in Appendix F.

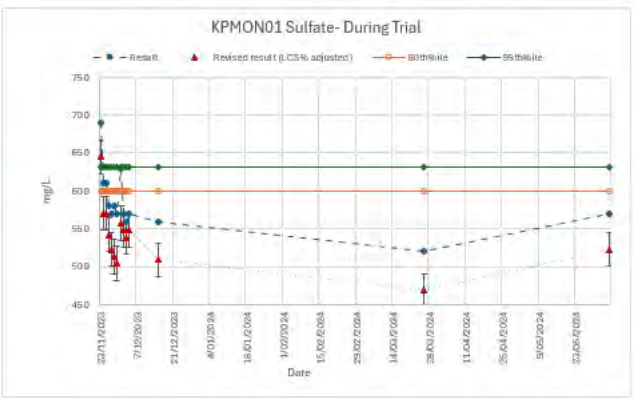
Error bars on data points are the average of dataset standard deviation for each parameter calculated from three sets of sample duplicates per location.

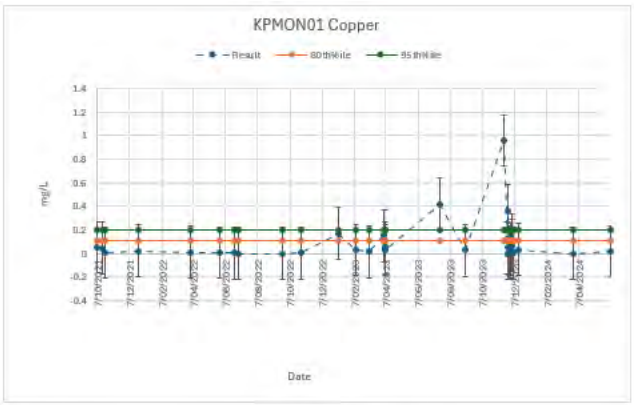
5.1 KPMON01

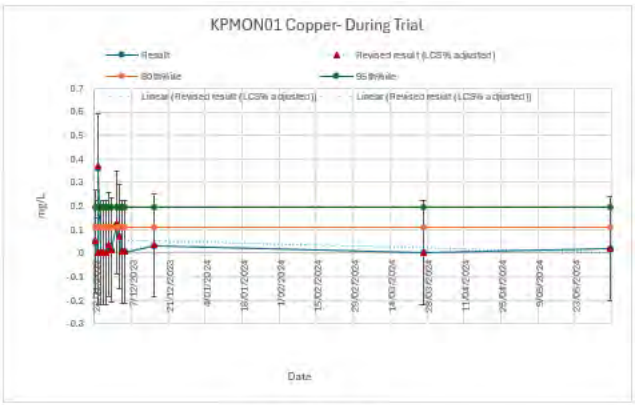

KPMON01 Conductivity
Result
80th%ile
95th%ile
TDS mg/L
Date

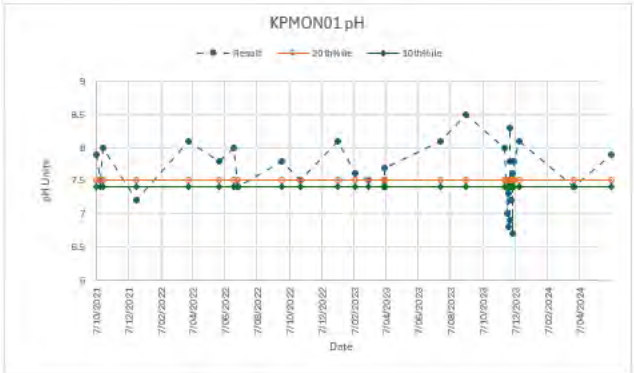

KPMON01 Conductivity-During Trial
Result
80th%ile
95th%ile
TDS mg/L
Date


KPMON01 Sulfate
Result
Revised result (LCS% adjusted)
80th%ile
95th%ile
mg/L
Date


KPMON01 Sulfate- During Trial
Result
Revised result (LCS% adjusted)
80th%ile
95th%ile
mg/L
Date


KPMON01 Copper
Result
80th%ile
95th%ile
mg/L
Date


KPMON01 Copper- During Trial
Result
Revised result (LCS% adjusted)
80th%ile
95th%ile
mg/L
Date


KPMON01 pH
Result
20th%ile
10th%ile
pH Units
Date

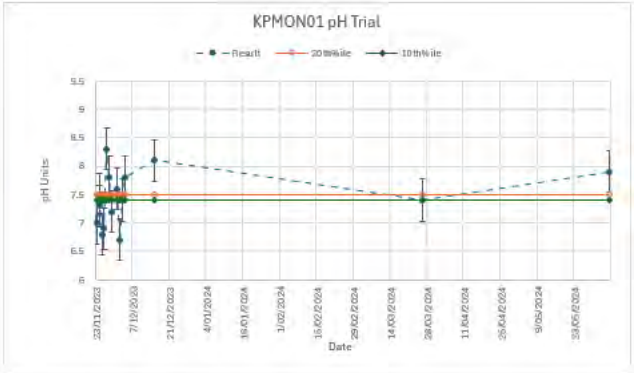
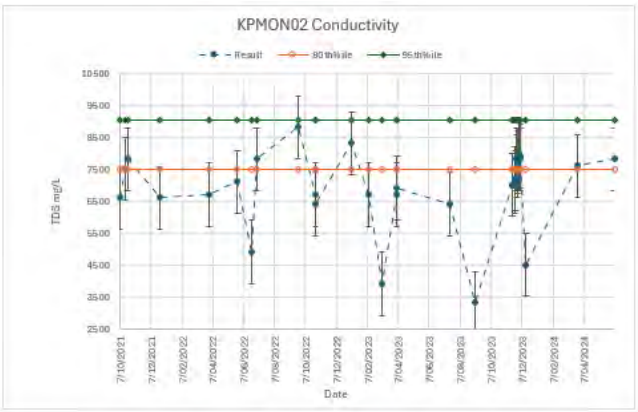
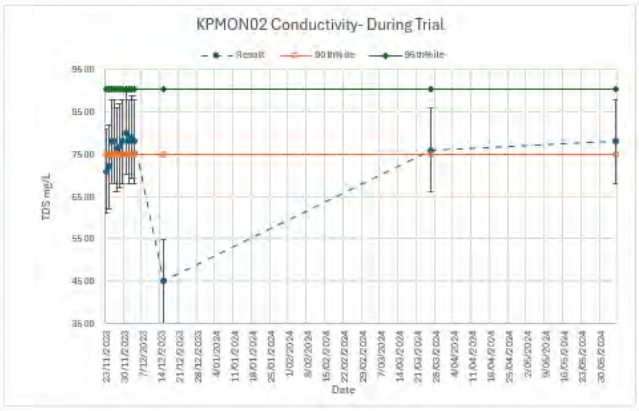

KPMON01 pH Trial
Result
20th%ile
10th%ile
pH Units
Date

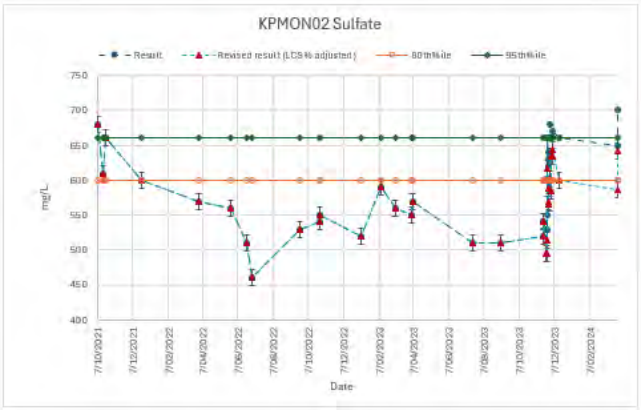
Table 5-1 Summary of leading indicator compliance in water from KPMON01 during / after trial

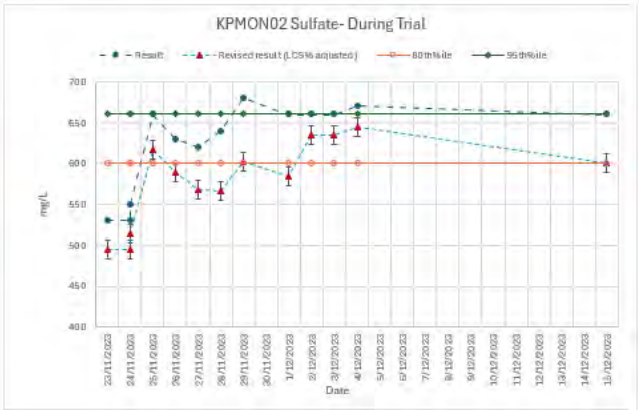
Conductivity	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	23-Nov-23	30-Nov	7-Dec-23	☑
	x	☑	☑	
Sulfate	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	23-Nov-23	30-Nov	7-Dec-23	☑
	x	☑	☑	
copper	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	24-Nov-23	1-Dec	8-Dec-23	☑
	x	-	☑	
pH	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	23-Nov-23	30-Nov	7-Dec-23	☑
	x	x	☑	

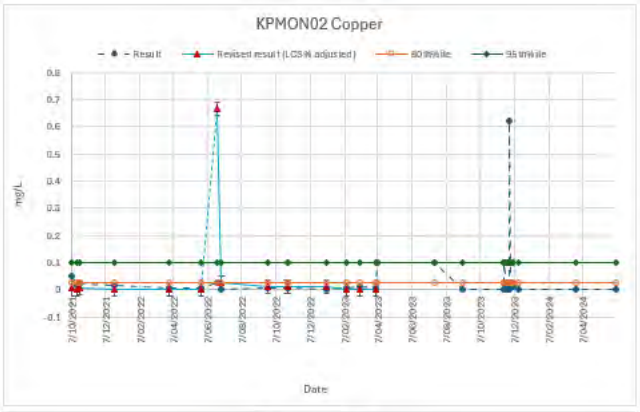
5.2 KPMON02

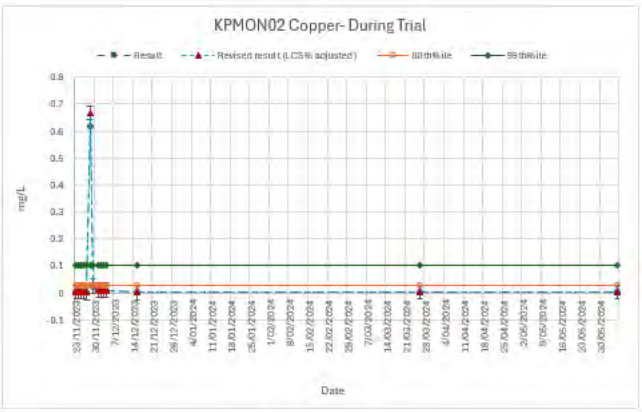

KPMON02 Conductivity
Result
80 th%ile
95 th%ile
TDS mg/L
Date

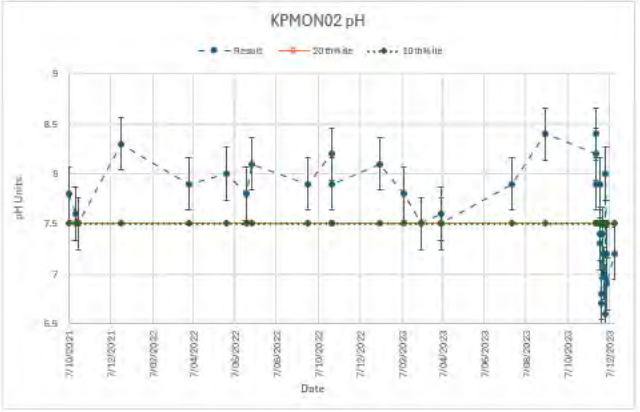

KPMON02 Conductivity- During Trial
Result
90 th%ile
95 th%ile
TDS mg/L
Date


KPMON02 Sulfate
Result
Revised result (LCS% adjusted)
80 th%ile
95 th%ile
mg/L
Date


KPMON02 Sulfate- During Trial
Result
Revised result (LCS% adjusted)
80 th%ile
95 th%ile
mg/L
Date


KPMON02 Copper
Result
Revised result (LCS% adjusted)
80 th%ile
95 th%ile
mg/L
Date


KPMON02 Copper- During Trial
Result
Revised result (LCS% adjusted)
80 th%ile
95 th%ile
mg/L
Date


KPMON02 pH
Result
20 th%ile
10 th%ile
pH Units
Date

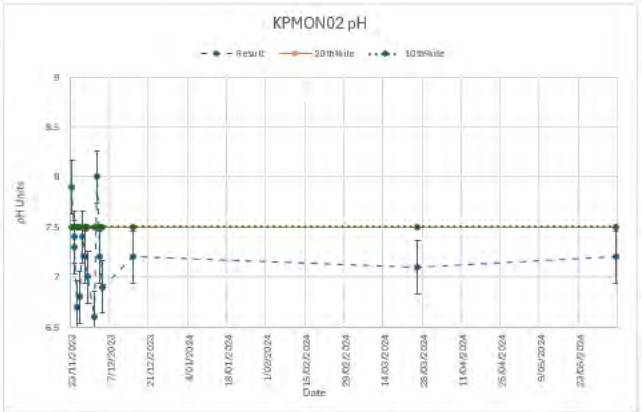
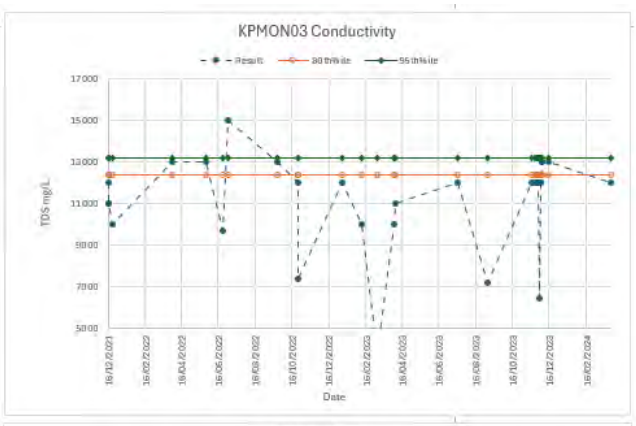
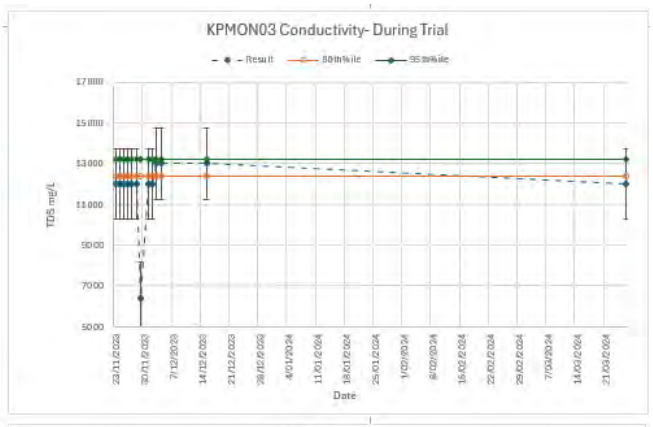

KPMON02 pH
Result
20 th%ile
10 th%ile
pH Units
Date

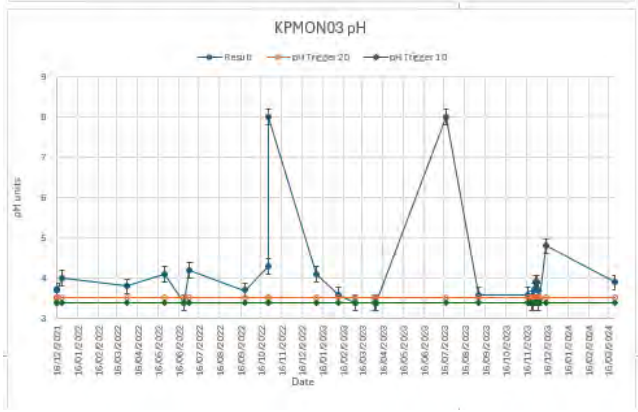
Table 5-2 Summary of leading indicator compliance in water from KPMON02 during / after trial

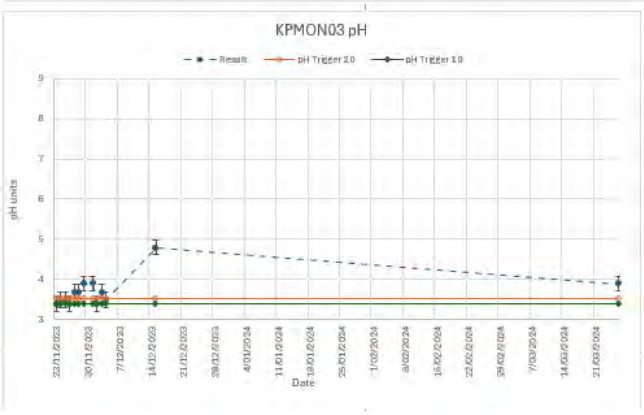
Conductivity	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	23-Nov-23	30-Nov	7-Dec-23	?
	x	x	No Data	
Sulfate	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	25-Nov-23	2-Dec	9-Dec-23	x
	x	x	x	
copper	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	27-Nov-23	4-Dec	11-Dec-23	☑
	x	☑	☑	
pH	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	24-Nov-23	1-Dec	8-Dec-23	?
	x	x	No Data	

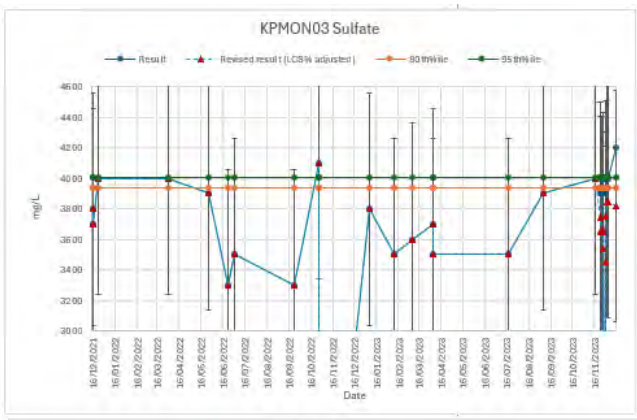
5.3 KPMON03

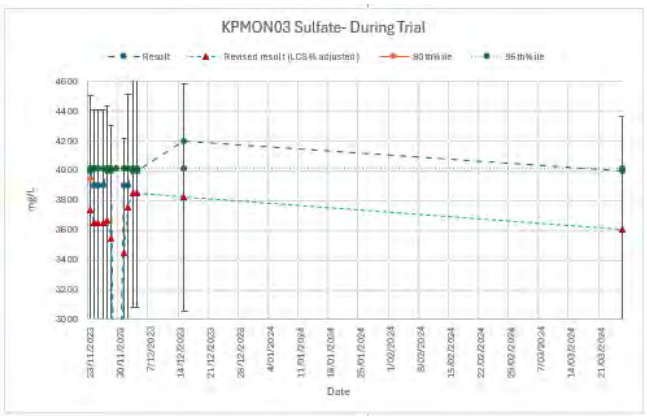

KPMON03 Conductivity
Result
80th%ile
95th%ile
TDS mg/L
Date

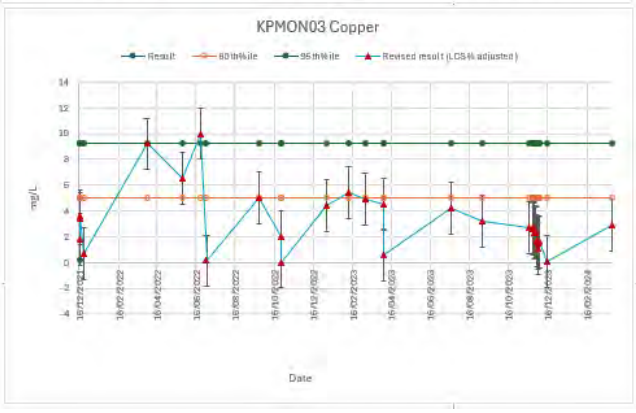

KPMON03 Conductivity- During Trial
Result
80th%ile
95th%ile
TDS mg/L
Date


KPMON03 pH
Result
pH Trigger 2.0
pH Trigger 1.0
pH units
Date


KPMON03 pH
Result
pH Trigger 2.0
pH Trigger 1.0
pH units
Date


KPMON03 Sulfate
Result
Revised result (LCS% adjusted)
80th%ile
95th%ile
mg/L
Date


KPMON03 Sulfate- During Trial
Result
Revised result (LCS% adjusted)
80th%ile
95th%ile
mg/L
Date


KPMON03 Copper
Result
80th%ile
95th%ile
Revised result (LCS% adjusted)
mg/L
Date

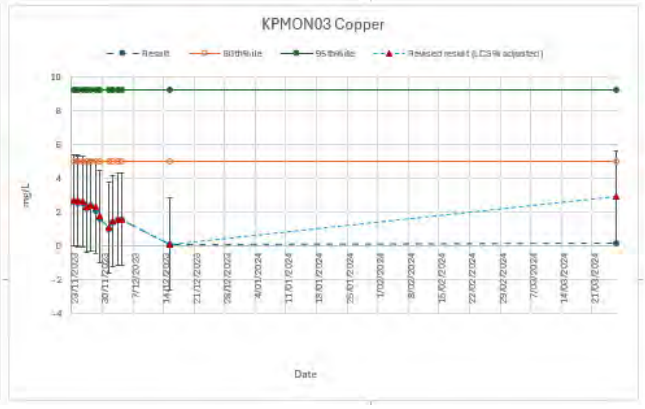

KPMON03 Copper
Result
80th%ile
95th%ile
Revised result (LCS% adjusted)
mg/L
Date

Table 5-3 Summary of leading indicator compliance in water from KPMON03 during / after trial

Conductivity	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
	27-Nov-23	4-Dec	11-Dec-23	☑
	☑	☑	☑	
Sulfate	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
				☑
copper	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
				☑
pH	Test 1	Test 2 <7 days	Test 3 <14 days	Compliance?
				☑

5.4 Summary

Individual exceedances of %ile triggers are evident though these are of low magnitude – i.e. they were not sustained nor statistically significant when accounting for RPD error or laboratory duplicate RPD error (conductivity and sulfate).

Further, when the compliance criterion (Section 2.6) is applied only sulfate in KPMON02 indicates potential non-compliance, noting both conductivity and pH have no data point around the 14 day mark post initial 'exceedance' (Table 5-4).

Table 5-4 Summary of exceedances / compliance

	KPMON01		KPMON02		KPMON03	
Parameter	Compliance with GMMP?	Compliance with DES (2021)?	Compliance with GMMP?	Compliance with DES (2021)?	Compliance with GMMP?	Compliance with DES (2021)?
copper	☑	☑	☑	☑	☑	☑
sulfate	☑	☑	x	☑	☑	☑
conductivity	☑	☑	-	☑	☑	☑
pH	☑	☑	-	☑	☑	☑

Though sulfate in KPMON02 provides the only outright noncompliance in the dataset, sulfate in wells KPMON01 to 03 is shown to be generally over reported by the laboratory noting persistent exceedance of 100% recovery in the laboratory control spikes. The laboratory may be generally reporting sulfate higher than true value.

Although prescribed in the GMMP, due to operational requirements low flow sampling was not applied as the groundwater sampling method – therefore there is likely to have been excessive water level drawdown in each well during and between sampling events:

- The lithology is very dynamic and known to be hosting sulfidic species particularly around 26 m depth onwards[3] with malachite (copper phase) in oxidised zones. Wetting and drying scenarios on the micro scale in and around the water table may produce some contributory oxidation of sulfidic species and concomitant generation of acidity, which would then influence the pH of the water column.
- Consequently, adherence to using low flow sampling as prescribed in the GMMP is recommended to minimise or even mitigate the contribution of near field sulfidic oxidation to water quality analytical results (this may also contribute some sulfate).
- In addition it is recommended that water level data and is collected and provided with chemistry data to determine notable changes in water level during sampling that may indicate changes in hydrogeochemistry as a function of water table variation.
- In addition it is recommended that water level data and is collected and provided with chemistry data to determine notable changes in water level during sampling that may indicate changes in hydrogeochemistry as a function of water table variation.

[3] According to drill records for KPFRT01 – 03 – no logs available for KPMON series wells.

6 REHABILITATION

The GMMP set out post-trial groundwater rehabilitation criteria (as per Section 2.8.3 of this document also):

1. Return to baseline conditions or better of all rehabilitation parameters (better is defined as lower dissolved species and higher pH).
2. Rehabilitation parameters are those that have been identified from column leach tests and geochemical modelling as modified or potentially mobilised by leaching: pH, EC, Metals: Fe, Co, Zn, Cu, Ni, Ag, Li, Mo, Cr V.

Groundwater chemistry data from operation wells KPFRT02, 03, 04 and 06 as well as KPMON01, 02 and 03 collected 5 June 2024 were compared to baseline (pre-trial) groundwater data – please refer to Appendix G.

There were no significant differences between pre and post-trial data indicating a satisfactory level of rehabilitation has been achieved.

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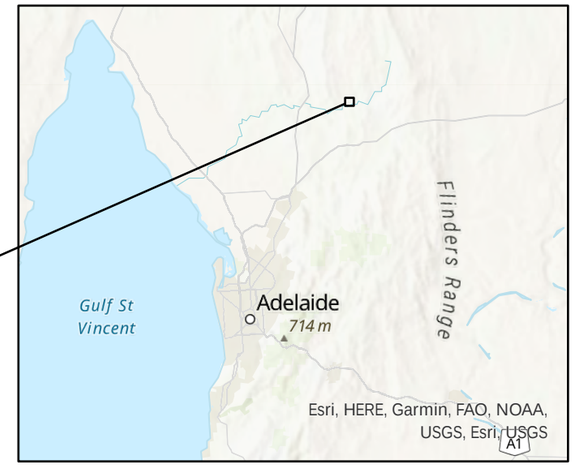
FIGURES

LWC Land and Water Consulting
Land & Water Consulting
Email: enquiries@lwconsulting.com.au
Web: www.lwconsulting.com.au



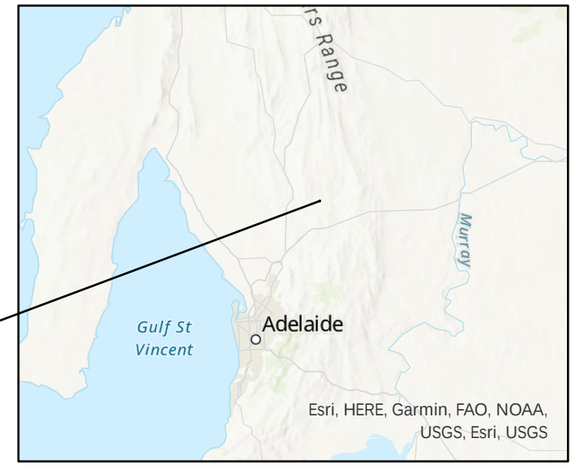
PROJECT: Kapunda Groundwater Monitoring Plan		
FIGURE TITLE: Site Locality Plan		
Site Address: East Terrace, Kapunda, SA 5373	FIGURE 1	Date: 29/09/2022
		Projection: GDA2020 Z54
Figure in set: 1 of 2	Revision A	Scale: 1:10,115

0 0.07 0.15 0.3 0.45 0.6
Kilometres

Legend

- Project Boundary
- Land Use Generalised 2020
  - Agriculture
  - Commercial
  - Horticulture
  - Industry- Food
  - Livestock
  - Mine/Quarry
  - Non-Private Residental
  - Public Institution
  - Recreation
  - Reserve
  - Residental
  - Retail
  - Rural Residental
  - Utility
  - Vacant
  - Vacant Residental
  - Cadastre

Land & Water Consulting
Email: enquiries@lwconsulting.com.au
Web: www.lwconsulting.com.au



PROJECT:
Kapunda Groundwater Monitoring Plan

FIGURE TITLE:
Site Layout Plan

Site Address:
East Terrace,
Kapunda, SA 5373

FIGURE
2
Revision A

Date: 29/09/2022

Projection:
GDA2020 Z54

Scale: 1:1,086

Figure in set: 2 of 2

0 0.01 0.01 0.03 0.04 0.06
Kilometres

Legend
- Project Boundary
- Groundwater Monitoring Locations

APPENDIX A TRIGGER VALUES

	General Statistics on Uncensored Data	
Date/Time of Computation	ProUCL 5.2 9/05/2024 2:58:20 PM	
User Selected Options		
From File	KPMON01 ProUCL input 2024.xls	
Full Precision	OFF	

From File: KPMON01 ProUCL input 2024.xls

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD
Aluminium (filtered)	27	1	2	25	92.59%	0.05	0.1	0.0556	3.8765E-4	0.0197
Arsenic (filtered)	28	0	22	6	21.43%	0.001	0.01	0.00435	1.1644E-5	0.00341
Barium (filtered)	26	2	21	5	19.23%	0.05	0.2	0.0555	1.7934E-4	0.0134
Beryllium (filtered)	27	1	0	27	100.00%	0.001	0.01	N/A	N/A	N/A
Boron (filtered)	27	1	23	4	14.81%	2	5	0.876	0.0169	0.13
Cadmium (filtered)	28	0	2	26	92.86%	2.0000E-4	0.1	2.0952E-4	1.8141E-9	4.2592E-5
Chromium (filtered)	27	1	3	24	88.89%	0.001	0.1	0.00105	4.7500E-8	2.1794E-4
Cobalt (filtered)	28	0	19	9	32.14%	0.001	0.01	0.00822	2.0984E-4	0.0145
Copper (filtered)	28	0	16	12	42.86%	0.001	0.1	0.0332	0.00468	0.0684
Iron (filtered)	28	0	12	16	57.14%	0.05	0.5	0.127	0.0169	0.13
Lead (filtered)	27	1	0	27	100.00%	0.001	0.1	N/A	N/A	N/A
Lithium (filtered)	24	4	17	7	29.17%	0.021	0.1	0.0398	2.5899E-4	0.0161
Manganese (filtered)	28	0	21	7	25.00%	0.005	0.1	0.0458	9.8908E-4	0.0314
Mercury (filtered)	28	0	0	28	100.00%	1.0000E-4	0.0021	N/A	N/A	N/A
Molybdenum (filtered)	26	2	18	8	30.77%	0.005	0.1	0.00705	1.9475E-6	0.0014
Nickel (filtered)	28	0	21	7	25.00%	0.001	0.1	0.0202	9.6509E-4	0.0311
Selenium (filtered)	28	0	12	16	57.14%	0.001	0.01	0.00313	5.9395E-6	0.00244
Silver (filtered)	26	2	0	26	100.00%	0.005	0.05	N/A	N/A	N/A
Strontium (filtered)	25	3	25	0	0.00%	N/A	N/A	1.916	0.0789	0.281
Uranium (filtered)	28	0	14	14	50.00%	0.005	0.05	0.0119	1.3695E-4	0.0117
Vanadium (filtered)	27	1	2	25	92.59%	0.005	0.1	0.0051	1.8141E-7	4.2592E-4
Zinc (filtered)	27	1	22	5	18.52%	0.005	0.1	0.0653	0.0136	0.117

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness
Aluminium (filtered)	2	1	0.12	0.13	0.125	0.125	5.0000E-5	0.00707	0.00741	N/A
Arsenic (filtered)	22	0	0.001	0.015	0.00477	0.003	1.2946E-5	0.0036	0.00148	1.357
Barium (filtered)	21	2	0.04	0.08	0.0562	0.05	1.8476E-4	0.0136	0.0148	0.515
Beryllium (filtered)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boron (filtered)	23	1	0.51	1.1	0.876	0.94	0.0177	0.133	0.089	-0.886
Cadmium (filtered)	2	0	2.0000E-4	4.0000E-4	3.0000E-4	3.0000E-4	2.0000E-8	1.4142E-4	1.4826E-4	N/A
Chromium (filtered)	3	1	0.001	0.002	0.00133	0.001	3.3333E-7	5.7735E-4	0	1.732
Cobalt (filtered)	19	0	0.001	0.058	0.0112	0.003	2.9551E-4	0.0172	0.00297	1.885
Copper (filtered)	16	0	0.003	0.36	0.054	0.031	0.00754	0.0869	0.0289	3.291
Iron (filtered)	12	0	0.07	0.6	0.223	0.17	0.0244	0.156	0.119	1.447
Lead (filtered)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithium (filtered)	17	4	0.023	0.069	0.0428	0.032	2.8132E-4	0.0168	0.0133	0.382
Manganese (filtered)	21	0	0.011	0.11	0.0517	0.036	0.00109	0.0329	0.0282	0.637
Mercury (filtered)	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (filtered)	18	2	0.006	0.011	0.00728	0.007	1.7418E-6	0.00132	0.00148	1.322
Nickel (filtered)	21	0	0.002	0.11	0.0248	0.01	0.00121	0.0348	0.0089	1.74
Selenium (filtered)	12	0	0.001	0.007	0.00508	0.0055	3.7197E-6	0.00193	0.00148	-1.144
Silver (filtered)	0	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Strontium (filtered)	25	3	1.4	2.4	1.916	1.9	0.0789	0.281	0.297	0.141
Uranium (filtered)	14	0	0.006	0.045	0.0164	0.011	1.8794E-4	0.0137	0.00593	1.467
Vanadium (filtered)	2	1	0.005	0.007	0.006	0.006	2.0000E-6	0.00141	0.00148	N/A
Zinc (filtered)	22	1	0.008	0.48	0.0745	0.0345	0.0169	0.13	0.0237	2.912

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile
Aluminium (filtered)	27	1	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.114
Arsenic (filtered)	28	0	0.0017	0.002	0.002	0.0035	0.009	0.0096	0.01	0.01
Barium (filtered)	26	2	0.04	0.05	0.05	0.06	0.0775	0.08	0.1	0.1
Beryllium (filtered)	27	1	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01
Boron (filtered)	27	1	0.74	0.76	0.79	0.95	1	1	2	2
Cadmium (filtered)	28	0	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	8.0000E-4	0.002	0.0314	0.1
Chromium (filtered)	27	1	0.001	0.001	0.001	0.001	0.006	0.01	0.046	0.1
Cobalt (filtered)	28	0	0.001	0.001	0.001	0.0035	0.01	0.01	0.0306	0.0418
Copper (filtered)	28	0	0.001	0.0018	0.00525	0.013	0.0498	0.0616	0.1	0.113
Iron (filtered)	28	0	0.05	0.05	0.05	0.08	0.165	0.192	0.373	0.458
Lead (filtered)	27	1	0.001	0.001	0.001	0.001	0.0055	0.01	0.046	0.1
Lithium (filtered)	24	4	0.0243	0.03	0.0308	0.05	0.0615	0.065	0.0907	0.1
Manganese (filtered)	28	0	0.0165	0.025	0.0288	0.05	0.0908	0.0996	0.1	0.107
Mercury (filtered)	28	0	1.0000E-4	1.0000E-4	1.0000E-4	0.001	0.0021	0.0021	0.0021	0.0021
Molybdenum (filtered)	26	2	0.006	0.006	0.006	0.0075	0.0105	0.05	0.075	0.1
Nickel (filtered)	28	0	0.003	0.004	0.00475	0.01	0.0188	0.051	0.1	0.1
Selenium (filtered)	28	0	0.001	0.001	0.001	0.0045	0.007	0.007	0.01	0.01
Silver (filtered)	26	2	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0388
Strontium (filtered)	25	3	1.64	1.7	1.7	1.9	2	2.22	2.3	2.38
Uranium (filtered)	28	0	0.005	0.005	0.005	0.009	0.038	0.0434	0.05	0.05
Vanadium (filtered)	27	1	0.005	0.005	0.005	0.005	0.006	0.0094	0.07	0.1
Zinc (filtered)	27	1	0.0114	0.0148	0.0185	0.048	0.064	0.0862	0.1	0.352

	M
1	
2	
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4	
5	
6	
7	
8	
9	
10	
11	**KM CV**
12	0.354
13	0.784
14	0.241
15	N/A
16	0.148
17	0.203
18	0.208
19	1.762
20	2.061
21	1.028
22	N/A
23	0.405
24	0.687
25	N/A
26	0.198
27	1.535
28	0.779
29	N/A
30	0.147
31	0.982
32	0.0836
33	1.785
34	
35	
36	
37	**CV**
38	0.0566
39	0.754
40	0.242
41	N/A
42	0.152
43	0.471
44	0.433
45	1.533
46	1.609
47	0.702
48	N/A
49	0.392
50	0.638
51	N/A
52	0.181
53	1.402
54	0.379
55	N/A
56	0.147
57	0.838
58	0.236
59	1.744
60	
61	
62	
63	**99%ile**
64	0.127
65	0.0137
66	0.175
67	0.01
68	4.22
69	0.1
70	0.1
71	0.055
72	0.295
73	0.573
74	0.1
75	0.1
76	0.11
77	0.0021
78	0.1
79	0.107
80	0.01
81	0.05
82	2.4
83	0.05
84	0.1
85	0.475

1				General Statistics on Uncensored Data								
2			Date/Time of Computation	ProUCL 5.2 9/05/2024 2:56:43 PM								
3			User Selected Options									
4			From File	KPMON01 ProUCL input 2024.xls								
5			Full Precision	OFF								
6												
7	From File: KPMON01 ProUCL input 2024.xls											
8												
9	General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method											
10												
11	Variable		NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD
12	Ammonia (as N)		28	0	27	1	3.57%	0.01	0.01	0.36	0.0407	0.202
13	Bromide		22	5	19	3	13.64%	1	25	15.25	238.6	15.45
14	Chloride		28	0	12	16	57.14%	1700	2100	1730	42294	205.7
15	Conductivity (at 25°C)		28	0	12	16	57.14%	5100	7800	5914	1959741	1400
16	Fluoride (Total)		24	3	24	0	0.00%	N/A	N/A	2.754	19.8	4.45
17	Nitrate & Nitrite (as N)		25	2	12	13	52.00%	0.05	0.05	1.052	13.65	3.695
18	Nitrate (as N)		27	1	16	11	40.74%	0.02	0.1	0.229	0.214	0.462
19	Nitrite (as N)		28	0	3	25	89.29%	0.02	0.2	0.0577	0.0304	0.174
20	pH (at 25 °C)		28	0	28	0	0.00%	N/A	N/A	7.55	0.165	0.406
21	Phosphate total (as P)		27	1	26	1	3.70%	0.01	0.01	0.0441	4.9081E-4	0.0222
22	filterable reactive (as P)		27	1	20	7	25.93%	0.01	0.2	0.0611	0.0342	0.185
23	ity (expressed as TDS)*		28	0	27	1	3.57%	10	10	3890	1433182	1197
24	Silicon (filtered)		28	0	28	0	0.00%	N/A	N/A	17.32	8.3	2.881
25	Sulphate (as SO4)		28	0	28	0	0.00%	N/A	N/A	573.9	2721	52.16
26	Kjeldahl Nitrogen (as N)		27	1	26	1	3.70%	0.2	0.2	0.884	0.156	0.395
27	Total Nitrogen (as N)		27	1	27	0	0.00%	N/A	N/A	1.801	13.66	3.696
28	olids Dried at 103-105°C		24	3	22	2	8.33%	5	5	33.54	810.9	28.48
29	Calcium		28	0	28	0	0.00%	N/A	N/A	121.8	109.2	10.45
30	Magnesium		28	0	28	0	0.00%	N/A	N/A	110.9	423.3	20.57
31	Potassium		28	0	28	0	0.00%	N/A	N/A	36.07	50.22	7.086
32	Sodium		28	0	28	0	0.00%	N/A	N/A	1200	6667	81.65
33	te Alkalinity (as CaCO3)		28	0	28	0	0.00%	N/A	N/A	280.8	133712	365.7
34	te Alkalinity (as CaCO3)		28	0	0	28	100.00%	1	10	N/A	N/A	N/A
35	de Alkalinity (as CaCO3)		28	0	0	28	100.00%	1	20	N/A	N/A	N/A
36	tal Alkalinity (as CaCO3)		28	0	28	0	0.00%	N/A	N/A	280.8	133712	365.7
37												
38	General Statistics for Raw Data Sets using Detected Data Only											
39												
40	Variable		NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness
41	Ammonia (as N)		27	0	0.04	0.96	0.373	0.38	0.039	0.197	0.178	0.613
42	Bromide		19	5	5.3	61	16.72	9.9	270.9	16.46	3.113	2.023
43	Chloride		12	0	1500	2200	1883	1900	36061	189.9	74.13	-0.575
44	Conductivity (at 25°C)		12	0	3100	7400	6300	6700	1445455	1202	889.5	-1.9
45	Fluoride (Total)		24	3	0.5	21	2.754	1.15	19.8	4.45	0.371	3.527
46	Nitrate & Nitrite (as N)		12	2	0.06	19	2.138	0.36	28.56	5.344	0.437	3.387
47	Nitrate (as N)		16	1	0.03	1.8	0.373	0.115	0.331	0.575	0.126	2.017
48	Nitrite (as N)		3	0	0.05	0.96	0.37	0.1	0.262	0.512	0.0741	1.713
49	pH (at 25 °C)		28	0	6.7	8.3	7.55	7.55	0.165	0.406	0.371	-0.324
50	Phosphate total (as P)		26	1	0.01	0.11	0.0454	0.04	4.8185E-4	0.022	0.0148	1.185
51	filterable reactive (as P)		20	1	0.01	1	0.0775	0.025	0.0475	0.218	0.00741	4.426
52	ity (expressed as TDS)*		27	0	1100	5500	4033	3900	943077	971.1	444.8	-0.982
53	Silicon (filtered)		28	0	10	21	17.32	18.5	8.3	2.881	2.224	-0.927
54	Sulphate (as SO4)		28	0	450	690	573.9	575	2721	52.16	37.06	-0.403
55	Kjeldahl Nitrogen (as N)		26	1	0.4	2.1	0.91	0.8	0.149	0.386	0.326	1.351
56	Total Nitrogen (as N)		27	1	0.4	20.1	1.801	0.94	13.66	3.696	0.504	5.023
57	olids Dried at 103-105°C		22	3	1.4	95	36.44	39.5	821.1	28.65	34.84	0.515
58	Calcium		28	0	91	140	121.8	120	109.2	10.45	14.83	-1.142
59	Magnesium		28	0	56	140	110.9	120	423.3	20.57	14.83	-0.738
60	Potassium		28	0	29	56	36.07	33	50.22	7.086	5.93	1.074
61	Sodium		28	0	1100	1400	1200	1200	6667	81.65	148.3	0.44
62	te Alkalinity (as CaCO3)		28	0	26	2100	280.8	245	133712	365.7	96.37	4.869
63	te Alkalinity (as CaCO3)		0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
64	de Alkalinity (as CaCO3)		0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
65	tal Alkalinity (as CaCO3)		28	0	26	2100	280.8	245	133712	365.7	96.37	4.869
66												
67	Percentiles using all Detects (Ds) and Non-Detects (NDs)											
68												
69	Variable		NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile
70	Ammonia (as N)		28	0	0.047	0.224	0.245	0.37	0.463	0.5	0.56	0.586
71	Bromide		22	5	5.61	7.44	8.2	9.95	19.5	22.8	34	54.95
72	Chloride		28	0	1700	1800	1875	1900	2000	2000	2030	2100
73	Conductivity (at 25°C)		28	0	5690	6460	6700	7200	7400	7460	7600	7665
74	Fluoride (Total)		24	3	0.83	0.9	0.9	1.15	2.175	2.92	4.01	9.965
75	Nitrate & Nitrite (as N)		25	2	0.05	0.05	0.05	0.05	0.34	0.472	1.372	1.78
76	Nitrate (as N)		27	1	0.02	0.02	0.02	0.04	0.18	0.208	0.55	1.436
77	Nitrite (as N)		28	0	0.02	0.02	0.02	0.02	0.02	0.032	0.1	0.165
78	pH (at 25 °C)		28	0	6.97	7.24	7.3	7.55	7.8	7.86	8.03	8.1
79	Phosphate total (as P)		27	1	0.02	0.03	0.03	0.04	0.05	0.058	0.07	0.084
80	filterable reactive (as P)		27	1	0.01	0.01	0.015	0.02	0.035	0.04	0.134	0.2
81	ity (expressed as TDS)*		28	0	2800	3600	3675	3900	4750	4900	5120	5465
82	Silicon (filtered)		28	0	13	15	15.75	18.5	19	19.6	20	20.65
83	Sulphate (as SO4)		28	0	507	538	557.5	575	602.5	610	633	640
84	Kjeldahl Nitrogen (as N)		27	1	0.5	0.6	0.6	0.8	1.1	1.1	1.34	1.54
85	Total Nitrogen (as N)		27	1	0.584	0.7	0.75	0.94	1.3	1.38	2.18	2.51
86	olids Dried at 103-105°C		24	3	5	5.26	6.425	28.5	53.25	54	73.5	86.5
87	Calcium		28	0	110	120	120	120	130	130	130	130

	A	B	C	D	E	F	G	H	I	J	K	L
88		Magnesium	28	0	86.5	92.8	94	120	130	130	130	136.5
89		Potassium	28	0	29	30	30	33	41	41.6	45	47.6
90		Sodium	28	0	1100	1100	1100	1200	1225	1300	1300	1300
91	te Alkalinity (as CaCO3)		28	0	100	142	160	245	280	286	313	320
92	te Alkalinity (as CaCO3)		28	0	7.3	10	10	10	10	10	10	10
93	de Alkalinity (as CaCO3)		28	0	14.3	20	20	20	20	20	20	20
94	tal Alkalinity (as CaCO3)		28	0	100	142	160	245	280	286	313	320

	M
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	**KM CV**
12	0.561
13	1.013
14	0.119
15	0.237
16	1.616
17	3.513
18	2.016
19	3.022
20	0.0538
21	0.503
22	3.026
23	0.308
24	0.166
25	0.0909
26	0.447
27	2.052
28	0.849
29	0.0858
30	0.186
31	0.196
32	0.068
33	1.302
34	N/A
35	N/A
36	1.302
37	
38	
39	
40	**CV**
41	0.53
42	0.985
43	0.101
44	0.191
45	1.616
46	2.5
47	1.544
48	1.383
49	0.0538
50	0.484
51	2.811
52	0.241
53	0.166
54	0.0909
55	0.425
56	2.052
57	0.786
58	0.0858
59	0.186
60	0.196
61	0.068
62	1.302
63	N/A
64	N/A
65	1.302
66	
67	
68	
69	**99%ile**
70	0.863
71	59.95
72	2173
73	7773
74	18.7
75	14.87
76	1.774
77	0.755
78	8.246
79	0.105
80	0.792
81	5500
82	21
83	676.5
84	1.97
85	15.55
86	93.39
87	137.3

	M
88	140
89	54.11
90	1373
91	1619
92	10
93	20
94	1619

	A	B	C	D	E	F	G	H	I
1	Ammonia (as N)	D_Ammonia (as N)	Bromide	D_Bromide	Chloride	D_Chloride	Conductivity (at 25°C)	D_Conductivity (at 25°C)	Fluoride (Total)
2	0.01	0			2100	1	5900	1	1.1
3	0.05	1			2000	1	7000	1	0.9
4	0.04	1			2200	1	7200	1	0.9
5	0.96	1	5.3	1	1900	1	6000	1	0.9
6	0.6	1	5.6	1	1900	1	6300	1	
7	0.56	1	8.8	1	1900	1	6700	1	1.2
8	0.56	1	9.6	1	1900	1	5200	1	1.1
9	0.46	1	9.4	1	1600	1	7400	1	1.1
10	0.43	1	25	0	1500	1	7400	1	1.4
11	0.43	1	10	0	1800	1	6700	1	1.2
12	0.56	1	9.9	1	1900	1	6700	1	0.8
13	0.17	1	5.7	1	1900	1	3100	1	1.1
14	0.22	1	61	1	2100	1	7500	1	0.8
15	0.26	1	56	1	2000	1	7500	1	2.1
16	0.36	1	35	1	2000	1	7600	1	11
17	0.04	1			1800	1	7700	1	
18	0.31	1	22	1	2000	1	7800	1	21
19	0.36	1	23	1	1900	1	7400	1	0.9
20	0.52	1	1	0	1900	1	7100	1	2.4
21	0.42	1	12	1	2000	1	7100	1	4.1
22	0.46	1	10	1	2000	1	7200	1	3.7
23	0.28	1		1	1800	1	7400	1	
24	0.38	1	9	1	1900	1	7100	1	1
25	0.3	1	8	1	1900	1	7400	1	0.5
26	0.25	1	10	1	1900	1	7300	1	1.4
27	0.23	1	10	1	1900	1	7200	1	1.7
28	0.38	1	7.3	1	1700	1	5100	1	3.8
29	0.47	1			1700	1	7600	1	

	J	K	L	M	N	O	P	Q
1	D_Fluoride (Total)	Nitrate & Nitrite (as N)	D_Nitrate & Nitrite (as N)	Nitrate (as N)	D_Nitrate (as N)	Nitrite (as N)	D_Nitrite (as N)	pH (at 25 °C)
2	1	0.88	1	0.06	1	0.96	1	7.9
3	1	0.05	0	0.1	0	0.04	0	7.5
4	1	0.05	0	0.02	0	0.02	0	8
5	1	19	1			0.2	0	7.2
6		0.17	1	0.16	1	0.02	0	8.1
7	1	0.05	0	0.03	1	0.02	0	7.8
8	1	0.05	0	0.03	1	0.02	0	8
9	1	0.05	0	0.05	1	0.02	0	7.4
10	1	0.06	1	0.02	0	0.05	1	7.8
11	1	0.05	0	0.02	0	0.02	0	7.5
12	1	0.84	1	0.82	1	0.02	0	7.6
13	1	0.34	1	0.34	1	0.02	0	7.5
14	1	0.38	1	0.37	1	0.02	0	7
15	1	0.07	1	0.07	1	0.02	0	7.5
16	1	0.05	0	0.02	0	0.02	0	7.3
17				0.02	0	0.1	1	7.8
18	1	1.7	1	1.7	1	0.02	0	6.8
19	1	0.2	1	0.2	1	0.02	0	6.9
20	1	1.8	1	1.8	1	0.02	0	8.3
21	1	0.05	0	0.03	1	0.02	0	7.8
22	1	0.05	0	0.02	0	0.02	0	7.2
23				0.02	0	0.1	0	7.6
24	1	0.05	0	0.02	0	0.02	0	7.6
25	1	0.05	0	0.02	0	0.02	0	6.7
26	1	0.05	0	0.04	1	0.02	0	7.4
27	1	0.05	0	0.02	0	0.02	0	7.8
28	1	0.21	1	0.21	1	0.02	0	8.1
29				0.05	1	0.02	0	7.3

	R	S	T	U	V
1	D_pH (at 25 °C)	Phosphate total (as P)	D_Phosphate total (as P)	Phosphorus filterable reactive (as P)	D_Phosphorus filterable reactive (as P)
2	1	0.01	0	0.02	1
3	1	0.01	1	0.01	0
4	1	0.02	1	0.01	1
5	1	0.02	1	0.09	1
6	1	0.04	1	0.01	0
7	1			0.01	0
8	1	0.05	1	0.01	0
9	1	0.04	1	0.03	1
10	1	0.05	1		
11	1	0.11	1	0.02	1
12	1	0.09	1	0.05	1
13	1	0.07	1	0.03	1
14	1	0.02	1	0.01	0
15	1	0.03	1	0.02	1
16	1	0.03	1	0.02	1
17	1	0.04	1	0.2	0
18	1	0.05	1	0.02	1
19	1	0.06	1	0.02	1
20	1	0.04	1	0.01	1
21	1	0.04	1	0.02	1
22	1	0.04	1	0.03	1
23	1	0.07	1	0.2	0
24	1	0.04	1	0.04	1
25	1	0.04	1	0.02	1
26	1	0.04	1	0.04	1
27	1	0.06	1	0.03	1
28	1	0.05	1	0.03	1
29	1	0.03	1	1	1

	W	X	Y	Z	AA	AB
1	Salinity (expressed as TDS)*	D_Salinity (expressed as TDS)*	Silicon (filtered)	D_Silicon (filtered)	Sulphate (as SO4)	D_Sulphate (as SO4)
2	3900	1	16	1	600	1
3	3900	1	15	1	550	1
4	4000	1	15	1	640	1
5	2100	1	10	1	570	1
6	10	0	17	1	520	1
7	1100	1	16	1	510	1
8	3500	1	17	1	470	1
9	3700	1	14	1	450	1
10	3600	1	12	1	500	1
11	3700	1	13	1	530	1
12	3800	1	17	1	590	1
13	5400	1	13	1	590	1
14	4900	1	18	1	690	1
15	3800	1	18	1	610	1
16	4500	1	19	1	610	1
17	5000	1	19	1	640	1
18	3100	1	19	1	610	1
19	4100	1	19	1	580	1
20	4200	1	20	1	570	1
21	3700	1	19	1	580	1
22	3700	1	19	1	570	1
23	4700	1	21	1	600	1
24	3600	1	20	1	630	1
25	5500	1	20	1	570	1
26	4900	1	19	1	560	1
27	5500	1	21	1	570	1
28	4100	1	19	1	560	1
29	4900	1	20	1	600	1

	AC	AD	AE	AF
1	Total Kjeldahl Nitrogen (as N)	D_Total Kjeldahl Nitrogen (as N)	Total Nitrogen (as N)	D_Total Nitrogen (as N)
2	0.2	0	1	1
3	1.6	1	1.6	1
4	0.4	1	0.4	1
5	1.1	1	20.1	1
6	0.7	1	0.87	1
7	0.8	1	0.8	1
8	0.56	1	0.56	1
9	0.9	1	0.9	1
10	1.1	1	1.16	1
11	0.6	1	0.6	1
12				
13	0.6	1	0.94	1
14	0.9	1	1.3	1
15	0.5	1	0.6	1
16	0.9	1	0.9	1
17	0.7	1	0.7	1
18	0.6	1	2.3	1
19	0.7	1	0.9	1
20	0.8	1	2.6	1
21	2.1	1	2.1	1
22	0.5	1	0.5	1
23	0.8	1	0.8	1
24	1.4	1	1.4	1
25	1.2	1	1.2	1
26	1.3	1	1.3	1
27	1.1	1	1.1	1
28	1.1	1	1.3	1
29	0.7	1	0.7	1

	AG	AH	AI	AJ	AK	AL
1	Total Suspended Solids Dried at 103-105°C	D_Total Suspended Solids Dried at 103-105°C	Calcium	D_Calcium	Magnesium	D_Magnesium
2	1.4	1	120	1	120	1
3	5.3	1	110	1	100	1
4	1.9	1	100	1	98	1
5	19	1	120	1	56	1
6	14	1	110	1	110	1
7	5	0	130	1	94	1
8	16	1	120	1	92	1
9	12	1	120	1	89	1
10	6.8	1	110	1	83	1
11	5	0	91	1	88	1
12	17	1	120	1	94	1
13	5.2	1	120	1	80	1
14	41	1	130	1	130	1
15	44	1	120	1	120	1
16	54	1	130	1	130	1
17			130	1	130	1
18	63	1	130	1	120	1
19	42	1	120	1	110	1
20	38	1	130	1	120	1
21	53	1	120	1	120	1
22	54	1	130	1	120	1
23			130	1	120	1
24	< 5	0	120	1	110	1
25	88	1	130	1	130	1
26	78	1	120	1	130	1
27	95	1	130	1	140	1
28	53	1	130	1	130	1
29			140	1	140	1

	AM	AN	AO	AP	AQ	AR
1	Potassium	D_Potassium	Sodium	D_Sodium	Bicarbonate Alkalinity (as CaCO3)	D_Bicarbonate Alkalinity (as CaCO3)
2	32	1	1200	1	260	1
3	41	1	1200	1	210	1
4	41	1	1100	1	180	1
5	56	1	1400	1	26	1
6	43	1	1300	1	160	1
7	45	1	1300	1	120	1
8	41	1	1300	1	170	1
9	45	1	1300	1	100	1
10	49	1	1200	1	86	1
11	38	1	1200	1	160	1
12	42	1	1200	1	130	1
13	38	1	1200	1	100	1
14	33	1	1300	1	160	1
15	30	1	1200	1	280	1
16	32	1	1200	1	270	1
17	32	1	1200	1	230	1
18	31	1	1200	1	260	1
19	29	1	1100	1	260	1
20	30	1	1100	1	320	1
21	29	1	1100	1	310	1
22	29	1	1100	1	290	1
23	30	1	1100	1	2100	1
24	30	1	1100	1	280	1
25	31	1	1200	1	320	1
26	29	1	1100	1	270	1
27	36	1	1300	1	220	1
28	35	1	1200	1	280	1
29	33	1	1200	1	310	1

	AS	AT	AU	AV
1	Carbonate Alkalinity (as CaCO3)	D_Carbonate Alkalinity (as CaCO3)	Hydroxide Alkalinity (as CaCO3)	D_Hydroxide Alkalinity (as CaCO3)
2	10	0	20	0
3	10	0	20	0
4	10	0	20	0
5	10	0	20	0
6	10	0	20	0
7	10	0	20	0
8	10	0	20	0
9	10	0	20	0
10	10	0	20	0
11	10	0	20	0
12	10	0	20	0
13	10	0	20	0
14	10	0	20	0
15	10	0	20	0
16	10	0	20	0
17	10	0	20	0
18	10	0	20	0
19	10	0	20	0
20	10	0	20	0
21	10	0	20	0
22	10	0	20	0
23	10	0	20	0
24	10	0	20	0
25	10	0	20	0
26	10	0	20	0
27	1	0	1	0
28	1	0	1	0
29	1	0	1	0

	AW	AX	AY	AZ	BA	BB
1	Total Alkalinity (as CaCO3)	D_Total Alkalinity (as CaCO3)	Aluminium (filtered)	D_Aluminium (filtered)	Arsenic (filtered)	D_Arsenic (filtered)
2	260	1	0.05	0	0.008	1
3	210	1	0.05	0	0.004	1
4	180	1	0.05	0	0.006	1
5	26	1	0.13	1	0.002	1
6	160	1	0.05	0	0.003	1
7	120	1	0.05	0	0.002	1
8	170	1			0.015	1
9	100	1	0.05	0	0.009	1
10	86	1	0.05	0	0.008	1
11	160	1	0.05	0	0.01	1
12	130	1	0.05	0	0.009	1
13	100	1	0.05	0	0.005	1
14	160	1	0.05	0	0.001	0
15	280	1	0.05	0	0.001	1
16	270	1	0.05	0	0.001	0
17	230	1	0.05	0	0.002	1
18	260	1	0.05	0	0.002	1
19	260	1	0.05	0	0.003	1
20	320	1	0.05	0	0.002	1
21	310	1	0.05	0	0.002	1
22	290	1	0.05	0	0.003	1
23	2100	1	0.05	0	0.01	0
24	280	1	0.05	0	0.01	0
25	320	1	0.05	0	0.01	0
26	270	1	0.05	0	0.003	1
27	220	1	0.1	0	0.002	1
28	280	1	0.1	0	0.004	1
29	310	1	0.12	1	0.01	0

	BC	BD	BE	BF	BG	BH	BI
1	Barium (filtered)	D_Barium (filtered)	Beryllium (filtered)	D_Beryllium (filtered)	Boron (filtered)	D_Boron (filtered)	Cadmium (filtered)
2	0.06	1	0.001	0	1.1	1	0.0002
3			0.001	0			0.0002
4	0.05	1	0.001	0	1	1	0.0002
5			0.001	0	0.74	1	0.0002
6	0.07	1	0.001	0	0.72	1	0.0002
7	0.07	1	0.001	0	0.76	1	0.0002
8	0.2	0			5		0.002
9	0.08	1	0.001	0	0.74	1	0.0002
10	0.08	1	0.001	0	0.94	1	0.0002
11	0.06	1	0.001	0	0.51	1	0.0002
12	0.08	1	0.001	0	0.95	1	0.0002
13	0.06	1	0.001	0	0.75	1	0.0002
14	0.04	1	0.001	0	0.94	1	0.0002
15	0.04	1	0.001	0	0.97	1	0.0002
16	0.04	1	0.001	0	0.97	1	0.0004
17	0.05	1	0.001	0	0.95	1	0.0002
18	0.05	1	0.001	0	0.96	1	0.0002
19	0.06	1	0.001	0	0.95	1	0.0002
20	0.06	1	0.001	0	2	0	0.0002
21	0.04	1	0.001	0	2	0	0.0002
22	0.05	1	0.001	0	2	0	0.0002
23	0.05	0	0.01	0	0.84	1	0.002
24	0.05	1	0.01	0	0.82	1	0.002
25	0.05	1	0.01	0	0.76	1	0.002
26	0.04	1	0.001	0	0.87	1	0.0002
27	0.1	0	0.001	0	1	1	0.1
28	0.1	0	0.001	0	1	1	0.1
29	0.1	0	0.01	0	0.9	1	0.1

	BJ	BK	BL	BM	BN	BO	BP
1	D_Cadmium (filtered)	Chromium (filtered)	D_Chromium (filtered)	Cobalt (filtered)	D_Cobalt (filtered)	Copper (filtered)	D_Copper (filtered)
2	0			0.008	1	0.052	1
3	0	0.001	1	0.005	1	0.046	1
4	0	0.001	0	0.003	1	0.006	1
5	0	0.001	0	0.001	0	0.02	1
6	0	0.001	0	0.001	0	0.011	1
7	0	0.001	0	0.001	1	0.008	1
8	0	0.01	0	0.01	0	0.01	0
9	0	0.001	0	0.001	1	0.001	0
10	0	0.001	0	0.001	1	0.001	0
11	0	0.002	1	0.001	0	0.003	1
12	0	0.001	1	0.001	1	0.03	1
13	0	0.001	0	0.002	1	0.014	1
14	1	0.001	0	0.047	1	0.049	1
15	0	0.001	0	0.032	1	0.001	0
16	1	0.001	0	0.058	1	0.36	1
17	0	0.001	0	0.007	1	0.001	0
18	0	0.001	0	0.003	1	0.001	0
19	0	0.001	0	0.002	1	0.001	0
20	0	0.001	0	0.004	1	0.032	1
21	0	0.001	0	0.001	0	0.012	1
22	0	0.001	0	0.004	1	0.12	1
23	0	0.01	0	0.01	0	0.068	1
24	0	0.01	0	0.01	0	0.01	0
25	0	0.01	0	0.01	0	0.01	0
26	0	0.001	0	0.003	1	0.033	1
27	0	0.1	0	0.03	1	0.1	0
28	0	0.1	0	0.001	1	0.1	0
29	0	0.1	0	0.01	0	0.1	0

	BQ	BR	BS	BT	BU	BV	BW	BX
1	Iron (filtered)	D_Iron (filtered)	Lead (filtered)	D_Lead (filtered)	Lithium (filtered)	D_Lithium (filtered)	Manganese (filtered)	D_Manganese (filtered)
2	0.08	1	0.001	0			0.036	1
3	0.05	0	0.001	0			0.036	1
4	0.05	0	0.001	0			0.03	1
5	0.16	1	0.001	0			0.005	0
6	0.05	0	0.001	0	0.059	1	0.013	1
7	0.05	0	0.001	0	0.053	1	0.028	1
8	0.5	0	0.01	0	0.069	1	0.05	0
9	0.07	1	0.001	0	0.063	1	0.029	1
10	0.05	0	0.001	0	0.061	1	0.046	1
11	0.05	0	0.001	0	0.055	1	0.018	1
12	0.18	1			0.068	1	0.023	1
13	0.05	0	0.001	0	0.042	1	0.021	1
14	0.37	1	0.001	0	0.031	1	0.1	1
15	0.08	1	0.001	0	0.03	1	0.099	1
16	0.16	1	0.001	0	0.03	1	0.11	1
17	0.6	1	0.001	0	0.031	1	0.088	1
18	0.05	0	0.001	0	0.032	1	0.058	1
19	0.05	0	0.001	0	0.031	1	0.069	1
20	0.15	1	0.001	0	0.025	1	0.11	1
21	0.2	1	0.001	0	0.024	1	0.011	1
22	0.38	1	0.001	0	0.023	1	0.055	1
23	0.05	0	0.01	0	0.05	0	0.05	0
24	0.24	1	0.01	0	0.05	0	0.069	1
25	0.05	0	0.01	0	0.05	0	0.05	0
26	0.05	0	0.001	0	0.021	0	0.036	1
27	0.1	0	0.1	0	0.1	0	0.1	0
28	0.1	0	0.1	0	0.1	0	0.1	0
29	0.1	0	0.1	0	0.1	0	0.1	0

	BY	BZ	CA	CB	CC	CD	CE
1	Mercury (filtered)	D_Mercury (filtered)	Molybdenum (filtered)	D_Molybdenum (filtered)	Nickel (filtered)	D_Nickel (filtered)	Selenium (filtered)
2	0.0001	0	0.008	1	0.016	1	0.007
3	0.0001	0	0.008	1	0.011	1	0.007
4	0.0001	0	0.009	1	0.008	1	0.007
5	0.0001	0			0.004	1	0.005
6	0.0001	0	0.007	1	0.002	1	0.001
7	0.0001	0	0.008	1	0.003	1	0.001
8	0.001	0			0.01	0	0.01
9	0.0001	0	0.006	1	0.003	1	0.001
10	0.0001	0	0.011	1	0.003	1	0.001
11	0.0001	0	0.005	0	0.001	0	0.001
12	0.0001	0	0.008	1	0.016	1	0.001
13	0.0001	0	0.006	1	0.005	1	0.001
14	0.0021	0	0.008	1	0.092	1	0.001
15	0.0021	0	0.007	1	0.067	1	0.001
16	0.0021	0	0.007	1	0.11	1	0.001
17	0.0021	0	0.006	1	0.027	1	0.001
18	0.0021	0	0.007	1	0.016	1	0.002
19	0.0021	0	0.007	1	0.01	1	0.004
20	0.0021	0	0.006	1	0.01	1	0.005
21	0.0021	0	0.006	1	0.004	1	0.006
22	0.0021	0	0.006	1	0.009	1	0.006
23	0.001	0	0.05	0	0.01	0	0.01
24	0.001	0	0.05	0	0.01	0	0.01
25	0.001	0	0.05	0	0.01	0	0.01
26	0.0021	0	0.005	0	0.005	1	0.005
27	0.0001	0	0.1	0	0.1	0	0.001
28	0.0001	0	0.1	0	0.1	0	0.006
29	0.001	0	0.1	0	0.1	1	0.01

	CF	CG	CH	CI	CJ	CK	CL
1	D_Selenium (filtered)	Silver (filtered)	D_Silver (filtered)	Strontium (filtered)	D_Strontium (filtered)	Uranium (filtered)	D_Uranium (filtered)
2	1	0.005	0	1.4	1	0.045	1
3	1					0.041	1
4	1			1.4	1	0.037	1
5	1	0.005	0			0.005	0
6	1	0.005	0	1.8	1	0.015	1
7	0	0.005	0	1.7	1	0.013	1
8	0	0.05	0	1.7	1	0.05	0
9	0	0.005	0	1.9	1	0.01	1
10	0	0.005	0			0.011	1
11	0	0.005	0	1.7	1	0.011	1
12	0	0.005	0	2	1	0.012	1
13	0	0.005	0	1.6	1	0.008	1
14	0	0.005	0	2.2	1	0.007	1
15	0	0.005	0	2.3	1	0.006	1
16	0	0.005	0	2.3	1	0.006	1
17	0	0.005	0	2.3	1	0.005	0
18	1	0.005	0	2.4	1	0.005	0
19	1	0.005	0	2.4	1	0.005	0
20	1	0.005	0	1.9	1	0.005	0
21	1	0.005	0	1.9	1	0.005	0
22	1	0.005	0	1.9	1	0.005	0
23	0	0.005	0	1.8	1	0.05	0
24	0	0.005	0	1.8	1	0.05	0
25	0	0.005	0	1.8	1	0.05	0
26	1	0.005	0	1.7	1	0.005	0
27	0	0.005	0	2	1	0.007	1
28	1	0.005	0	2	1	0.005	0
29	0	0.05	0	2	1	0.05	0

	CM	CN	CO	CP
1	Vanadium (filtered)	D_Vanadium (filtered)	Zinc (filtered)	D_Zinc (filtered)
2	0.007	1	0.053	1
3	0.005	0	0.021	1
4	0.005	1	0.009	1
5	0.005	0	0.014	1
6	0.005	0	0.008	1
7	0.005	0	0.013	1
8		0	0.05	0
9	0.005	0	0.025	1
10	0.005	0	0.018	1
11	0.005	0	0.005	0
12	0.005	0		
13	0.005	0	0.027	1
14	0.005	0	0.46	1
15	0.005	0	0.075	1
16	0.005	0	0.48	1
17	0.005	0	0.089	1
18	0.005	0	0.05	1
19	0.005	0	0.023	1
20	0.005	0	0.042	1
21	0.005	0	0.014	1
22	0.005	0	0.048	1
23	0.01	0	0.05	1
24	0.01	0	0.05	1
25	0.05	0	0.05	1
26	0.005	0	0.019	1
27	0.1	0	0.1	0
28	0.1	0	0.1	0
29	0.1	0	0.1	0

Ammonia (as N)	D_Ammonia (as N)	Bromide	D_Bromide	Chloride	D_Chloride
				2200	1
0.47	1			2500	1
0.94	1	5.6	1	2700	1
		< 10	0		
0.9	1	5	1	2000	1
0.77	1	7.1	1	2000	1
0.67	1	9.6	1	1900	1
0.67	1	11	1	1700	1
1.1	1	< 25	0	1800	1
0.71	1	< 10	0	2100	1
0.75	1	< 10	0	1900	1
0.72	1	9.5	1	1800	1
0.77	1	5.4	1	1800	1
0.75	1	31	1	1900	1
0.78	1	27	1	1900	1
0.85	1	10	1	1900	1
0.51	1			1700	1
0.31	1	9.4	1	2100	1
0.25	1	10	1	2100	1
0.31	1	8	1	2100	1
0.49	1	6.4	1	2100	1
0.29	1	6.4	1	2100	1
0.19	1			1900	1
0.2	1	8.9	1	2100	1
0.18	1	8.8	1	2100	1
0.16	1	2.8	1	2100	1
0.15	1	9.3	1	2100	1
0.18	1	4.7	1	1800	1
0.38	1			1900	1

Conductivity (at 25°C)	D_Conductivity (at 25°C)	Fluoride (Total)	D_Fluoride (Total)
7500	1	1.4	1
7800	1	1.1	1
6600	1	1.2	1
6700	1	1.4	1
7100	1	1.5	1
4900	1	1.4	1
7800	1	1.7	1
8800	1	1.7	1
6700	1	1.3	1
6400	1	1.8	1
6700	1	0.9	1
3900	1	1.3	1
7100	1	1.6	1
7200	1	3.7	1
7200	1	0.05	0
7300	1		
7800	1	13	1
7800	1	7	1
7600	1	3.1	1
7700	1	0.9	1
7800	1	2.1	1
8000	1		
8000	1	1.4	1
7800	1	4.3	1
7900	1	0.05	0
7800	1	1.6	1
4500	1	2.2	1
8400	1		

Nitrate & Nitrite (as N)	D_Nitrate & Nitrite (as N)	Nitrate (as N)	D_Nitrate (as N)	Nitrite (as N)
		< 0.1	0	
		0.18	1	3.4
				< 0.02
< 0.05	0	< 0.02	0	< 0.02
< 0.05	0	0.03	1	< 0.02
0.09	1	0.09	1	< 0.02
0.13	1	0.13	1	< 0.02
0.17	1	0.12	1	0.04
< 0.05	0	< 0.02	0	< 0.02
1.4	1	1.4	1	< 0.02
1.1	1	1.1	1	< 0.02
0.19	1	0.14	1	0.05
0.2	1	0.15	1	0.05
0.07	1	0.06	1	< 0.02
0.05	0	0.02	1	< 0.02
		0.02	0	0.1
0.05	0	< 0.02	0	< 0.02
0.09	1	0.08	1	< 0.02
0.13	1	0.13	1	< 0.02
0.05	0	< 0.02	0	< 0.02
0.13	1	0.13	1	< 0.02
		0.02	0	0.1
0.21	1	0.21	1	< 0.02
0.05	0	< 0.02	0	< 0.02
0.05	0	< 0.02	0	< 0.02
0.05	0	< 0.02	0	< 0.02
0.07	1	0.07	1	< 0.02
		0.06	1	0.02

D_Nitrite (as N)	pH (at 25 °C)	D_pH (at 25 °C)	Phosphate total (as P)	D_Phosphate total (as P)
	7.6	1	0.01	1
1	7.5	1	0.02	1
0	8.3	1	0.01	1
0	7.9	1	0.02	1
0	8	1	< 0.5	0
0	7.8	1	0.01	1
0	8.1	1	0.01	1
1	7.9	1	0.01	1
0	8.2	1	< 0.01	0
0	7.9	1	0.01	1
0	7.8	1	0.03	1
1	7.5	1	0.05	1
0	7.9	1	0.01	0
0	7.4	1	0.01	1
0	7.3	1	0.01	0
0	7.6	1	0.01	0
0	6.7	1	0.01	0
0	6.8	1	0.01	0
0	7.4	1	0.01	1
0	7.2	1	0.01	0
0	7	1	0.01	0
0	6.8	1	0.01	0
0	6.6	1	0.01	0
0	8	1	0.01	1
0	7.2	1	0.01	0
0	6.9	1	0.01	1
0	7.2	1	0.01	0
0	6.5	1	0.01	0

Phosphorus filterable reactive (as P)	D_Phosphorus filterable reactive (as P)
< 0.01	0
< 0.01	0
0.03	1
< 0.01	0
0.11	1
< 0.01	0
0.02	1
0.02	1
0.01	1
0.02	1
0.05	1
0.01	0
0.01	0
0.01	0
0.7	1
0.01	0
0.01	0
0.01	0
0.01	0
0.01	0
0.2	0
0.01	0
0.01	0
0.01	0
0.01	0
0.01	0
3	1

Salinity (expressed as TDS)*	D_Salinity (expressed as TDS)*	Silicon (filtered)	D_Silicon (filtered)
4400	1	13	1
4100	1	12	1
2200	1	7.3	1
		5.1	1
1300	1	5.6	1
3700	1	6.6	1
3900	1	9.6	1
3600	1	5.3	1
3700	1	< 5	0
4000	1	< 5	0
3600	1		
4900	1	3.9	1
1900	1	< 5	1
3700	1	< 5	1
490	1	< 5	1
4700	1	5	1
4500	1	7.3	1
3900	1	7	1
4500	1	7.6	1
4100	1	7	1
4200	1	7.7	1
5100	1	8	1
4100	1	9.8	1
2900	1	8.3	1
5900	1	7.4	1
6200	1	8.9	1
4500	1	8.7	1
5400	1	8	1

Sulphate (as SO4)	D_Sulphate (as SO4)	Total Kjeldahl Nitrogen (as N)
610	1	2.3
660	1	2.7
600	1	1.3
570	1	1.3
560	1	2.3
510	1	0.67
460	1	
530	1	1.1
540	1	0.8
550	1	0.9
590	1	2.1
560	1	1.7
530	1	2.4
530	1	3
550	1	2
570	1	1.4
660	1	0.4
630	1	0.8
620	1	0.5
640	1	0.5
680	1	0.8
680	1	0.5
660	1	1.8
660	1	0.2
660	1	1.1
670	1	0.5
660	1	2.3
680	1	0.5

D_Total Kjeldahl Nitrogen (as N)	Total Nitrogen (as N)	D_Total Nitrogen (as N)
1	8.3	1
1	6.3	1
1	4.9	1
1	1.3	1
1	2.3	1
1	0.76	1
	6.63	1
1	1.27	1
1	0.8	1
1	2.3	1
1	3.2	1
1	1.89	1
1	2.6	1
1	3.1	1
1	2	1
1	1.4	1
1	0.4	1
1	0.9	1
1	0.6	1
1	0.5	1
1	0.9	1
1	0.5	1
1	2	1
0	0.2	0
1	1.1	1
1	0.5	1
1	2.4	1
1	0.6	1

Total Suspended Solids Dried at 103–105°C	D_Total Suspended Solids Dried at 103–105°C	Calcium
7.5	1	170
14	1	120
31	1	56
21	1	73
< 5	0	97
26	1	88
25	1	120
6.8	1	84
13	1	59
10	1	64
9.6	1	69
9.8	1	71
17	1	53
52	1	50
< 5	0	56
		110
58	1	110
41	1	110
72	1	110
25	1	110
66	1	120
		110
65	1	110
120	1	120
110	1	120
110	1	58
170	1	120
		130

D_Calcium	Magnesium	D_Magnesium	Potassium	D_Potassium	Sodium	D_Sodium
1	140	1	34	1	1300	1
1	120	1	46	1	1200	1
1	100	1	72	1	1600	1
1	100	1	60	1	1400	1
1	100	1	63	1	1400	1
1	100	1	56	1	1400	1
1	140	1	87	1	2100	1
1	87	1	64	1	1400	1
1	72	1	51	1	1200	1
1	75	1	52	1	1300	1
1	72	1	50	1	1100	1
1	66	1	54	1	1200	1
1	63	1	53	1	1300	1
1	58	1	50	1	1200	1
1	64	1	51	1	1200	1
1	100	1	36	1	1300	1
1	110	1	37	1	1300	1
1	99	1	35	1	1300	1
1	100	1	36	1	1300	1
1	110	1	33	1	1200	1
1	120	1	34	1	1300	1
1	120	1	36	1	1300	1
1	110	1	37	1	1300	1
1	130	1	35	1	1300	1
1	130	1	35	1	1300	1
1	69	1	58	1	1300	1
1	130	1	38	1	1400	1
1	140	1	39	1	1400	1

Bicarbonate Alkalinity (as CaCO3)	D_Bicarbonate Alkalinity (as CaCO3)
160	1
120	1
210	1
200	1
190	1
94	1
200	1
200	1
300	1
190	1
160	1
180	1
200	1
230	1
170	1
260	1
290	1
210	1
280	1
240	1
260	1
310	1
340	1
290	1
240	1
190	1
240	1
280	1

Carbonate Alkalinity (as CaCO3)	D_Carbonate Alkalinity (as CaCO3)	Hydroxide Alkalinity (as CaCO3)
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
< 10	0	< 20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
10	0	20
1	0	1
1	0	1
1	0	1

D_Hydroxide Alkalinity (as CaCO3)	Total Alkalinity (as CaCO3)	D_Total Alkalinity (as CaCO3)
0	160	1
0	120	1
0	210	1
0	200	1
0	190	1
0	94	1
0	200	1
0	200	1
0	300	1
0	190	1
0	160	1
0	180	1
0	200	1
0	230	1
0	170	1
0	260	1
0	290	1
0	210	1
0	280	1
0	240	1
0	260	1
0	310	1
0	340	1
0	290	1
0	240	1
0	190	1
0	240	1
0	280	1

Aluminium (filtered)	D_Aluminium (filtered)	Arsenic (filtered)	D_Arsenic (filtered)
< 0.05	0	0.004	1
< 0.05	0	0.004	1
0.09	1	0.005	1
< 0.05	0	0.002	1
< 0.05	0	< 0.001	0
< 0.5	0	< 0.01	0
< 0.05	0	0.001	1
< 0.05	0	0.002	1
< 0.05	0	0.002	1
< 0.05	0	0.003	1
0.07	1	0.003	1
< 0.05	0	0.001	1
0.05	0	0.003	1
0.05	0	0.003	1
0.05	0	0.002	1
0.05	0	0.001	0
0.05	0	0.001	0
0.05	0	0.001	0
0.16	1	0.001	0
0.09	1	0.001	1
0.05	0	0.006	1
0.05	0	0.01	0
0.05	0	0.01	0
0.05	0	0.01	0
0.05	0	0.001	0
0.1	0	0.003	1
0.1	0	0.006	1
0.1	0	0.01	0

Barium (filtered)	D_Barium (filtered)	Beryllium (filtered)	D_Beryllium (filtered)	Boron (filtered)
		< 0.001	0	
0.07		< 0.001	0	0.87
0.1		< 0.001	0	1.1
0.07		< 0.001	0	0.78
0.07		< 0.001	0	0.84
< 0.2		< 0.01	0	< 5
0.07		< 0.001	0	0.81
0.08		< 0.001	0	1
0.06		< 0.001	0	0.54
0.06		< 0.001	0	0.65
0.07		< 0.001	0	0.99
0.06		< 0.001	0	0.9
0.07	1	0.001	0	0.82
0.07	1	0.001	0	0.82
0.07	1	0.001	0	0.82
0.06	1	0.001	0	1
0.05	1	0.001	0	1.1
0.06	1	0.001	0	1.1
0.06	1	0.001	0	2
0.06	1	0.001	0	2
0.06	1	0.001	0	2
0.05	0	0.01	0	0.96
0.05	0	0.01	0	0.91
0.05	0	0.01	0	0.95
0.04	1	0.001	0	1.1
0.1	0	0.001	0	0.6
0.1	0	0.001	0	1
0.1	0	0.01	0	1

D_Boron (filtered)	Cadmium (filtered)	D_Cadmium (filtered)	Chromium (filtered)
	< 0.0002	0	0.004
1	< 0.0002	0	< 0.001
1	< 0.0002	0	< 0.001
1	< 0.0002	0	< 0.001
1	< 0.0002	0	< 0.001
0	< 0.002	0	< 0.01
1	< 0.0002	0	< 0.001
1	< 0.0002	0	< 0.001
1	< 0.0002	0	0.002
1	< 0.0002	0	0.002
1	< 0.0002	0	< 0.001
1	< 0.0002	0	< 0.001
1	0.0002	0	0.001
1	0.0002	0	0.001
1	0.0002	0	0.001
1	0.0002	0	0.001
1	0.0002	0	0.001
1	0.0002	0	0.001
0	0.0002	1	0.001
0	0.0002	0	0.001
0	0.0002	0	0.001
1	0.002	0	0.01
1	0.002	0	0.01
1	0.002	0	0.01
1	0.0002	0	0.001
1	0.1	0	0.1
1	0.1	0	0.1
1	0.1	0	0.1

D_Chromium (filtered)	Cobalt (filtered)	D_Cobalt (filtered)	Copper (filtered)	D_Copper (filtered)
1	0.012	1	0.018	1
0	0.009	1	0.019	1
0	< 0.001	0	0.015	1
0	0.008	1	0.006	1
0	0.008	1	0.006	1
0	< 0.01	0	0.028	1
0	0.003	1	< 0.001	0
0	0.001	1	0.006	1
1	0.003	1	0.005	1
1	0.002	1	0.004	1
0	< 0.001	0	0.006	1
0	0.001	1	0.009	1
0	0.004	1	0.004	1
0	0.004	1	0.003	1
0	0.007	1	0.005	1
0	0.1	1	0.001	0
0	0.11	1	0.001	0
0	0.1	1	0.001	0
0	0.1	1	0.62	1
0	0.14	1	0.024	1
0	0.17	1	0.01	1
0	0.15	1	0.01	0
0	0.11	1	0.01	0
0	0.17	1	0.01	0
0	0.15	1	0.001	0
0	0.012	1	0.1	0
0	0.16	1	0.1	0
0	0.19	1	0.1	0

Iron (filtered)	D_Iron (filtered)	Lead (filtered)	D_Lead (filtered)	Lithium (filtered)
< 0.05	0	< 0.001	0	
< 0.05	0	< 0.001	0	
0.09	1	< 0.001	0	
0.57	1	< 0.001	0	0.079
< 0.05	0	< 0.001	0	0.073
		< 0.01	0	0.077
< 0.05	0	< 0.001	0	0.069
< 0.05	0	< 0.001	0	0.067
< 0.05	0	< 0.001	0	0.055
0.15	1	< 0.001	0	0.058
0.48	1	0.002	1	0.064
< 0.05	0	< 0.001	0	0.051
0.05	0	0.001	0	0.065
0.05	0	0.001	0	0.064
0.52	1	0.001	0	0.062
0.05	0	0.001	0	0.03
0.09	1	0.001	0	0.029
1.3	1	0.001	0	0.032
2.6	1	0.001	0	0.025
6.8	1	0.002	1	0.019
31	1	0.001	0	0.019
0.05	0	0.01	0	0.05
0.05	0	0.01	0	0.05
0.05	0	0.01	0	0.05
3.1	1	0.001	0	0.019
0.1	0	0.1	0	0.1
0.11	1	0.1	0	0.1
0.1	0	0.1	0	0.1

D_Lithium (filtered)	Manganese (filtered)	D_Manganese (filtered)	Mercury (filtered)
	0.044	1	< 0.0001
	0.024	1	< 0.0001
	< 0.005	0	< 0.0001
1	0.15	1	< 0.0001
1	0.18	1	< 0.0001
1	0.18	1	< 0.001
1	0.2	1	< 0.0001
1	0.23	1	< 0.0001
1	0.2	1	< 0.0001
1	0.2	1	< 0.0001
1	0.25	1	< 0.0001
1	0.21	1	< 0.0001
1	0.15	1	0.0021
1	0.17	1	0.0021
1	0.21	1	0.0021
1	0.95	1	0.0021
1	0.83	1	0.0021
1	0.88	1	0.0021
1	0.73	1	0.0021
1	0.62	1	0.0021
1	0.58	1	0.0021
0	0.51	1	0.001
0	0.54	1	0.001
0	0.45	1	0.001
1	0.47	1	0.0021
0	0.1	1	0.0001
0	0.5	1	0.0001
0	0.4	1	0.001

D_Mercury (filtered)	Molybdenum (filtered)	D_Molybdenum (filtered)	Nickel (filtered)
0	0.009	1	0.019
0	0.005	1	0.015
0			0.001
0	< 0.005	0	0.007
0	< 0.005	0	0.014
0	< 0.05	0	< 0.01
0	< 0.005	0	0.007
0	< 0.005	0	0.004
0	< 0.005	0	< 0.001
0	0.005	1	0.002
0	< 0.005	0	0.003
0	< 0.005	0	0.003
0	0.005	0	0.02
0	0.005	0	0.021
0	0.005	0	0.026
0	0.005	0	0.078
0	0.005	0	0.091
0	0.005	0	0.086
0	0.005	0	0.1
0	0.005	0	0.16
0	0.005	0	0.2
0	0.05	0	0.17
0	0.05	0	0.12
0	0.05	0	0.19
0	0.005	0	0.15
0	0.1	0	0.1
0	0.1	0	0.1
0	0.1	0	0.2

D_Nickel (filtered)	Selenium (filtered)	D_Selenium (filtered)	Silver (filtered)	D_Silver (filtered)
1	0.008	1		
1	0.006	1		
1	< 0.001	0	< 0.005	0
1	< 0.001	0	< 0.005	0
1	< 0.001	0	< 0.005	0
0	< 0.01	0	< 0.05	0
1	< 0.001	0	< 0.005	0
1	< 0.001	0	< 0.005	0
0	< 0.001	0	< 0.005	0
1	0.001	1	< 0.005	0
1	< 0.001	0	< 0.005	0
1	< 0.001	0	< 0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.001	0	0.005	0
1	0.01	0	0.005	0
1	0.01	1	0.005	0
1	0.01	0	0.005	0
1	0.001	0	0.005	0
0	0.001	0	0.005	0
1	0.001	1	0.005	0
1	0.01	0	0.05	0

Strontium (filtered)	D_Strontium (filtered)	Uranium (filtered)	D_Uranium (filtered)
		0.09	1
1.8	1	0.066	1
1.9	1		
1.5	1	0.056	1
1.5	1	0.037	1
1.4	1	< 0.05	0
1.4	1	0.031	1
		0.033	1
1.3	1	0.024	1
1.3	1	0.024	1
1.4	1	0.028	1
1.2	1	0.016	1
1.6	1	0.016	1
1.6	1	0.016	1
1.6	1	0.018	1
1.9	1	0.059	1
1.9	1	0.052	1
2	1	0.06	1
1.5	1	0.032	1
1.6	1	0.034	1
1.5	1	0.055	1
1.5	1	0.05	0
1.4	1	0.05	0
1.6	1	0.05	0
1.5	1	0.049	1
1	1	0.017	1
2	1	0.057	1
2	1	0.05	0

Vanadium (filtered)	D_Vanadium (filtered)	Zinc (filtered)	D_Zinc (filtered)
< 0.005	0	0.035	1
0.006	1	0.038	1
< 0.005	0	0.007	1
< 0.005	0	0.022	1
< 0.005	0	0.052	1
< 0.05	0	0.063	1
< 0.005	0	0.04	1
< 0.005	0	0.041	1
< 0.005	0	0.014	1
< 0.005	0	0.028	1
< 0.005	0		
< 0.005	0	0.015	1
0.005	0	0.1	0
0.005	0	0.04	1
0.005	0	0.073	1
0.005	0	0.023	1
0.005	0	0.013	1
0.005	0	0.017	1
0.005	0	0.17	1
0.005	0	0.092	1
0.005	0	0.038	1
0.01	0	0.01	1
0.05	0	0.01	1
0.01	0	0.01	1
0.005	0	0.005	1
0.1	0	0.1	0
0.1	0	0.1	0
0.1	0	0.1	0

	General Statistics on Uncensored Data	
Date/Time of Computation	ProUCL 5.2 9/05/2024 3:05:33 PM	
User Selected Options		
From File	KPMON02 Pro UCL 2024.xls	
Full Precision	OFF	

From File: KPMON02 Pro UCL 2024.xls

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD
Aluminium (filtered)	18	11	4	14	77.78%	0.05	0.1	0.0629	7.4977E-4	0.0274
Arsenic (filtered)	26	3	17	9	34.62%	0.001	0.01	0.00255	2.5207E-6	0.00159
Barium (filtered)	26	3	10	16	61.54%	0.05	0.1	0.0519	1.2857E-4	0.0113
Beryllium (filtered)	16	13	0	16	100.00%	0.001	0.01	N/A	N/A	N/A
Boron (filtered)	26	3	23	3	11.54%	2	2	0.898	0.0236	0.154
Cadmium (filtered)	16	13	1	15	93.75%	2.0000E-4	0.1	2.0000E-4	0	0
Chromium (filtered)	19	10	3	16	84.21%	0.001	0.1	0.00138	6.9822E-7	8.3560E-4
Cobalt (filtered)	25	4	25	0	0.00%	N/A	N/A	0.069	0.005	0.0707
Copper (filtered)	27	2	17	10	37.04%	0.001	0.1	0.0307	0.0134	0.116
Iron (filtered)	20	9	12	8	40.00%	0.05	0.1	2.362	45.73	6.763
Lead (filtered)	17	12	2	15	88.24%	0.001	0.1	0.00118	1.4876E-7	3.8569E-4
Lithium (filtered)	25	4	19	6	24.00%	0.05	0.1	0.0469	4.5728E-4	0.0214
Manganese (filtered)	27	2	27	0	0.00%	N/A	N/A	0.369	0.0695	0.264
Mercury (filtered)	16	13	0	16	100.00%	1.0000E-4	0.0021	N/A	N/A	N/A
Molybdenum (filtered)	19	10	3	16	84.21%	0.005	0.1	0.00531	1.1361E-6	0.00107
Nickel (filtered)	26	3	25	1	3.85%	0.1	0.1	0.0697	0.00488	0.0699
Selenium (filtered)	19	10	5	14	73.68%	0.001	0.01	0.00223	7.4201E-6	0.00272
Silver (filtered)	16	13	0	16	100.00%	0.005	0.05	N/A	N/A	N/A
Strontium (filtered)	26	3	26	0	0.00%	N/A	N/A	1.573	0.0676	0.26
Uranium (filtered)	26	3	22	4	15.38%	0.05	0.05	0.0376	3.6454E-4	0.0191
Vanadium (filtered)	17	12	1	16	94.12%	0.005	0.1	0.00509	8.2645E-8	2.8748E-4
Zinc (filtered)	27	2	23	4	14.81%	0.1	0.1	0.0363	0.00117	0.0343

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness
Aluminium (filtered)	4	11	0.07	0.16	0.103	0.09	0.00156	0.0395	0.0148	1.646
Arsenic (filtered)	17	3	0.001	0.006	0.003	0.003	2.5000E-6	0.00158	0.00148	0.645
Barium (filtered)	10	3	0.04	0.07	0.06	0.06	8.8889E-5	0.00943	0.00741	-0.994
Beryllium (filtered)	0	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boron (filtered)	23	3	0.54	1.1	0.898	0.91	0.0247	0.157	0.133	-0.689
Cadmium (filtered)	1	13	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	N/A	N/A	0	N/A
Chromium (filtered)	3	10	0.002	0.004	0.00267	0.002	1.3333E-6	0.00115	0	1.732
Cobalt (filtered)	25	4	0.001	0.19	0.069	0.012	0.005	0.0707	0.0163	0.373
Copper (filtered)	17	2	0.003	0.62	0.0464	0.006	0.0219	0.148	0.00445	4.105
Iron (filtered)	12	9	0.09	31	3.901	0.545	76.69	8.757	0.675	3.179
Lead (filtered)	2	12	0.002	0.002	0.002	0.002	0	0	0	N/A
Lithium (filtered)	19	4	0.019	0.079	0.0504	0.058	4.5947E-4	0.0214	0.0222	-0.366
Manganese (filtered)	27	2	0.024	0.95	0.369	0.23	0.0695	0.264	0.252	0.79
Mercury (filtered)	0	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (filtered)	3	10	0.005	0.009	0.00633	0.005	5.3333E-6	0.00231	0	1.732
Nickel (filtered)	25	3	0.001	0.2	0.0715	0.026	0.00517	0.0719	0.0371	0.631
Selenium (filtered)	5	10	0.001	0.01	0.0052	0.006	1.6700E-5	0.00409	0.00593	-0.0923
Silver (filtered)	0	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Strontium (filtered)	26	3	1	2	1.573	1.5	0.0676	0.26	0.148	0.114
Uranium (filtered)	22	3	0.016	0.09	0.0395	0.0335	4.0778E-4	0.0202	0.0252	0.686
Vanadium (filtered)	1	12	0.006	0.006	0.006	0.006	N/A	N/A	0	N/A
Zinc (filtered)	23	2	0.005	0.17	0.0372	0.028	0.00134	0.0367	0.0208	2.424

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile
Aluminium (filtered)	18	11	0.05	0.05	0.05	0.05	0.09	0.096	0.1	0.109
Arsenic (filtered)	26	3	0.001	0.001	0.001	0.003	0.00475	0.006	0.01	0.01
Barium (filtered)	26	3	0.05	0.06	0.06	0.065	0.07	0.07	0.1	0.1
Beryllium (filtered)	16	13	0.001	0.001	0.001	0.001	0.00325	0.01	0.01	0.01
Boron (filtered)	26	3	0.715	0.82	0.82	0.955	1.075	1.1	1.55	2
Cadmium (filtered)	16	13	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	0.002	0.002	0.1	0.1
Chromium (filtered)	19	10	0.001	0.001	0.001	0.001	0.01	0.01	0.1	0.1
Cobalt (filtered)	25	4	0.0024	0.0038	0.004	0.012	0.14	0.15	0.166	0.17
Copper (filtered)	27	2	0.001	0.004	0.0045	0.009	0.0185	0.023	0.1	0.1
Iron (filtered)	20	9	0.05	0.05	0.05	0.105	0.753	1.56	3.47	8.01
Lead (filtered)	17	12	0.001	0.001	0.001	0.001	0.01	0.01	0.1	0.1
Lithium (filtered)	25	4	0.0214	0.0298	0.032	0.058	0.069	0.0738	0.0916	0.1
Manganese (filtered)	27	2	0.13	0.172	0.18	0.23	0.525	0.572	0.77	0.865
Mercury (filtered)	16	13	5.5000E-4	0.001	0.001	0.0021	0.0021	0.0021	0.0021	0.0021
Molybdenum (filtered)	19	10	0.005	0.005	0.005	0.005	0.05	0.05	0.1	0.1
Nickel (filtered)	26	3	0.003	0.007	0.00875	0.052	0.115	0.15	0.18	0.198
Selenium (filtered)	19	10	0.001	0.001	0.001	0.001	0.007	0.0088	0.01	0.01
Silver (filtered)	16	13	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0163
Strontium (filtered)	26	3	1.3	1.4	1.4	1.5	1.75	1.9	1.95	2
Uranium (filtered)	26	3	0.0165	0.024	0.025	0.043	0.0543	0.056	0.0595	0.0645
Vanadium (filtered)	17	12	0.005	0.005	0.005	0.005	0.01	0.042	0.1	0.1
Zinc (filtered)	27	2	0.01	0.0132	0.0145	0.038	0.068	0.0882	0.1	0.1

	M
1	
2	
3	
4	
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7	
8	
9	
10	
11	**KM CV**
12	0.436
13	0.624
14	0.218
15	N/A
16	0.171
17	N/A
18	0.603
19	1.025
20	3.774
21	2.864
22	0.326
23	0.456
24	0.715
25	N/A
26	0.201
27	1.003
28	1.221
29	N/A
30	0.165
31	0.508
32	0.0565
33	0.943
34	
35	
36	
37	**CV**
38	0.385
39	0.527
40	0.157
41	N/A
42	0.175
43	N/A
44	0.433
45	1.025
46	3.193
47	2.245
48	N/A
49	0.426
50	0.715
51	N/A
52	0.365
53	1.005
54	0.786
55	N/A
56	0.165
57	0.511
58	N/A
59	0.985
60	
61	
62	
63	**99%ile**
64	0.15
65	0.01
66	0.1
67	0.01
68	2
69	0.1
70	0.1
71	0.185
72	0.485
73	26.4
74	0.1
75	0.1
76	0.932
77	0.0021
78	0.1
79	0.2
80	0.01
81	0.0433
82	2
83	0.084
84	0.1
85	0.152

	General Statistics on Uncensored Data	
Date/Time of Computation	ProUCL 5.2 9/05/2024 3:04:44 PM	
User Selected Options		
From File	KPMON02 Pro UCL 2024.xls	
Full Precision	OFF	

From File: KPMON02 Pro UCL 2024.xls

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD
Ammonia (as N)	27	2	27	0	0.00%	N/A	N/A	0.535	0.0817	0.286
Bromide	20	8	20	0	0.00%	N/A	N/A	9.795	48.31	6.95
Chloride	28	1	12	16	57.14%	1700	2100	1885	56989	238.7
Conductivity (at 25°C)	28	1	12	16	57.14%	4500	8400	6233	1843406	1358
Fluoride (Total)	25	3	23	2	8.00%	0.05	0.05	2.308	6.71	2.59
Nitrate & Nitrite (as N)	19	9	13	6	31.58%	0.05	0.05	0.225	0.129	0.359
Nitrate (as N)	19	10	17	2	10.53%	0.02	0.02	0.218	0.131	0.361
Nitrite (as N)	7	22	3	4	57.14%	0.02	0.1	0.516	1.387	1.178
pH (at 25 °C)	28	1	28	0	0.00%	N/A	N/A	7.464	0.265	0.515
Phosphate total (as P)	26	3	14	12	46.15%	0.01	0.01	0.0131	7.5148E-5	0.00867
filterable reactive (as P)	23	6	9	14	60.87%	0.01	0.2	0.179	0.382	0.618
ity (expressed as TDS)*	27	2	27	0	0.00%	N/A	N/A	3907	1644106	1282
Silicon (filtered)	22	7	22	0	0.00%	N/A	N/A	7.686	4.707	2.17
Sulphate (as SO4)	28	1	28	0	0.00%	N/A	N/A	600.7	3881	62.3
Kjeldahl Nitrogen (as N)	27	2	26	1	3.70%	0.2	0.2	1.329	0.637	0.798
Total Nitrogen (as N)	28	1	27	1	3.57%	0.2	0.2	2.13	4.106	2.026
olids Dried at 103-105°C	23	5	23	0	0.00%	N/A	N/A	46.94	1941	44.06
Calcium	28	1	28	0	0.00%	N/A	N/A	95.29	908.9	30.15
Magnesium	28	1	28	0	0.00%	N/A	N/A	100.9	662.5	25.74
Potassium	28	1	28	0	0.00%	N/A	N/A	47.57	184	13.56
Sodium	28	1	28	0	0.00%	N/A	N/A	1332	31892	178.6
te Alkalinity (as CaCO3)	28	1	28	0	0.00%	N/A	N/A	222.6	3403	58.34
te Alkalinity (as CaCO3)	16	13	0	16	100.00%	1	10	N/A	N/A	N/A
de Alkalinity (as CaCO3)	16	13	0	16	100.00%	1	20	N/A	N/A	N/A
tal Alkalinity (as CaCO3)	28	1	28	0	0.00%	N/A	N/A	222.6	3403	58.34

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness
Ammonia (as N)	27	2	0.15	1.1	0.535	0.51	0.0817	0.286	0.385	0.107
Bromide	20	8	2.8	31	9.795	8.85	48.31	6.95	2.891	2.4
Chloride	12	1	1700	2700	2033	1950	91515	302.5	222.4	1.272
Conductivity (at 25°C)	12	1	3900	8800	6742	6700	1708106	1307	889.5	-0.863
Fluoride (Total)	23	3	0.9	13	2.504	1.6	7.121	2.669	0.445	3.219
Nitrate & Nitrite (as N)	13	9	0.07	1.4	0.306	0.13	0.181	0.426	0.089	2.217
Nitrate (as N)	17	10	0.02	1.4	0.241	0.13	0.15	0.387	0.0741	2.617
Nitrite (as N)	3	22	0.04	3.4	1.163	0.05	3.752	1.937	0.0148	1.732
pH (at 25 °C)	28	1	6.5	8.3	7.464	7.5	0.265	0.515	0.593	-0.279
Phosphate total (as P)	14	3	0.01	0.05	0.0157	0.01	1.3407E-4	0.0116	0	2.4
filterable reactive (as P)	9	6	0.01	3	0.44	0.03	0.971	0.985	0.0297	2.745
ity (expressed as TDS)*	27	2	490	6200	3907	4100	1644106	1282	593	-0.877
Silicon (filtered)	22	7	3.9	13	7.686	7.5	4.707	2.17	1.557	0.688
Sulphate (as SO4)	28	1	460	680	600.7	605	3881	62.3	81.54	-0.347
Kjeldahl Nitrogen (as N)	26	2	0.4	3	1.372	1.2	0.635	0.797	1.038	0.48
Total Nitrogen (as N)	27	1	0.4	8.3	2.202	1.4	4.273	2.067	1.334	1.699
olids Dried at 103-105°C	23	5	6.8	170	46.94	26	1941	44.06	24.31	1.369
Calcium	28	1	50	170	95.29	110	908.9	30.15	24.46	0.155
Magnesium	28	1	58	140	100.9	100	662.5	25.74	33.36	-0.117
Potassium	28	1	33	87	47.57	48	184	13.56	17.05	1.05
Sodium	28	1	1100	2100	1332	1300	31892	178.6	148.3	3.131
te Alkalinity (as CaCO3)	28	1	94	340	222.6	210	3403	58.34	51.89	-0.0453
te Alkalinity (as CaCO3)	0	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
de Alkalinity (as CaCO3)	0	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
tal Alkalinity (as CaCO3)	28	1	94	340	222.6	210	3403	58.34	51.89	-0.0453

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile
Ammonia (as N)	27	2	0.18	0.21	0.27	0.51	0.76	0.77	0.87	0.928
Bromide	20	8	4.97	5.56	6.2	8.85	9.7	10	12.6	27.2
Chloride	28	1	1800	1840	1900	2000	2100	2100	2130	2395
Conductivity (at 25°C)	28	1	5950	6700	6700	7550	7800	7800	8000	8260
Fluoride (Total)	25	3	0.9	1.18	1.3	1.5	2.1	2.38	4.06	6.46
Nitrate & Nitrite (as N)	19	9	0.05	0.05	0.05	0.09	0.18	0.194	0.388	1.13
Nitrate (as N)	19	10	0.02	0.048	0.06	0.12	0.145	0.162	0.388	1.13
Nitrite (as N)	7	22	0.032	0.042	0.045	0.05	0.1	0.1	1.42	2.41
pH (at 25 °C)	28	1	6.77	6.94	7.15	7.5	7.9	7.9	8.03	8.165
Phosphate total (as P)	26	3	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.0275
filterable reactive (as P)	23	6	0.01	0.01	0.01	0.01	0.025	0.042	0.182	0.65
ity (expressed as TDS)*	27	2	2080	3600	3650	4100	4500	4660	5220	5750
Silicon (filtered)	22	7	5.12	5.8	6.7	7.5	8.6	8.86	9.78	11.89
Sulphate (as SO4)	28	1	530	544	550	605	660	660	673	680
Kjeldahl Nitrogen (as N)	27	2	0.5	0.5	0.585	1.1	2.05	2.26	2.34	2.61
Total Nitrogen (as N)	28	1	0.5	0.6	0.72	1.35	2.45	2.9	5.32	6.515
olids Dried at 103-105°C	23	5	9.64	11.2	13.5	26	65.5	69.6	110	119
Calcium	28	1	56	61	67.75	110	120	120	120	126.5

	A	B	C	D	E	F	G	H	I	J	K	L
88		Magnesium	28	1	65.4	72	74.25	100	120	126	133	140
89		Potassium	28	1	34.7	35.4	36	48	54.5	57.2	63.3	69.2
90		Sodium	28	1	1200	1200	1275	1300	1400	1400	1400	1530
91	te Alkalinity (as CaCO3)		28	1	160	184	190	210	265	280	293	306.5
92	te Alkalinity (as CaCO3)		16	13	1	10	10	10	10	10	10	10
93	de Alkalinity (as CaCO3)		16	13	1	20	20	20	20	20	20	20
94	tal Alkalinity (as CaCO3)		28	1	160	184	190	210	265	280	293	306.5

	M
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	**KM CV**
12	0.534
13	0.71
14	0.127
15	0.218
16	1.122
17	1.593
18	1.658
19	2.283
20	0.069
21	0.663
22	3.457
23	0.328
24	0.282
25	0.104
26	0.601
27	0.951
28	0.939
29	0.316
30	0.255
31	0.285
32	0.134
33	0.262
34	N/A
35	N/A
36	0.262
37	
38	
39	
40	**CV**
41	0.534
42	0.71
43	0.149
44	0.194
45	1.066
46	1.391
47	1.603
48	1.665
49	0.069
50	0.737
51	2.239
52	0.328
53	0.282
54	0.104
55	0.581
56	0.939
57	0.939
58	0.316
59	0.255
60	0.285
61	0.134
62	0.262
63	N/A
64	N/A
65	0.262
66	
67	
68	
69	**99%ile**
70	1.058
71	30.24
72	2646
73	8692
74	11.56
75	1.346
76	1.346
77	3.202
78	8.273
79	0.045
80	2.494
81	6122
82	12.79
83	680
84	2.922
85	7.849
86	159
87	159.2

	M
88	140
89	82.95
90	1965
91	331.9
92	10
93	20
94	331.9

	A	B	C	D	E	F	G	H	I
1	Ammonia (as N)	D_Ammonia (as N)	Bromide	D_Bromide	Chloride	D_Chloride	Conductivity (at 25°C)	D_Conductivity	Fluoride (Total)
2	0.19	1	10	0	2800	1	12000	1	1.3
3	0.2	1	10	0	2600	1	11000	1	1.3
4	0.22	1	10	0	2900	1	11000	1	1.3
5	0.67	1	5.9	1	3200	1	10000	1	1.3
6			10	0					
7	0.59	1	6	1	2900	1	13000	1	2
8	0.58	1	7.4	1	2900	1	13000	1	1.9
9	0.74	1	13	1	2700	1	9700	1	1.7
10	0.78	1	14	1	2100	1	15000	1	2.4
11	0.99	1	25	0	2800	1	13000	1	2.2
12	0.69	1	10	0	2900	1	12000	1	1.8
13	0.74	1			2100	1	7400	1	
14	0.66	1	8.3	1	2200	1	10000	1	0.8
15	0.85	1	6.2	1	2200	1	3800	1	1.4
16	0.67	1	6.9	1	2700	1	12000	1	1.3
17	0.69	1	9.3	1	2600	1	12000	1	5.4
18	0.73	1	5.8	1	2600	1	12000	1	1.8
19	0.78	1			2800	1	13000	1	
20	0.7	1	1.2	1	2600	1	12000	1	78
21	0.73	1	10	1	2500	1	12000	1	17
22	0.72	1	9	1	2800	1	12000	1	5.1
23	0.86	1	6.7	1	2600	1	12000	1	1.6
24	0.01	0	5.5	0	770	1	6400	1	1.6
25	0.84	1			3200	1	13000	1	
26	0.76	1	9.2	1	2700	1	12000	1	1.8
27	1.1	1	5.7	1	2600	1	12000	1	1.4
28	1.2	1	9.4	1	2600	1	13000	1	3.9
29	1.2	1	6.2	1	2600	1	13000	1	0.9
30	1.1	1	7.2	1	2400	1	13000	1	5.5
31	1.2	1			2600	1	13000	1	

	J	K	L	M	N	O	P	Q
1	D_Flouride (Total)	Nitrate & Nitrite (as N)	D_Nitrate & Nitrite (as N)	Nitrate (as N)	D_Nitrate (as N)	Nitrite (as N)	D_Nitrite (as N)	pH (at 25 °C)
2	1	1	1	0.99	1	0.02	0	3.7
3	1	1.8	1	1.7	1	0.05	1	3.7
4	1	1.9	1	1.8	1	0.08	1	3.7
5	1	3.3	1	3	1	0.27	1	4
6								
7	1	0.05	0	0.02	0	0.02	0	3.8
8	1	0.1	1	0.03	1	0.08	1	4.1
9	1	0.54	1	0.46	1	0.08	1	3.4
10	1	0.05	0	0.02	0	0.1	0	4.2
11	1	0.56	1	0.51	1	0.05	1	3.7
12	1	1.3	1	1.2	1	0.09	1	4.3
13	1			0.02	0	0.02	0	8
14	1	1	1	1	1	0.02	0	3.6
15	1	0.05	0	0.02	0	0.02	0	3.4
16	1	0.05	0	0.02	0	0.02	0	3.4
17	1	0.05	0	0.03	1	0.02	0	3.5
18	1	0.05	0	0.02	0	0.02	0	3.5
19				0.02	0	0.2	1	3.4
20	1	0.08	1	0.08	1	0.02	0	3.5
21	1	0.05	0	0.04	1	0.02	0	3.4
22	1	0.05	0	0.05	1	0.02	0	3.7
23	1	0.05	0	0.02	0	0.02	0	3.7
24	1	0.05	0	0.02	1	0.02	0	3.9
25				0.02	0	0.1	0	3.5
26	1	0.16	1	0.16	1	0.02	0	3.9
27	1	0.07	1	0.07	1	0.02	0	3.4
28	1	0.05	0	0.02	0	0.02	0	3.7
29	1	0.05	0	0.02	0	0.02	0	3.5
30	1	4.6	1	4.6	1	0.02	0	4.8
31				0.02	0	0.02	0	4.5

	R	S	T	U	V
1	D_pH	Phosphate total (as P)	D_Phosphate total (as P)	Phosphorus filterable reactive (as P)	D_Phosphorus filterable reactive (as P)
2	1	0.01	0	0.01	0
3	1	0.01	0	0.01	0
4	1	0.01	0	0.01	0
5	1	0.01	0	0.04	1
6					
7	1	0.03	1	0.01	0
8	1			0.01	0
9	1	0.01	0	0.01	0
10	1	0.03	1	0.09	1
11	1	0.04	1		
12	1	0.01	1	0.04	1
13	1	0.01	0	0.01	1
14	1	0.04	1	0.04	1
15	1	0.01	0	0.03	1
16	1	0.01	1	0.01	1
17	1	0.02	1	0.01	0
18	1	0.03	1	0.02	1
19	1	-	0	0.2	0
20	1	0.02	1	0.01	0
21	1	0.03	1	0.01	1
22	1	0.02	1	0.01	0
23	1	0.03	1	0.01	0
24	1	0.02	1	0.02	1
25	1	0.03	1	0.2	0
26	1	0.03	1	0.01	0
27	1	0.03	1	0.03	1
28	1	0.01	0	0.01	0
29	1	0.01	0	0.01	0
30	1	0.02	1	0.02	1
31	1	0.01	1	3	1

	W	X	Y	Z	AA	AB
1	Salinity (expressed as TDS)*	D_Salinity (expressed as TDS)*	Silicon (filtered)	D_Silicon (filtered)	Sulphate (as SO4)	D_Sulphate (as SO4)
2	10000	1	31	1	3800	1
3	9300	1	34	1	3700	1
4	9500	1	30	1	3700	1
5	5200	1	29	1	4000	1
6						
7	10	0	27	1	4000	1
8	11000	1	28	1	3900	1
9	8000	1	34	1	3300	1
10	10000	1			3500	1
11	7100	1	30	1	3300	1
12	7500	1	33	1	4100	1
13					670	1
14	7700	1	24	1	3500	1
15	9300	1	23	1	3600	1
16	10000	1	29	1	4000	1
17	7200	1	26	1	3900	1
18	10000	1	28	1	3900	1
19	8200	1	30	1	3500	1
20	8600	1	29	1	3900	1
21	9400	1	28	1	3900	1
22	1100	1	30	1	4000	1
23	7300	1	29	1	4000	1
24	3400	1	28	1	1200	1
25	8200	1	36	1	3800	1
26	9600	1	18	1	3900	1
27	8400	1	30	1	3900	1
28	8400	1	31	1	4000	1
29	7400	1	31	1	4000	1
30	9900	1	36	1	4200	1
31	8500	1	36	1	3900	1

	AC	AD	AE	AF
1	Total Kjeldahl Nitrogen (as N)	D_Total Kjeldahl Nitrogen (as N)	Total Nitrogen (as N)	D_Total Nitrogen (as N)
2	0.2	0	1	1
3	0.2	0	1.8	1
4	0.2	0	1.9	1
5	0.67	1	3.97	1
6				
7	0.59	1	0.59	1
8	1.6	1	1.7	1
9	2.1	1	2.64	1
10				
11	1.1	1	1.66	1
12	0.8	1	2.1	1
13	0.9	1	0.7	1
14	0.7	1	1.7	1
15	1.1	1	1.1	1
16	2.1	1	2.1	1
17	1.7	1	1.7	1
18	1.7	1	1.7	1
19	1.9	1	1.9	1
20	2.1	1	2.2	1
21	1.9	1	1.9	1
22	1.1	1	1.1	1
23	1.1	1	1.1	1
24	2.4	1	2.4	1
25	1.8	1	1.8	1
26	2.1	1	2.3	1
27	1.3	1	1.4	1
28	1.2	1	1.2	1
29	1.5	1	1.5	1
30	1.3	1	5.9	1
31	1.3	1	1.3	1

	AG	AH	AI	AJ	AK	AL
1	Total Suspended Solids Dried at 103-105°C	D_Total Suspended Solids Dried at 103-105°C	Calcium	D_Calcium	Magnesium	D_Magnesium
2	21	1	520	1	570	1
3	19	1	490	1	530	1
4	17	1	440	1	470	1
5	57	1	530	1	570	1
6						
7	37	1	460	1	500	1
8	7.4	1	570	1	560	1
9	37	1	500	1	480	1
10	36	1	790	1	780	1
11	13	1	500	1	450	1
12	34	1	520	1	480	1
13			72	1	84	1
14	40	1	380	1	320	1
15	23	1	420	1	360	1
16	51	1	400	1	400	1
17	13	1	360	1	360	1
18	100	1	390	1	390	1
19			400	1	410	1
20	41	1	390	1	390	1
21	74	1	400	1	410	1
22	47	1	300	1	380	1
23	10	1	380	1	360	1
24	56	1	250	1	230	1
25			390	1	400	1
26	98	1	400	1	380	1
27	120	1	400	1	390	1
28	190	1	380	1	370	1
29	130	1	430	1	440	1
30	180	1	470	1	460	1
31			430	1	410	1

	AM	AN	AO	AP	AQ	AR
1	Potassium	D_Potassium	Sodium	D_Sodium	Bicarbonate Alkalinity (as CaCO3)	D_Bicarbonate Alkalinity (as CaCO3)
2	54	1	1900	1	20	0
3	52	1	1800	1	20	0
4	48	1	1600	1	20	0
5	55	1	2000	1	20	0
6						
7	49	1	1700	1	20	0
8	54	1	1800	1	20	0
9	49	1	1800	1	20	0
10	74	1	2600	1	20	0
11	44	1	1600	1	20	0
12	46	1	1700	1	1400	1
13	53	1	1400	1	200	1
14	49	1	1300	1	20	0
15	53	1	1500	1	20	0
16	40	1	1600	1	20	0
17	36	1	1400	1	20	0
18	39	1	1600	1	20	0
19	40	1	1600	1	20	0
20	38	1	1600	1	20	0
21	39	1	1600	1	20	0
22	37	1	1500	1	20	0
23	35	1	1500	1	20	0
24	23	1	970	1	20	0
25	38	1	1600	1	20	0
26	38	1	1500	1	20	0
27	38	1	1600	1	20	0
28	35	1	1600	1	20	0
29	48	1	1800	1	1	0
30	47	1	1900	1	1	0
31	39	1	1800	1	1	0

	AS	AT	AU	AV
1	Carbonate Alkalinity (as CaCO3)	D_Carbonate Alkalinity (as CaCO3)	Hydroxide Alkalinity (as CaCO3)	D_Hydroxide Alkalinity (as CaCO3)
2	10	0	20	0
3	10	0	20	0
4	10	0	20	0
5	10	0	20	0
6				
7	10	0	20	0
8	10	0	20	0
9	10	0	20	0
10	10	0	20	0
11	10	0	20	0
12	10	0	20	0
13	1	0	1	0
14	10	0	20	0
15	10	0	20	0
16	10	0	20	0
17	10	0	20	0
18	10	0	20	0
19	10	0	20	0
20	10	0	20	0
21	10	0	20	0
22	10	0	20	0
23	10	0	20	0
24	10	0	20	0
25	10	0	20	0
26	10	0	20	0
27	10	0	20	0
28	10	0	20	0
29	1	0	1	0
30	1	0	1	0
31	1	0	1	0

	AW	AX	AY	AZ	BA	BB
1	Total Alkalinity (as CaCO3)	D_Total Alkalinity (as CaCO3)	Aluminium (filtered)	D_Aluminium (filtered)	Arsenic (filtered)	D_Arsenic (filtered)
2	20	0	0.11	1	0.005	1
3	20	0	0.2	1	0.01	1
4	20	0	0.12	1	0.03	1
5	20	0	0.5	0	0.06	1
6						
7	20	0	0.5	0	0.01	0
8	20	0	0.13	1	0.007	1
9	20	0	0.5	0	0.014	1
10	20	0	0.12	1		
11	20	0	0.5	0	0.026	1
12	1400	1	0.5	0	0.038	1
13	200	1	0.1	0	0.004	1
14	20	0			0.014	1
15	20	0	0.68	1	0.01	0
16	20	0	0.05	0	0.01	0
17	20	0	0.05	0	0.01	0
18	20	0	0.05	0	0.01	0
19	20	0	0.05	0	0.01	0
20	20	0	0.05	0	0.012	1
21	20	0	0.05	0	0.013	1
22	20	0	0.05	0	0.01	0
23	20	0	0.05	0	0.016	1
24	20	0	0.05	0	0.01	1
25	20	0	0.05	0	0.01	0
26	20	0	0.05	0	0.014	1
27	20	0	0.05	0	0.014	1
28	20	0	2.9	1	0.1	0
29	0	0	0.1	0	0.1	0
30	0	0	0.12	0	0.01	0
31	0	0	0.1	0	0.18	1

	BC	BD	BE	BF	BG	BH	BI
1	Barium (filtered)	D_Barium (filtered)	Beryllium (filtered)	D_Beryllium (filtered)	Boron (filtered)	D_Boron (filtered)	Cadmium (filtered)
2	0.05	1	0.001	0	1.7	1	0.0013
3	0.05	1	0.001	0	1.8	1	0.0019
4	0.05	1	0.001	0	1.7	1	0.002
5	0.2	0	0.01	0	2.3	1	0.002
6							
7	0.2	0	0.01	0	5	0	0.0024
8	0.05	1	0.001	0	1.6	1	0.0018
9	0.2	0	0.01	0	5	0	0.003
10	0.04	1	0.001	0	1.8	1	0.0004
11	0.2	0	0.01	0	1.8	1	0.02
12	0.2	0	0.01	0	5	0	0.002
13	0.1	0	0.001	0			0.0002
14	0.05	1	0.001	0	1.6	1	0.0023
15	0.2	0	0.01	0	1.3	1	0.0024
16	0.2	0	0.01	0	1.6	1	0.002
17	0.2	0	0.01	0	1.6	1	0.002
18	0.2	0	0.01	0	1.5	1	0.0021
19	0.2	0	0.01	0	1.5	1	0.002
20	0.2	0	0.01	0	1.5	1	0.002
21	0.05	0	0.01	0	1.6	1	0.0023
22	0.2	0	0.01	0	2	0	0.002
23	0.2	0	0.01	0	< 5	0	0.002
24	0.2	0	0.01	0	< 5	0	0.002
25	0.05	0	0.01	0	1.2	1	0.002
26	0.05	0	0.01	0	1.3	1	0.002
27	0.05	0	0.01	0	1.2	1	0.002
28	2	0	0.1	0	2.2	1	0.02
29	0.1	0	0.1	0	2	1	0.1
30	0.1	0	0.1	0	2	1	0.1
31	0.1	0	0.01	0	0.1	0	0.2

	BJ	BK	BL	BM	BN	BO	BP
1	D_Cadmium (filtered)	Chromium (filtered)	D_Chromium (filtered)	Cobalt (filtered)	D_Cobalt (filtered)	Copper (filtered)	D_Copper (filtered)
2	1	0.001	0	1.2	1	1.8	1
3	1	0.001	0	1.2	1	3.4	1
4	1	0.001	0	1.2	1	3.6	1
5	0	0.01	0	1.5	1	0.65	1
6							
7	1	0.01	0	1.4	1	9.2	1
8	1	0.001	0	1.3	1	6.5	1
9	1	0.01	0	1.2	1	10	1
10	1	0.001	0			0.13	1
11	0	0.01	0	1.7	1	5	1
12	0	0.001	0	1.8	1	2	1
13	0	0.001	0			0.011	1
14	1	0.001	1	1.4	1	5.4	1
15	1	0.01	0	1.4	1	4.9	1
16	0	0.01	0	1.9	1	2.6	1
17	0	0.01	0	2	1	2.6	1
18	1	0.01	0	1.9	1	2.5	1
19	0	0.01	0	1.9	1	2.5	1
20	0	0.01	0	2	1	2.2	1
21	1	0.01	0	2	1	2.4	1
22	0	0.01	0	1.9	1	2.1	1
23	0	0.01	0	2	1	1.6	1
24	0	0.01	0	1.1	1	1	1
25	0	0.01	0	1.9	1	1.4	1
26	0	0.01	0	2	1	1.5	1
27	0	0.01	0	2	1	1.5	1
28	0	0.1	0	2.3	1	0.1	0
29	0	0.1	0	1.9	1	3	1
30	0	0.1	0	2.2	1	2	1
31	1	0.4	1	2.4	1	0.2	1

	BQ	BR	BS	BT	BU	BV	BW	BX
1	Iron (filtered)	D_Iron (filtered)	Lead (filtered)	D_Lead (filtered)	Lithium (filtered)	D_Lithium (filtered)	Manganese (filtered)	D_Manganese (filtered)
2	300	1	0.001	0	0.009	1	1	1
3	320	1	0.001	0	0.009	1	0.97	1
4	320	1	0.001	0	0.009	1	0.96	1
5	460	1	0.01	0	0.05	0	1.1	1
6								
7	380	1	0.01	0	0.05	0	1	1
8	370	1	0.001	0	0.007	1	1	1
9	330	1	0.01	0	0.05	0	0.86	1
10			0.001	0	0.01	1		
11	560	1	0.01	0	0.05	0	1.3	1
12	630	1	0.01	0	0.05	0	1.2	1
13			0.001	0	0.1	0	0.1	0
14	400	1			0.009	1	1.2	1
15	380	1	0.01	0	0.05	0	1.2	1
16	630	1	0.01	0	0.05	0	1.4	1
17	500	1	0.01	0	0.05	0	1.4	1
18	490	1	0.01	0	0.05	0	1.4	1
19	500	1	0.01	0	0.05	0	1.4	1
20	490	1	0.01	0	0.05	0	1.4	1
21	600	1	0.01	0	0.05	0	1.5	1
22	530	1	0.01	0	0.05	0	1.4	1
23	580	1	0.01	0	0.05	0	1.4	1
24	330	1	0.01	0	0.05	0	0.78	1
25	570	1	0.01	0	0.05	0	1.3	1
26	630	1	0.01	0	0.05	0	1.4	1
27	640	1	0.01	0	0.05	0	1.4	1
28	790	1	0.1	0	0.05	0	1.5	1
29	570	1	3	1	0.1	0	2	1
30	760	1	2	1	0.1	0	2	1
31	830	1	0.5	1	0.1	0	2	1

	BY	BZ	CA	CB	CC	CD	CE
1	Mercury (filtered)	D_Mercury (filtered)	Molybdenum (filtered)	D_Molybdenum (filtered)	Nickel (filtered)	D_Nickel (filtered)	Selenium (filtered)
2	0.0001	0	0.005	0	1.9	1	0.001
3	0.0001	0	0.005	0	1.9	1	0.003
4	0.0001	0	0.005	0	1.8	1	0.002
5	0.001	0			2.5	1	0.01
6							
7	0.001	0	0.05	0	2.4	1	0.01
8	0.0001	0	0.005	0	2.1	1	0.001
9	0.001	0	0.05	0	1.8	1	0.01
10	0.0001	0	0.005	0			0.001
11	0.001	0	0.05	0	2.8	1	0.01
12	0.001	0	0.05	0	2.8	1	0.01
13	0.0001	0					0.001
14	0.0001	0	0.005	0	2.2	1	0.001
15	0.001	0	0.05	0	2.3	1	0.01
16	0.001	0	0.05	0	3.2	1	0.01
17	0.001	0	0.05	0	3.3	1	0.01
18	0.001	0	0.05	0	3.1	1	0.01
19	0.001	0	0.05	0	3.2	1	0.01
20	0.001	0	0.05	0	3.3	1	0.01
21	0.001	0	0.05	0	3.5	1	0.01
22	0.001	0	0.05	0	3.2	1	0.01
23	0.001	0	0.05	0	3.3	1	0.01
24	0.001	0	0.05	0	1.9	1	0.01
25	0.001	0	0.05	0	3.1	1	0.01
26	0.001	0	0.05	0	3.3	1	0.01
27	0.001	0	0.05	0	3.4	1	0.01
28	0.01	0	0.05	0	3.8	1	0.1
29	0.01	0	0.1	0	4	1	0.1
30	0.01	0	0.1	0	4	1	0.1
31	0.001	0	0.1	0	4	1	0.01

	CF	CG	CH	CI	CJ	CK	CL
1	D_Selenium (filtered)	Silver (filtered)	D_Silver (filtered)	Strontium (filtered)	D_Strontium (filtered)	Uranium (filtered)	D_Uranium (filtered)
2	0	0.005	0	4.4	1	0.005	0
3	1	0.005	0	4.3	1	0.005	0
4	1	0.005	0	4.1	1	0.005	0
5	0	0.05	0	5.3	1	0.05	0
6							
7	0	0.05	0	4.4	1	0.05	0
8	0	0.005	0	4.3	1	0.005	0
9	0	0.05	0	4.1	1	0.05	0
10	0	0.005	0	4	1	0.005	0
11	0	0.05	0			0.05	0
12	0	0.01	0	3.5	0	0.05	0
13	0	0.005	0			0.032	1
14	1	0.005	0	3.4	0	0.005	0
15	0	0.05	0	3.6	0	0.05	0
16	0	0.05	0	3.5	1	0.05	0
17	0	0.05	0	3.4	1	0.05	0
18	0	0.05	0	3.5	1	0.05	0
19	0	0.05	0	3.5	1	0.05	0
20	0	0.05	0	3.6	1	0.05	0
21	0	0.05	0	3.6	1	0.05	0
22	0	0.05	0	2.8	1	0.05	0
23	0	0.05	0	3.2	1	0.05	0
24	0	0.05	0	2	1	0.05	0
25	0	0.005	0	3.3	1	0.05	0
26	0	0.005	0	3.4	1	0.05	0
27	0	0.005	0	3.5	1	0.05	0
28	0	0.05	0	3.2	1	0.05	0
29	0	0.5	0	4	1	0.5	0
30	0	0.5	0	4	1	0.5	0
31	0	0.05	0	3	1	0.05	0

	CM	CN	CO	CP
1	Vanadium (filtered)	D_Vanadium (filtered)	Zinc (filtered)	D_Zinc (filtered)
2	0.005	0	20	1
3	0.005	0	21	1
4	0.005	0	20	1
5	0.05	0	26	1
6				
7	0.05	0	24	1
8	0.005	0	24	1
9	0.05	0	22	1
10	0.005	0		
11	0.05	0	32	1
12	0.05	0	35	1
13	0.1	0		
14	0.005	0	28	1
15	0.05	0	26	1
16	0.05	0	37	1
17	0.05	0	35	1
18	0.05	0	36	1
19	0.05	0	36	1
20	0.05	0	39	1
21	0.05	0	39	1
22	0.05	0	37	1
23	0.05	0	38	1
24	0.05	0	22	1
25	0.01	0	38	1
26	0.05	0	40	1
27	0.05	0	42	1
28	0.05	0	47	1
29	0.1	0	39	1
30	0.1	0	46	1
31	0.1	0	48	1

	General Statistics on Uncensored Data
Date/Time of Computation	ProUCL 5.2 9/05/2024 3:25:07 PM
User Selected Options	
From File	KPMON03 CENSORED 2024.xls
Full Precision	OFF

From File: KPMON03 CENSORED 2024.xls

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Aluminium (filtered)	28	2	7	21	75.00%	0.05	0.5	0.193	0.286	0.534	2.762
Arsenic (filtered)	28	2	17	11	39.29%	0.01	0.1	0.0194	0.00111	0.0333	1.723
Barium (filtered)	29	1	6	23	79.31%	0.05	2	0.045	2.5000E-5	0.005	0.111
Beryllium (filtered)	29	1	0	29	100.00%	0.001	0.1	N/A	N/A	N/A	N/A
Boron (filtered)	26	4	21	5	19.23%	0.1	5	1.581	0.185	0.43	0.272
Cadmium (filtered)	29	1	12	17	58.62%	2.0000E-4	0.1	0.00833	0.00131	0.0362	4.352
Chromium (filtered)	29	1	2	27	93.10%	0.001	0.1	0.0148	0.0053	0.0728	4.933
Cobalt (filtered)	27	3	27	0	0.00%	N/A	N/A	1.73	0.142	0.377	0.218
Copper (filtered)	29	1	28	1	3.45%	0.1	0.1	2.817	5.902	2.429	0.862
Iron (filtered)	27	3	27	0	0.00%	N/A	N/A	514.4	22156	148.9	0.289
Lead (filtered)	28	2	3	25	89.29%	0.001	0.1	0.197	0.434	0.659	3.34
Lithium (filtered)	29	1	6	23	79.31%	0.05	0.1	0.00883	8.0556E-7	8.9753E-4	0.102
Manganese (filtered)	28	2	27	1	3.57%	0.1	0.1	1.27	0.146	0.382	0.301
Mercury (filtered)	29	1	0	29	100.00%	1.0000E-4	0.01	N/A	N/A	N/A	N/A
Molybdenum (filtered)	27	3	0	27	100.00%	0.005	0.1	N/A	N/A	N/A	N/A
Nickel (filtered)	27	3	27	0	0.00%	N/A	N/A	2.893	0.515	0.717	0.248
Selenium (filtered)	29	1	3	26	89.66%	0.001	0.1	0.00143	5.3061E-7	7.2843E-4	0.51
Silver (filtered)	29	1	0	29	100.00%	0.005	0.5	N/A	N/A	N/A	N/A
Strontium (filtered)	27	3	24	3	11.11%	3.4	3.6	3.611	0.436	0.66	0.183
Uranium (filtered)	29	1	1	28	96.55%	0.005	0.5	0.00886	8.9265E-5	0.00945	1.067
Vanadium (filtered)	29	1	0	29	100.00%	0.005	0.1	N/A	N/A	N/A	N/A
Zinc (filtered)	27	3	27	0	0.00%	N/A	N/A	33.22	74.79	8.648	0.26

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Aluminium (filtered)	7	2	0.11	2.9	0.609	0.13	1.063	1.031	0.0297	2.448	1.694
Arsenic (filtered)	17	2	0.004	0.18	0.0275	0.014	0.00174	0.0417	0.00593	3.439	1.518
Barium (filtered)	6	1	0.04	0.05	0.0483	0.05	1.6667E-5	0.00408	0	-2.449	0.0845
Beryllium (filtered)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boron (filtered)	21	4	1.2	2.3	1.657	1.6	0.0886	0.298	0.297	0.462	0.18
Cadmium (filtered)	12	1	4.0000E-4	0.2	0.0185	0.0022	0.00327	0.0572	3.7064E-4	3.463	3.091
Chromium (filtered)	2	1	0.001	0.4	0.201	0.201	0.0796	0.282	0.296	N/A	1.407
Cobalt (filtered)	27	3	1.1	2.4	1.73	1.9	0.142	0.377	0.297	-0.235	0.218
Copper (filtered)	28	1	0.011	10	2.918	2.3	6.038	2.457	1.26	1.562	0.842
Iron (filtered)	27	3	300	830	514.4	500	22156	148.9	177.9	0.358	0.289
Lead (filtered)	3	2	0.5	3	1.833	2	1.583	1.258	1.483	-0.586	0.686
Lithium (filtered)	6	1	0.007	0.01	0.00883	0.009	9.6667E-7	9.8319E-4	0	-1.438	0.111
Manganese (filtered)	27	2	0.78	2	1.314	1.4	0.102	0.32	0.297	0.699	0.244
Mercury (filtered)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (filtered)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel (filtered)	27	3	1.8	4	2.893	3.1	0.515	0.717	0.89	-0.136	0.248
Selenium (filtered)	3	1	0.001	0.003	0.002	0.002	1.0000E-6	0.001	0.00148	0	0.5
Silver (filtered)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Strontium (filtered)	24	3	2	5.3	3.683	3.55	0.437	0.661	0.667	-0.0757	0.179
Uranium (filtered)	1	1	0.032	0.032	0.032	0.032	N/A	N/A	0	N/A	N/A

58	Vanadium (filtered)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
59	Zinc (filtered)	27	3	20	48	33.22	36	74.79	8.648	8.895	-0.12	0.26
60												
61	Percentiles using all Detects (Ds) and Non-Detects (NDs)											
62												
63	Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
64	Aluminium (filtered)	28	2	0.05	0.05	0.05	0.1	0.275	0.5	0.5	0.617	2.301
65	Arsenic (filtered)	28	2	0.0091	0.01	0.01	0.011	0.0185	0.0284	0.072	0.1	0.158
66	Barium (filtered)	29	1	0.05	0.05	0.05	0.2	0.2	0.2	0.2	0.2	1.496
67	Beryllium (filtered)	29	1	0.001	0.001	0.01	0.01	0.01	0.01	0.028	0.1	0.1
68	Boron (filtered)	26	4	1.25	1.5	1.5	1.65	2	2	3.65	5	5
69	Cadmium (filtered)	29	1	0.0017	0.002	0.002	0.002	0.0024	0.00264	0.036	0.1	0.172
70	Chromium (filtered)	29	1	0.001	0.001	0.001	0.01	0.01	0.01	0.1	0.1	0.316
71	Cobalt (filtered)	27	3	1.2	1.32	1.4	1.9	2	2	2.08	2.27	2.374
72	Copper (filtered)	29	1	0.186	1.24	1.5	2.2	3.4	4.12	5.62	8.12	9.776
73	Iron (filtered)	27	3	326	372	380	500	615	630	688	781	819.6
74	Lead (filtered)	28	2	0.001	0.0046	0.01	0.01	0.01	0.01	0.22	1.475	2.73
75	Lithium (filtered)	29	1	0.009	0.034	0.05	0.05	0.05	0.05	0.1	0.1	0.1
76	Manganese (filtered)	28	2	0.93	1	1	1.35	1.4	1.4	1.65	2	2
77	Mercury (filtered)	29	1	1.0000E-4	1.0000E-4	0.001	0.001	0.001	0.001	0.0028	0.01	0.01
78	Molybdenum (filtered)	27	3	0.005	0.014	0.05	0.05	0.05	0.05	0.07	0.1	0.1
79	Nickel (filtered)	27	3	1.9	2.12	2.25	3.1	3.3	3.38	3.88	4	4
80	Selenium (filtered)	29	1	0.001	0.0026	0.01	0.01	0.01	0.01	0.028	0.1	0.1
81	Silver (filtered)	29	1	0.005	0.005	0.005	0.05	0.05	0.05	0.05	0.32	0.5
82	Strontium (filtered)	27	3	3.12	3.32	3.4	3.5	4.05	4.1	4.34	4.4	5.066
83	Uranium (filtered)	29	1	0.005	0.0212	0.05	0.05	0.05	0.05	0.05	0.32	0.5
84	Vanadium (filtered)	29	1	0.005	0.008	0.05	0.05	0.05	0.05	0.1	0.1	0.1
85	Zinc (filtered)	27	3	21.6	24	25	36	39	39	43.6	46.7	47.74

	General Statistics on Uncensored Data	
Date/Time of Computation	ProUCL 5.2 9/05/2024 3:24:00 PM	
User Selected Options		
From File	KPMON03 CENSORED 2024.xls	
Full Precision	OFF	

From File: KPMON03 CENSORED 2024.xls

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Ammonia (as N)	29	1	28	1	3.45%	0.01	0.01	0.731	0.0849	0.291	0.399
Bromide	26	3	19	7	26.92%	5.5	25	7.257	8.652	2.941	0.405
Chloride	29	1	13	16	55.17%	770	3200	2198	422754	650.2	0.296
Nitrate & Nitrite (as N)	25	4	13	12	48.00%	0.05	0.05	0.68	1.268	1.126	1.655
Nitrite (as N)	29	1	8	21	72.41%	0.02	0.1	0.0464	0.00323	0.0568	1.225
Phosphate total (as P)	27	3	18	9	33.33%	0.01	0.01	0.02	1.0370E-4	0.0102	0.509
ilterable reactive (as P)	28	2	13	15	53.57%	0.01	0.2	0.126	0.306	0.553	4.39
ty (expressed as TDS)*	28	2	27	1	3.57%	10	10	7865	6512396	2552	0.324
Silicon (filtered)	27	3	27	0	0.00%	N/A	N/A	29.56	16.18	4.022	0.136
Sulphate (as SO4)	29	1	29	0	0.00%	N/A	N/A	3623	610336	781.2	0.216
Kjeldahl Nitrogen (as N)	28	2	25	3	10.71%	0.2	0.2	1.309	0.381	0.617	0.471
Total Nitrogen (as N)	28	2	28	0	0.00%	N/A	N/A	1.87	1.066	1.032	0.552
lids Dried at 103-105°C	25	4	25	0	0.00%	N/A	N/A	58.06	2600	50.99	0.878
Calcium	29	1	29	0	0.00%	N/A	N/A	426.3	13938	118.1	0.277
Magnesium	29	1	29	0	0.00%	N/A	N/A	425.3	14421	120.1	0.282
Potassium	29	1	29	0	0.00%	N/A	N/A	44.48	90.26	9.5	0.214
Sodium	29	1	29	0	0.00%	N/A	N/A	1651	74728	273.4	0.166
e Alkalinity (as CaCO3)	29	1	2	27	93.10%	1	20	56.1	65819	256.6	4.573
e Alkalinity (as CaCO3)	29	1	0	29	100.00%	1	10	N/A	N/A	N/A	N/A
e Alkalinity (as CaCO3)	29	1	0	29	100.00%	1	20	N/A	N/A	N/A	N/A
l Alkalinity (as CaCO3)	29	1	2	27	93.10%	0	20	55.17	65922	256.8	4.654

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Ammonia (as N)	28	1	0.19	1.2	0.756	0.735	0.0713	0.267	0.133	-0.342	0.353
Bromide	19	3	1.2	14	7.758	7.2	8.068	2.84	2.076	0.249	0.366
Chloride	13	1	2100	3200	2638	2800	134231	366.4	148.3	-0.448	0.139
Nitrate & Nitrite (as N)	13	4	0.07	4.6	1.262	1	1.877	1.37	1.245	1.495	1.085
Nitrite (as N)	8	1	0.05	0.27	0.113	0.08	0.00628	0.0792	0.0297	1.522	0.704
Phosphate total (as P)	18	3	0.01	0.04	0.025	0.03	8.5294E-5	0.00924	0.0148	-0.252	0.369
ilterable reactive (as P)	13	2	0.01	3	0.258	0.03	0.679	0.824	0.0148	3.601	3.188
ty (expressed as TDS)*	27	2	1100	11000	8156	8400	4552564	2134	1631	-1.814	0.262
Silicon (filtered)	27	3	18	36	29.56	30	16.18	4.022	2.965	-0.667	0.136
Sulphate (as SO4)	29	1	670	4200	3623	3900	610336	781.2	148.3	-3.153	0.216
Kjeldahl Nitrogen (as N)	25	2	0.59	2.4	1.442	1.3	0.272	0.521	0.593	0.0619	0.361
Total Nitrogen (as N)	28	2	0.59	5.9	1.87	1.7	1.066	1.032	0.593	2.504	0.552
lids Dried at 103-105°C	25	4	7.4	190	58.06	40	2600	50.99	31.13	1.421	0.878
Calcium	29	1	72	790	426.3	400	13938	118.1	59.3	0.0526	0.277
Magnesium	29	1	84	780	425.3	410	14421	120.1	74.13	0.12	0.282
Potassium	29	1	23	74	44.48	44	90.26	9.5	8.895	0.726	0.214
Sodium	29	1	970	2600	1651	1600	74728	273.4	148.3	1.016	0.166
e Alkalinity (as CaCO3)	2	1	200	1400	800	800	720000	848.5	889.5	N/A	1.061
e Alkalinity (as CaCO3)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
e Alkalinity (as CaCO3)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
l Alkalinity (as CaCO3)	2	1	200	1400	800	800	720000	848.5	889.5	N/A	1.061

	A	B	C	D	E	F	G	H	I	J	K	L	M
58													
59	Percentiles using all Detects (Ds) and Non-Detects (NDs)												
60													
61	Variable		NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
62	Ammonia (as N)		29	1	0.216	0.632	0.67	0.73	0.85	0.912	1.12	1.2	1.2
63	Bromide		26	3	5.75	6	6.2	8.65	10	10	11.5	13.75	22.25
64	Chloride		29	1	2180	2460	2600	2600	2800	2840	2900	3080	3200
65	Nitrate & Nitrite (as N)		25	4	0.05	0.05	0.05	0.07	1	1.06	1.86	3.02	4.288
66	Nitrite (as N)		29	1	0.02	0.02	0.02	0.02	0.08	0.08	0.1	0.16	0.25
67	Phosphate total (as P)		27	3	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.037	0.04
68	ilterable reactive (as P)		28	2	0.01	0.01	0.01	0.01	0.0325	0.04	0.123	0.2	2.244
69	ty (expressed as TDS)*		28	2	4660	7240	7375	8400	9525	9780	10000	10000	10730
70	Silicon (filtered)		27	3	25.2	28	28	30	31	32.6	34.8	36	36
71	Sulphate (as SO4)		29	1	3300	3500	3600	3900	4000	4000	4000	4060	4172
72	Kjeldahl Nitrogen (as N)		28	2	0.473	0.74	0.875	1.3	1.825	1.9	2.1	2.1	2.319
73	Total Nitrogen (as N)		28	2	1.07	1.14	1.275	1.7	2.1	2.16	2.472	3.505	5.379
74	lids Dried at 103-105°C		25	4	13	18.6	21	40	74	98.4	126	170	187.6
75	Calcium		29	1	348	380	390	400	490	500	522	554	728.4
76	Magnesium		29	1	352	366	380	410	480	488	562	570	721.2
77	Potassium		29	1	35.8	38	38	44	49	52.4	54	54.6	68.68
78	Sodium		29	1	1400	1500	1500	1600	1800	1800	1900	1960	2432
79	e Alkalinity (as CaCO3)		29	1	16.2	20	20	20	20	20	20	128	1064
80	e Alkalinity (as CaCO3)		29	1	1	10	10	10	10	10	10	10	10
81	e Alkalinity (as CaCO3)		29	1	1	20	20	20	20	20	20	20	20
82	l Alkalinity (as CaCO3)		29	1	16	20	20	20	20	20	20	128	1064

APPENDIX B FIELD SHEETS

Groundwater Sampling Record (Purge Sheet)

No.
00005

Site Details

Project
Kapunda

Task
Push Pull Test

Date
24/11/2023

ENVIRO COPPER
THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No.
00005

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
10:16 AM	KPFRT02		2.20	14.48	20.40	347.00	85.80	Rnd3 sampling. Sample taken No purge
10:17 AM	KPFRT06		3.79	11.48	21.90	160.00	153.10	3rd Rnd. Sample taken. 40l purged
12:06 PM	KPFRT03		3.49	9.80	20.20	229.00	29.90	3rf rnd. 40l purged. Sample taken
12:23 PM	KPFRT04		6.48	8.39	19.90	131.00	23.50	3rd rnd. 40l purged. Sample.ple taken
12:31 PM	KPMON03		3.90	10.99	20.30	257.00	29.00	Sampled by bailer. No purge. Sample taken
12:34 PM	KPMON01		7.24	7.06	20.10	141.00	21.50	3rd rnd. 40l purged. Sample taken
12:47 PM	KPMON02		7.51	6.83	20.10	143.00	27.00	3rd rnd. 40l purged. Sample taken

Groundwater Sampling Record (Purge Sheet)

No.
00005

Sign Off

Company Representative undertaking Sampling
Brett

Date
24/11/2023

Time
12:53 PM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00007

Site Details

Project
Kapunda

Task
Push Pull Test

Date
26/11/2023

Groundwater Sampling Record (Purge Sheet)

No. 00007

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
08:43 AM	KPFRT02		1.78	17.41	19.40	296.00	73.50	XRF#50
08:49 AM	KPFRT06		3.59	12.38	19.00	191.00	249.10	40l purged
09:00 AM	KPFRT03		3.94	11.06	18.50	164.00	41.80	40l purged
09:05 AM	KPMON03		3.93	11.54	18.60	163.00	32.10	Not purged
09:11 AM	KPFRT04		6.54	8.82	18.50	109.00	30.70	40l purged
09:20 AM	KPMON01		7.41	7.30	18.60	66.00	29.20	40l purged
09:30 AM	KPMON02		6.78	7.55	19.00	-56.00	31.20	40l purged

Groundwater Sampling Record (Purge Sheet)

No.
00007

Sign Off

Company Representative undertaking Sampling
Matt

Date
26/11/2023

Time
09:33 AM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00008

Site Details

Project
Kapunda

Task
Push Pull Test

Date
27/11/2023

ENVIRO COPPER
THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No.
00008

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
09:27 AM	KPFRT02	11.72	1.80	17.44	18.50	320.00	62.60	Rnd7 sampling. No purge. XRF #59
09:34 AM	KPFRT06		3.49	12.45	18.80	174.00	291.60	Rnd7. 40l purged. Sample taken
09:36 AM	KPFRT03		4.21	11.29	18.70	169.00	45.00	Rnd7. 40l purged. Sample taken
09:51 AM	KPFRT04		6.55	8.64	18.80	108.00	29.50	Rnd7. 40l purged. Sample l e taken
10:05 AM	KPMON03		6.78	11.59	18.80	130.00	38.90	Rnd7. Bailer sampled. No purge
10:07 AM	KPMON01		6.09	7.03	18.80	16.00	36.30	Rnd7. 40l purged. Sample taken
10:19 AM	KPMON02		5.95	7.12	18.70	-74.00	27.70	Rnd7. 40l purged. Sample taken. Groundwater still clear.

Groundwater Sampling Record (Purge Sheet)

No.
00008

Sign Off

Company Representative undertaking Sampling
Brett

Date
27/11/2023

Time
10:26 AM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00010

Site Details

Project
Kapunda

Task
Push Pull Test

Date
02/12/2023

ENVIRO COPPER THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No. 00010

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
11:32 AM	KPFRT02		1.37		20.90	404.00	86.60	
11:38 AM	KPFRT06		3.92	13.52	19.50	163.00	258.10	
11:43 AM	KPFRT03		4.68	12.15	20.10	151.00	46.50	
11:49 AM	KPFRT04		6.83	9.40	20.20	102.00	78.80	
11:54 AM	KPMON01		7.78	6.90	19.70	60.00	35.30	
11:59 AM	KPMON02		7.16	8.02	19.40	-24.00	29.70	
12:03 AM	KPMON03		4.67	11.10	19.30	149.00	32.60	Not purged

Groundwater Sampling Record (Purge Sheet)

No.
00010

Sign Off

Company Representative undertaking Sampling
Matt

Date
02/12/2023

Time
12:05 PM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00011

Site Details

Project
Kapunda

Task
Push Pull Test

Date
03/12/2023

ENVIRO COPPER THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No. 00011

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
01:51 PM	KPFRT02		1.28		27.20	355.00	110.40	Xrf 105
02:02 PM	KPFRT06		3.57	13.32	27.50	158.00	269.30	20l purged
02:08 PM	KPFRT03		4.69	11.34	23.10	125.00	47.60	40l purged
02:17 PM	KPFRT04		6.72	9.63	25.30	101.00	28.10	Double check cu
02:20 PM	KPMON03		5.47	11.48	22.90	119.00	29.80	
02:24 PM	KPMON01		7.66	7.35	25.40	39.00	27.70	
02:28 PM	KPMON02		7.16	6.34	22.10	-121.00	28.90	

Groundwater Sampling Record (Purge Sheet)

No.
00011

Sign Off

Company Representative undertaking Sampling
Matt

Date
03/12/2023

Time
02:30 PM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00012

Site Details

Project
Kapunda

Task
Push Pull Test

Date
04/12/2023

ENVIRO COPPER THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No. 00012

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
09:58 AM	KPFRT02		1.21		21.60	264.00	88.70	No purge. Sample taken
10:00 AM	KPFRT03		4.21	12.15	21.10	172.00	33.00	40l purged. Sample taken
10:13 AM	KPFRT04		6.98	7.31	21.20	104.00	25.00	40l purged. Sample taken
10:22 AM	KPMON01		7.90	7.39	21.40	-9.00	22.50	40l purged. Sample taken
10:23 AM	KPMON02		7.21	7.32	21.70	-106.00	26.00	40l purged. Sample taken
10:30 AM	KPMON03		5.48	9.47	22.10	146.00	24.00	Bailer sampled. No purge. Sample taken
10:32 AM	KPFRT06		4.32	11.03	22.30	172.00	163.90	40l purged. Sample taken

Groundwater Sampling Record (Purge Sheet)

No.
00012

Sign Off

Company Representative undertaking Sampling
Brett

Date
04/12/2023

Time
10:53 AM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00013

Site Details

Project
Kapunda

Task
Push Pull Test

Date
05/12/2023

ENVIRO COPPER THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No. 00013

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
09:27 AM	KPFRT02		1.26		23.60	308.00	123.90	
09:30 AM	KPFRT06		3.28	14.15	21.50	174.00	270.50	Purged 40L
09:38 AM	KPFRT03		4.78	8.72	21.20	135.00	44.10	40l purged
09:47 AM	KPFRT04		6.97	9.23	21.30	94.00	33.10	40l purged

Groundwater Sampling Record (Purge Sheet)

No.
00013

Sign Off

Company Representative undertaking Sampling
Matt

Date
05/12/2023

Time
09:48 AM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00014

Site Details

Project
Kapunda

Task
Push Pull Test

Date
06/12/2023

Groundwater Sampling Record (Purge Sheet)

No. 00014

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
01:42 PM	KPFRT02	15.83	1.77		27.20	289.00	180.00	Purged 450L
02:05 PM	KPFRT06	11.91	3.82	12.19	26.90	165.00	308.80	40L purged. KPFRT02 purged 450L
02:17 PM	KPFRT03	11.74	4.29	10.58	24.40	161.00	54.50	40L purged. KPFRT02 purged 450L
02:23 PM	KPFRT04	12.12	6.61	9.12	23.10	126.00	40.60	40L purged. KPFRT02 purged 450L

Groundwater Sampling Record (Purge Sheet)

No.
00014

Sign Off

Company Representative undertaking Sampling
Matt

Date
06/12/2023

Time
02:24 PM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00015

Site Details

Project
Kapunda

Task
Push Pull Test

Date
11/12/2023

ENVIRO COPPER THE INVISIBLE MINE

Groundwater Sampling Record (Purge Sheet)

No. 00015

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
02:18 PM	KPFRT02	12.02	1.34	0.00	20.80	299.00	137.00	Conductivity below detection. No purge. XRF 160
02:40 PM	KPFRT06	11.69	3.86	12.82	19.80	195.00	315.40	40l purged. Sample taken. Recheck Cond
02:47 PM	KPFRT03	11.79	4.74	11.36	20.30	119.00	37.60	40l purged. Sample taken
02:56 PM	KPFRT04	11.43	6.81	9.15	19.80	90.00	39.50	40l purged. Sample taken
03:10 PM	KPMON01	12.22	7.79	6.82	19.40	43.00		20l purged. No sample taken
03:11 PM	KPMON02	12.22	7.27	7.34	19.30	-24.00		20l purged. No sample taken
03:17 PM	KPMON03	11.61	5.85	8.95	19.60	81.00		Bailer used. No purge. No sample taken

Groundwater Sampling Record (Purge Sheet)

No.
00015

Sign Off

Company Representative undertaking Sampling
Brett

Date
11/12/2023

Time
03:24 PM

Signature

Groundwater Sampling Record (Purge Sheet)

No.
00016

Site Details

Project
Kapunda

Task
Push Pull Test

Date
15/12/2023

Groundwater Sampling Record (Purge Sheet)

No. 00016

Data Entry

New Time	Well ID	SWL (m)	pH	Cond (ms)	Temp (C)	ORP (mV)	Cu (ppm)	Comments Observatic
10:20 AM	KPFRT06		3.55	12.42	19.20	154.00	269.00	40l purged. Samples taken Eurofins & BV
10:21 AM	KPFRT03		2.67	10.22	18.70	239.00	32.70	40l purged. Samples taken Eurofins & BV
10:31 AM	KPFRT04		6.25	8.84	18.50	168.00	25.10	40l purged. Samples taken Eurofins & BV
10:37 AM	KPMON01		5.72	7.83	18.30	176.00	25.60	40l purged. Samples taken Eurofins & BV
10:50 AM	KPMON02		6.67	6.94	18.80	-10.00	29.30	40l purged. Samples taken Eurofins & BV
11:01 AM	KPMON03		3.52	9.45	18.60	280.00	31.00	No purge. Sampled by bailer. Samples taken Eurofins & BV

Groundwater Sampling Record (Purge Sheet)

No.
00016

Sign Off

Company Representative undertaking Sampling

Brett

Date

15/12/2023

Time

11:50 AM

Signature

APPENDIX C LABORATORY REPORTS

Envirocopper Ltd
Suite 4, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1051308-W**
Project name KAPUNDA
Project ID 2
Received Date Dec 05, 2023

Client Sample ID			PP_021223_KPFRT02#1	PP_021223_KPFRT03#1	PP_021223_KPFRT04#1	PP_021223_KPFRT06#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0013036	M23-De0013037	M23-De0013038	M23-De0013039
Date Sampled			Dec 02, 2023	Dec 02, 2023	Dec 02, 2023	Dec 02, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.19	1.2	0.05	0.16
Bromide	1	mg/L	1700	170	13	9.7
Chloride	1	mg/L	4100	2800	2500	2900
Conductivity (at 25 °C)	10	uS/cm	98000	12000	9500	14000
Fluoride	0.5	mg/L	< 0.5	< 0.5	1.4	0.6
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	11	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.02	11	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	2.81	0.7	1.05	4.34
pH (at 25 °C)	0.1	pH Units	0.7	3.3	6.8	3.3
Phosphorus reactive (as P)	0.01	mg/L	0.08	0.02	< 0.01	0.02
Salinity (expressed as TDS)*	10	mg/L	58000	7200	5100	5700
Sulphate (as SO4)	5	mg/L	4700	3000	790	4700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.0	1.9	1.1	4.5
Total Nitrogen (as N)*	0.2	mg/L	3.0	1.9	12	4.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	1100	170	110	270
Phosphate total (as P)	0.01	mg/L	0.60	0.02	< 0.01	0.22
Silicon (filtered)	0.5	mg/L	58	39	18	61
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	2300	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	2300	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	26	5.3	< 0.5	69
Arsenic (filtered)	0.001	mg/L	0.16	0.011	< 0.01	0.024
Barium (filtered)	0.02	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	2.0	1.5	0.96	1.8
Cadmium (filtered)	0.0002	mg/L	0.039	0.018	< 0.002	0.037
Chromium (filtered)	0.001	mg/L	0.46	< 0.01	< 0.01	0.054
Cobalt (filtered)	0.001	mg/L	4.4	2.4	0.11	4.5
Copper (filtered)	0.001	mg/L	68	7.2	0.12	240
Iron (filtered)	0.05	mg/L	890	550	< 0.5	610

Client Sample ID			PP_021223_KPFRT02#1	PP_021223_KPFRT03#1	PP_021223_KPFRT04#1	PP_021223_KPFRT06#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0013036	M23-De0013037	M23-De0013038	M23-De0013039
Date Sampled			Dec 02, 2023	Dec 02, 2023	Dec 02, 2023	Dec 02, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	0.066	< 0.01	< 0.01	0.020
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	2.1	1.1	0.13	1.9
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	7.2	3.8	0.19	7.4
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	0.018	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	4.3	3.5	1.9	4.4
Uranium (filtered)	0.005	mg/L	0.14	< 0.05	< 0.05	0.20
Vanadium (filtered)	0.005	mg/L	0.051	< 0.01	< 0.01	< 0.01
Zinc (filtered)	0.005	mg/L	69	35	0.39	45
Alkali Metals						
Calcium	0.5	mg/L	430	290	160	510
Magnesium	0.5	mg/L	390	270	180	380
Potassium	0.5	mg/L	25	38	29	36
Sodium	0.5	mg/L	2200	1600	1400	1700

Client Sample ID			PP_021223_KPMON01#1	PP_021223_KPMON02#1	PP_021223_KPMON03#1	PP_031223_KPFRT02#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0013040	M23-De0013041	M23-De0013042	M23-De0013043
Date Sampled			Dec 02, 2023	Dec 02, 2023	Dec 02, 2023	Dec 03, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.30	0.18	1.1	0.18
Bromide	1	mg/L	8.0	8.8	5.7	1700
Chloride	1	mg/L	1900	2100	2600	4100
Conductivity (at 25 °C)	10	uS/cm	7400	7800	12000	97000
Fluoride	0.5	mg/L	0.5	4.3	1.4	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	0.07	2.0
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	0.07	2.0
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.9	< 0.2	0.2	3.02
pH (at 25 °C)	0.1	pH Units	6.7	8.0	3.4	1.1
Phosphorus reactive (as P)	0.01	mg/L	0.02	< 0.01	0.03	0.12
Salinity (expressed as TDS)*	10	mg/L	5500	2900	8400	63000
Sulphate (as SO4)	5	mg/L	570	660	3900	4600
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.2	< 0.2	1.3	3.2
Total Nitrogen (as N)*	0.2	mg/L	1.2	< 0.2	1.4	5.2
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	88	120	120	540
Phosphate total (as P)	0.01	mg/L	0.04	0.01	0.03	0.68
Silicon (filtered)	0.5	mg/L	20	8.3	30	59
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	2100	310	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	2100	310	< 20	< 20

Client Sample ID			PP_021223_KP MON01#1	PP_021223_KP MON02#1	PP_021223_KP MON03#1	PP_031223_KP FRT02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0013040**	**M23-De0013041**	**M23-De0013042**	**M23-De0013043**
Date Sampled			**Dec 02, 2023**	**Dec 02, 2023**	**Dec 02, 2023**	**Dec 03, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.5	< 0.5	< 0.5	31
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	0.20
Barium (filtered)	0.02	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	0.84	0.96	1.2	1.9
Cadmium (filtered)	0.0002	mg/L	< 0.002	< 0.002	< 0.002	0.040
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	0.28
Cobalt (filtered)	0.001	mg/L	< 0.01	0.15	1.9	4.6
Copper (filtered)	0.001	mg/L	0.068	< 0.01	1.4	79
Iron (filtered)	0.05	mg/L	< 0.5	< 0.5	570	950
Lead (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	0.078
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	< 0.05	0.51	1.3	2.1
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	< 0.01	0.17	3.1	7.4
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	1.8	1.5	3.3	4.5
Uranium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	0.18
Vanadium (filtered)	0.005	mg/L	< 0.01	< 0.01	< 0.01	0.075
Zinc (filtered)	0.005	mg/L	< 0.05	< 0.01	38	72
Alkali Metals						
Calcium	0.5	mg/L	130	110	390	420
Magnesium	0.5	mg/L	120	120	400	380
Potassium	0.5	mg/L	30	36	38	25
Sodium	0.5	mg/L	1100	1300	1600	2100

Client Sample ID			PP_031223_KP FRT03#1	PP_031223_KP FRT04#1	PP_031223_KP FRT06#1	PP_031223_KP MON01#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0013044**	**M23-De0013045**	**M23-De0013046**	**M23-De0013047**
Date Sampled			**Dec 03, 2023**	**Dec 03, 2023**	**Dec 03, 2023**	**Dec 03, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.2	0.03	0.40	0.25
Bromide	1	mg/L	160	13	16	10
Chloride	1	mg/L	720	2900	2900	1900
Conductivity (at 25 °C)	10	uS/cm	12000	9400	15000	7300
Fluoride	0.5	mg/L	< 0.5	2.0	1.4	1.4
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	7.6	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	0.02	7.6	< 0.02	0.04
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	1.37	4.2	1.05
pH (at 25 °C)	0.1	pH Units	3.7	6.9	3.7	7.4
Phosphorus reactive (as P)	0.01	mg/L	0.02	< 0.01	< 0.01	0.04
Salinity (expressed as TDS)*	10	mg/L	12000	7100	11000	4900

Client Sample ID			PP_031223_KPFRT03#1	PP_031223_KPFRT04#1	PP_031223_KPFRT06#1	PP_031223_KPMON01#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0013044**	**M23-De0013045**	**M23-De0013046**	**M23-De0013047**
Date Sampled			**Dec 03, 2023**	**Dec 03, 2023**	**Dec 03, 2023**	**Dec 03, 2023**
Test/Reference	LOR	Unit				
Sulphate (as SO4)	5	mg/L	49	3100	5000	560
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.4	1.4	4.6	1.3
Total Nitrogen (as N)*	0.2	mg/L	1.4	9.0	4.6	1.3
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	130	120	230	78
Phosphate total (as P)	0.01	mg/L	0.03	< 0.01	0.19	0.04
Silicon (filtered)	0.5	mg/L	39	20	62	19
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	330	< 20	280
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	330	< 20	280
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	5.6	< 0.5	77	< 0.5
Arsenic (filtered)	0.001	mg/L	0.011	< 0.01	0.041	< 0.01
Barium (filtered)	0.02	mg/L	< 0.05	< 0.05	< 0.05	0.05
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	1.4	0.91	1.9	0.82
Cadmium (filtered)	0.0002	mg/L	0.019	< 0.002	0.054	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	0.43	< 0.01
Cobalt (filtered)	0.001	mg/L	2.5	0.17	4.8	< 0.01
Copper (filtered)	0.001	mg/L	7.6	0.75	250	< 0.01
Iron (filtered)	0.05	mg/L	560	< 0.5	710	0.24
Lead (filtered)	0.001	mg/L	< 0.01	< 0.01	0.026	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	1.1	0.17	2.0	0.069
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	4.0	0.27	8.0	< 0.01
Selenium (filtered)	0.001	mg/L	< 0.01	0.014	0.011	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	3.6	2.0	4.3	1.8
Uranium (filtered)	0.005	mg/L	< 0.05	< 0.05	0.23	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.01	< 0.05	< 0.01	< 0.01
Zinc (filtered)	0.005	mg/L	37	0.73	54	< 0.05
Alkali Metals						
Calcium	0.5	mg/L	300	160	510	120
Magnesium	0.5	mg/L	270	180	400	110
Potassium	0.5	mg/L	38	29	38	30
Sodium	0.5	mg/L	1600	1400	1800	1100

Client Sample ID			PP_031223_KP MON02#1	PP_031223_KP MON03#1	PP_041223_KP FRT02#1	PP_041223_KP FRT03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0013048**	**M23-De0013049**	**M23-De0013050**	**M23-De0013051**
Date Sampled			**Dec 03, 2023**	**Dec 03, 2023**	**Dec 04, 2023**	**Dec 04, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.16	1.2	0.23	1.1
Bromide	1	mg/L	2.8	9.4	1600	180
Chloride	1	mg/L	2100	2600	3900	2800
Conductivity (at 25 °C)	10	uS/cm	7900	13000	100000	12000
Fluoride	0.5	mg/L	< 0.5	3.9	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.94	< 0.2	3.37	0.3
pH (at 25 °C)	0.1	pH Units	7.2	3.7	0.7	3.3
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	0.11	0.01
Salinity (expressed as TDS)*	10	mg/L	5900	8400	75000	2100
Sulphate (as SO4)	5	mg/L	660	4000	4600	2800
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.1	1.2	3.6	1.4
Total Nitrogen (as N)*	0.2	mg/L	1.1	1.2	3.6	1.4
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	110	190	580	110
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	0.76	0.02
Silicon (filtered)	0.5	mg/L	7.4	31	63	37
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	340	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	340	< 20	< 20	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.5	< 0.5	37	4.5
Arsenic (filtered)	0.001	mg/L	< 0.01	0.014	0.23	< 0.01
Barium (filtered)	0.02	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	0.91	1.3	1.9	1.4
Cadmium (filtered)	0.0002	mg/L	< 0.002	< 0.002	0.038	0.015
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	0.20	< 0.01
Cobalt (filtered)	0.001	mg/L	0.11	2.0	4.4	2.1
Copper (filtered)	0.001	mg/L	< 0.01	1.5	77	6.6
Iron (filtered)	0.05	mg/L	< 0.5	630	910	450
Lead (filtered)	0.001	mg/L	< 0.01	< 0.01	0.090	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.54	1.4	2.1	0.95
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	0.12	3.3	7.2	3.4
Selenium (filtered)	0.001	mg/L	0.010	< 0.01	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	1.4	3.4	4.3	3.3
Uranium (filtered)	0.005	mg/L	< 0.05	< 0.05	0.22	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc (filtered)	0.005	mg/L	< 0.01	40	69	31

Client Sample ID			PP_031223_KP MON02#1	PP_031223_KP MON03#1	PP_041223_KP FRT02#1	PP_041223_KP FRT03#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0013048	M23-De0013049	M23-De0013050	M23-De0013051
Date Sampled			Dec 03, 2023	Dec 03, 2023	Dec 04, 2023	Dec 04, 2023
Test/Reference	LOR	Unit				
Alkali Metals						
Calcium	0.5	mg/L	110	400	440	280
Magnesium	0.5	mg/L	110	380	380	260
Potassium	0.5	mg/L	37	38	27	38
Sodium	0.5	mg/L	1300	1500	2200	1600

Client Sample ID			PP_041223_KP FRT04#1	PP_041223_KP FRT06#1	PP_041223_KP MON01#1	PP_041223_KP MON02#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0013052	M23-De0013053	M23-De0013054	M23-De0013055
Date Sampled			Dec 04, 2023	Dec 04, 2023	Dec 04, 2023	Dec 04, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.02	0.29	0.23	0.15
Bromide	1	mg/L	16	9.5	10	9.3
Chloride	1	mg/L	2500	2900	1900	2100
Conductivity (at 25 °C)	10	uS/cm	9300	14000	7200	7800
Fluoride	0.5	mg/L	2.0	5.5	1.7	1.6
Nitrate & Nitrite (as N)	0.05	mg/L	12	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	12	< 0.02	< 0.02	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.78	4.31	0.87	0.35
pH (at 25 °C)	0.1	pH Units	6.0	3.3	7.8	6.9
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	0.02	0.03	< 0.01
Salinity (expressed as TDS)*	10	mg/L	5200	3900	5500	6200
Sulphate (as SO4)	5	mg/L	800	4800	570	670
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.8	4.6	1.1	0.5
Total Nitrogen (as N)*	0.2	mg/L	13	4.6	1.1	0.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	180	170	95	110
Phosphate total (as P)	0.01	mg/L	< 0.01	0.20	0.06	0.01
Silicon (filtered)	0.5	mg/L	19	57	21	8.9
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	170	< 20	320	290
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	170	< 20	320	290
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.5	75	< 0.5	< 0.5
Arsenic (filtered)	0.001	mg/L	< 0.01	0.028	< 0.01	< 0.01
Barium (filtered)	0.02	mg/L	< 0.05	< 0.05	0.05	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	0.97	1.9	0.76	0.95
Cadmium (filtered)	0.0002	mg/L	< 0.002	0.040	< 0.002	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01	0.035	< 0.01	< 0.01
Cobalt (filtered)	0.001	mg/L	0.14	4.8	< 0.01	0.17
Copper (filtered)	0.001	mg/L	0.51	240	< 0.01	< 0.01
Iron (filtered)	0.05	mg/L	< 0.5	640	< 0.5	< 0.5
Lead (filtered)	0.001	mg/L	< 0.01	0.025	< 0.01	< 0.01

Client Sample ID			PP_041223_KP FRT04#1	PP_041223_KP FRT06#1	PP_041223_KP MON01#1	PP_041223_KP MON02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0013052**	**M23-De0013053**	**M23-De0013054**	**M23-De0013055**
Date Sampled			**Dec 04, 2023**	**Dec 04, 2023**	**Dec 04, 2023**	**Dec 04, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.15	1.9	< 0.05	0.45
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	0.23	8.0	< 0.01	0.19
Selenium (filtered)	0.001	mg/L	0.015	< 0.01	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	2.0	4.4	1.8	1.6
Uranium (filtered)	0.005	mg/L	< 0.05	0.23	< 0.05	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.01	< 0.05	< 0.01
Zinc (filtered)	0.005	mg/L	0.66	49	< 0.05	< 0.01
Alkali Metals						
Calcium	0.5	mg/L	160	480	130	120
Magnesium	0.5	mg/L	180	370	130	130
Potassium	0.5	mg/L	29	35	31	35
Sodium	0.5	mg/L	1400	1700	1200	1300

Client Sample ID			PP_041223_KP MON03#1
Sample Matrix			**Water**
Eurofins Sample No.			**M23-De0013056**
Date Sampled			**Dec 04, 2023**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	1.2
Bromide	1	mg/L	6.2
Chloride	1	mg/L	2600
Conductivity (at 25 °C)	10	uS/cm	13000
Fluoride	0.5	mg/L	0.9
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.3
pH (at 25 °C)	0.1	pH Units	3.5
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	7400
Sulphate (as SO4)	5	mg/L	4000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.5
Total Nitrogen (as N)*	0.2	mg/L	1.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	130
Phosphate total (as P)	0.01	mg/L	< 0.01
Silicon (filtered)	0.5	mg/L	31
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20

Client Sample ID			PP_041223_KPMON03#1
Sample Matrix			Water
Eurofins Sample No.			M23-De0013056
Date Sampled			Dec 04, 2023
Test/Reference	LOR	Unit	
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.5
Arsenic (filtered)	0.001	mg/L	0.014
Barium (filtered)	0.02	mg/L	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.01
Boron (filtered)	0.05	mg/L	1.2
Cadmium (filtered)	0.0002	mg/L	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01
Cobalt (filtered)	0.001	mg/L	2.0
Copper (filtered)	0.001	mg/L	1.5
Iron (filtered)	0.05	mg/L	640
Lead (filtered)	0.001	mg/L	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05
Manganese (filtered)	0.005	mg/L	1.4
Mercury (filtered)	0.0001	mg/L	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05
Nickel (filtered)	0.001	mg/L	3.4
Selenium (filtered)	0.001	mg/L	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	3.5
Uranium (filtered)	0.005	mg/L	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05
Zinc (filtered)	0.005	mg/L	42
Alkali Metals			
Calcium	0.5	mg/L	400
Magnesium	0.5	mg/L	390
Potassium	0.5	mg/L	38
Sodium	0.5	mg/L	1600

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 07, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Dec 07, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Dec 06, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Dec 07, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Dec 07, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Dec 07, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Dec 07, 2023	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Dec 07, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Dec 12, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Dec 07, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Dec 07, 2023	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Dec 07, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Dec 07, 2023	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Envirocopper Ltd
Address: Suite 4, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1051308
Phone: 08 7127 1110
Fax:

Received: Dec 5, 2023 3:33 PM
Due: Dec 12, 2023
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_021223_KPFRT02#1	Dec 02, 2023		Water	M23-De0013036	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
2	PP_021223_KPFRT03#1	Dec 02, 2023		Water	M23-De0013037	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
3	PP_021223_KPFRT04#1	Dec 02, 2023		Water	M23-De0013038	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
4	PP_021223_KPFRT06#1	Dec 02, 2023		Water	M23-De0013039	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
5	PP_021223_KPMON01#1	Dec 02, 2023		Water	M23-De0013040	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
6	PP_021223_KPMON02#1	Dec 02, 2023		Water	M23-De0013041	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
7	PP_021223_KPMON03#1	Dec 02, 2023		Water	M23-De0013042	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
8	PP_031223_KPFRT02#1	Dec 03, 2023		Water	M23-De0013043	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

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
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Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X	X	X	X
9	PP_031223_KPFRT03#1	Dec 03, 2023		Water	M23-De0013044	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
10	PP_031223_KPFRT04#1	Dec 03, 2023		Water	M23-De0013045	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
11	PP_031223_KPFRT06#1	Dec 03, 2023		Water	M23-De0013046	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
12	PP_031223_KPMON01#1	Dec 03, 2023		Water	M23-De0013047	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
13	PP_031223_KPMON02#1	Dec 03, 2023		Water	M23-De0013048	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
14	PP_031223_KPMON03#1	Dec 03, 2023		Water	M23-De0013049	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
15	PP_041223_KPFRT02#1	Dec 04, 2023		Water	M23-De0013050	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
16	PP_041223_KPFRT03#1	Dec 04, 2023		Water	M23-De0013051	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
17	PP_041223_KPFRT04#1	Dec 04, 2023		Water	M23-De0013052	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
18	PP_041223_K	Dec 04, 2023		Water	M23-De0013053	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

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X	X	X	X
18	PP_041223_KPFRT06#1	Dec 04, 2023		Water	M23-De0013053																																	
19	PP_041223_KPMON01#1	Dec 04, 2023		Water	M23-De0013054	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
20	PP_041223_KPMON02#1	Dec 04, 2023		Water	M23-De0013055	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
21	PP_041223_KPMON03#1	Dec 04, 2023		Water	M23-De0013056	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
Test Counts						21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21

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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ammonia (as N)	%	102			70-130	Pass	
Bromide	%	100			70-130	Pass	
Chloride	%	103			70-130	Pass	
Conductivity (at 25 °C)	%	100			70-130	Pass	
Fluoride	%	89			70-130	Pass	
Nitrate & Nitrite (as N)	%	106			70-130	Pass	
Nitrite (as N)	%	101			70-130	Pass	
Phosphorus reactive (as P)	%	89			70-130	Pass	
Sulphate (as SO4)	%	104			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	85			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
Phosphate total (as P)	%	97			70-130	Pass	
Silicon (filtered)	%	99			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	71			70-130	Pass	
Total Alkalinity (as CaCO3)	%	75			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	104			80-120	Pass	
Arsenic (filtered)	%	95			80-120	Pass	
Boron (filtered)	%	113			80-120	Pass	
Cadmium (filtered)	%	106			80-120	Pass	
Chromium (filtered)	%	97			80-120	Pass	
Cobalt (filtered)	%	94			80-120	Pass	
Copper (filtered)	%	96			80-120	Pass	
Iron (filtered)	%	98			80-120	Pass	
Lead (filtered)	%	107			80-120	Pass	
Lithium (filtered)	%	115			80-120	Pass	
Manganese (filtered)	%	93			80-120	Pass	
Mercury (filtered)	%	94			80-120	Pass	
Molybdenum (filtered)	%	98			80-120	Pass	
Nickel (filtered)	%	95			80-120	Pass	
Selenium (filtered)	%	98			80-120	Pass	
Silver (filtered)	%	105			80-120	Pass	
Strontium (filtered)	%	97			80-120	Pass	
Uranium (filtered)	%	114			80-120	Pass	
Zinc (filtered)	%	96			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	93			80-120	Pass	
Magnesium	%	96			80-120	Pass	
Potassium	%	94			80-120	Pass	
Sodium	%	94			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	B23-De0008042	NCP	%	101			70-130	Pass	
Silicon (filtered)	M23-De0013036	CP	%	89			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-De0013036	CP	%	97			75-125	Pass	
Magnesium	M23-De0013036	CP	%	94			75-125	Pass	
Potassium	M23-De0013036	CP	%	90			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sodium	M23-De0013036	CP	%	102			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-De0013037	CP	%	96			75-125	Pass	
Arsenic (filtered)	M23-De0013037	CP	%	96			75-125	Pass	
Barium (filtered)	M23-De0013037	CP	%	103			75-125	Pass	
Beryllium (filtered)	M23-De0013037	CP	%	92			75-125	Pass	
Boron (filtered)	M23-De0013037	CP	%	81			75-125	Pass	
Cadmium (filtered)	M23-De0013037	CP	%	92			75-125	Pass	
Chromium (filtered)	M23-De0013037	CP	%	106			75-125	Pass	
Cobalt (filtered)	M23-De0013037	CP	%	104			75-125	Pass	
Copper (filtered)	M23-De0013037	CP	%	97			75-125	Pass	
Lead (filtered)	M23-De0013037	CP	%	86			75-125	Pass	
Lithium (filtered)	M23-De0013037	CP	%	89			75-125	Pass	
Manganese (filtered)	M23-De0013037	CP	%	96			75-125	Pass	
Mercury (filtered)	M23-De0013037	CP	%	89			75-125	Pass	
Molybdenum (filtered)	M23-De0013037	CP	%	94			75-125	Pass	
Nickel (filtered)	M23-De0013037	CP	%	102			75-125	Pass	
Selenium (filtered)	M23-De0013037	CP	%	97			75-125	Pass	
Silver (filtered)	M23-De0013037	CP	%	89			75-125	Pass	
Strontium (filtered)	M23-De0013037	CP	%	105			75-125	Pass	
Uranium (filtered)	M23-De0013037	CP	%	93			75-125	Pass	
Vanadium (filtered)	M23-De0013037	CP	%	90			75-125	Pass	
Spike - % Recovery									
				Result 1					
Bromide	M23-De0011166	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-De0013045	CP	%	95			75-125	Pass	
Arsenic (filtered)	M23-De0013045	CP	%	97			75-125	Pass	
Barium (filtered)	M23-De0013045	CP	%	99			75-125	Pass	
Beryllium (filtered)	M23-De0013045	CP	%	91			75-125	Pass	
Boron (filtered)	M23-De0013045	CP	%	82			75-125	Pass	
Cadmium (filtered)	M23-De0013045	CP	%	92			75-125	Pass	
Chromium (filtered)	M23-De0013045	CP	%	109			75-125	Pass	
Cobalt (filtered)	M23-De0013045	CP	%	92			75-125	Pass	
Copper (filtered)	M23-De0013045	CP	%	93			75-125	Pass	
Iron (filtered)	M23-De0013045	CP	%	102			75-125	Pass	
Lead (filtered)	M23-De0013045	CP	%	89			75-125	Pass	
Lithium (filtered)	M23-De0013045	CP	%	89			75-125	Pass	
Manganese (filtered)	M23-De0013045	CP	%	95			75-125	Pass	
Mercury (filtered)	M23-De0013045	CP	%	91			75-125	Pass	
Molybdenum (filtered)	M23-De0013045	CP	%	95			75-125	Pass	
Nickel (filtered)	M23-De0013045	CP	%	97			75-125	Pass	
Selenium (filtered)	M23-De0013045	CP	%	97			75-125	Pass	
Silver (filtered)	M23-De0013045	CP	%	91			75-125	Pass	
Strontium (filtered)	M23-De0013045	CP	%	96			75-125	Pass	
Uranium (filtered)	M23-De0013045	CP	%	92			75-125	Pass	
Vanadium (filtered)	M23-De0013045	CP	%	92			75-125	Pass	
Zinc (filtered)	M23-De0013045	CP	%	121			75-125	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-De0013046	CP	%	87			75-125	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Alkali Metals				Result 1					
Calcium	M23-De0013046	CP	%	99			75-125	Pass	
Magnesium	M23-De0013046	CP	%	99			75-125	Pass	
Potassium	M23-De0013046	CP	%	91			75-125	Pass	
Sodium	M23-De0013046	CP	%	125			75-125	Pass	
Spike - % Recovery									
				Result 1					
Fluoride	M23-De0013047	CP	%	90			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M23-De0013048	CP	%	104			70-130	Pass	
Nitrite (as N)	M23-De0013048	CP	%	100			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0013048	CP	%	73			70-130	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-De0013054	CP	%	87			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-De0013054	CP	%	94			75-125	Pass	
Magnesium	M23-De0013054	CP	%	96			75-125	Pass	
Potassium	M23-De0013054	CP	%	92			75-125	Pass	
Sodium	M23-De0013054	CP	%	86			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-De0013055	CP	%	91			75-125	Pass	
Arsenic (filtered)	M23-De0013055	CP	%	94			75-125	Pass	
Barium (filtered)	M23-De0013055	CP	%	96			75-125	Pass	
Beryllium (filtered)	M23-De0013055	CP	%	91			75-125	Pass	
Boron (filtered)	M23-De0013055	CP	%	86			75-125	Pass	
Cadmium (filtered)	M23-De0013055	CP	%	90			75-125	Pass	
Chromium (filtered)	M23-De0013055	CP	%	105			75-125	Pass	
Cobalt (filtered)	M23-De0013055	CP	%	90			75-125	Pass	
Copper (filtered)	M23-De0013055	CP	%	91			75-125	Pass	
Iron (filtered)	M23-De0013055	CP	%	98			75-125	Pass	
Lead (filtered)	M23-De0013055	CP	%	85			75-125	Pass	
Lithium (filtered)	M23-De0013055	CP	%	87			75-125	Pass	
Manganese (filtered)	M23-De0013055	CP	%	91			75-125	Pass	
Molybdenum (filtered)	M23-De0013055	CP	%	92			75-125	Pass	
Nickel (filtered)	M23-De0013055	CP	%	95			75-125	Pass	
Selenium (filtered)	M23-De0013055	CP	%	99			75-125	Pass	
Silver (filtered)	M23-De0013055	CP	%	87			75-125	Pass	
Strontium (filtered)	M23-De0013055	CP	%	94			75-125	Pass	
Uranium (filtered)	M23-De0013055	CP	%	88			75-125	Pass	
Vanadium (filtered)	M23-De0013055	CP	%	88			75-125	Pass	
Zinc (filtered)	M23-De0013055	CP	%	122			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-De0014441	NCP	mg/L	520	530	<1	30%	Pass	
Conductivity (at 25 °C)	M23-De0008367	NCP	uS/cm	17000	17000	<1	30%	Pass	
pH (at 25 °C)	M23-De0008367	NCP	pH Units	9.7	9.7	pass	30%	Pass	
Sulphate (as SO4)	M23-De0014441	NCP	mg/L	40	39	<1	30%	Pass	
Silicon (filtered)	M23-De0013036	CP	mg/L	58	56	3.6	30%	Pass	

Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-De0008367	NCP	mg/L	1200	1200	2.4	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-De0008367	NCP	mg/L	1500	1500	2.1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-De0008367	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-De0008367	NCP	mg/L	2700	2700	2.2	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0013036	CP	mg/L	430	420	3.4	30%	Pass	
Magnesium	M23-De0013036	CP	mg/L	390	370	3.8	30%	Pass	
Potassium	M23-De0013036	CP	mg/L	25	24	2.9	30%	Pass	
Sodium	M23-De0013036	CP	mg/L	2200	2100	2.7	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0013037	CP	mg/L	5.3	5.2	1.0	30%	Pass	
Arsenic (filtered)	M23-De0013037	CP	mg/L	0.011	0.009	16	30%	Pass	
Barium (filtered)	M23-De0013037	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Beryllium (filtered)	M23-De0013037	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-De0013037	CP	mg/L	1.5	1.4	4.0	30%	Pass	
Cadmium (filtered)	M23-De0013037	CP	mg/L	0.018	0.017	2.0	30%	Pass	
Chromium (filtered)	M23-De0013037	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cobalt (filtered)	M23-De0013037	CP	mg/L	2.4	2.4	1.0	30%	Pass	
Copper (filtered)	M23-De0013037	CP	mg/L	7.2	7.0	2.0	30%	Pass	
Lead (filtered)	M23-De0013037	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Lithium (filtered)	M23-De0013037	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-De0013037	CP	mg/L	1.1	1.1	<1	30%	Pass	
Mercury (filtered)	M23-De0013037	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-De0013037	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-De0013037	CP	mg/L	3.8	3.8	1.0	30%	Pass	
Selenium (filtered)	M23-De0013037	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silver (filtered)	M23-De0013037	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M23-De0013037	CP	mg/L	3.5	3.5	<1	30%	Pass	
Uranium (filtered)	M23-De0013037	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Vanadium (filtered)	M23-De0013037	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Zinc (filtered)	M23-De0013037	CP	mg/L	35	35	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	M23-De0013039	CP	mg/L	270	260	5.2	30%	Pass	
Phosphate total (as P)	M23-De0013039	CP	mg/L	0.22	0.21	1.4	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0013041	CP	mg/L	0.18	0.19	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0013041	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M23-De0013042	CP	mg/L	5.7	5.0	13	30%	Pass	
Fluoride	M23-De0013042	CP	mg/L	1.4	1.2	17	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M23-De0013044	CP	mg/L	1.4	1.1	25	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0013045	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Arsenic (filtered)	M23-De0013045	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Barium (filtered)	M23-De0013045	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Beryllium (filtered)	M23-De0013045	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-De0013045	CP	mg/L	0.91	0.87	5.0	30%	Pass	
Cadmium (filtered)	M23-De0013045	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chromium (filtered)	M23-De0013045	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cobalt (filtered)	M23-De0013045	CP	mg/L	0.17	0.17	<1	30%	Pass	
Copper (filtered)	M23-De0013045	CP	mg/L	0.75	0.76	2.0	30%	Pass	
Iron (filtered)	M23-De0013045	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Lead (filtered)	M23-De0013045	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Lithium (filtered)	M23-De0013045	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-De0013045	CP	mg/L	0.17	0.17	3.0	30%	Pass	
Mercury (filtered)	M23-De0013045	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-De0013045	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-De0013045	CP	mg/L	0.27	0.27	<1	30%	Pass	
Selenium (filtered)	M23-De0013045	CP	mg/L	0.014	0.014	5.0	30%	Pass	
Silver (filtered)	M23-De0013045	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M23-De0013045	CP	mg/L	2.0	2.0	1.0	30%	Pass	
Uranium (filtered)	M23-De0013045	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Vanadium (filtered)	M23-De0013045	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-De0013045	CP	mg/L	0.73	0.73	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M23-De0013046	CP	mg/L	16	17	3.8	30%	Pass	
Fluoride	M23-De0013046	CP	mg/L	1.4	1.3	2.9	30%	Pass	
Silicon (filtered)	M23-De0013046	CP	mg/L	62	57	8.4	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0013046	CP	mg/L	510	470	7.5	30%	Pass	
Magnesium	M23-De0013046	CP	mg/L	400	360	9.9	30%	Pass	
Potassium	M23-De0013046	CP	mg/L	38	35	7.9	30%	Pass	
Sodium	M23-De0013046	CP	mg/L	1800	1600	9.4	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	M23-De0013048	CP	mg/L	110	93	20	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0013051	CP	mg/L	1.1	1.0	11	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0013051	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M23-De0013051	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M23-De0013052	CP	mg/L	16	16	3.7	30%	Pass	
Fluoride	M23-De0013052	CP	mg/L	2.0	2.1	7.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M23-De0013054	CP	mg/L	1.1	1.1	3.5	30%	Pass	
Silicon (filtered)	M23-De0013054	CP	mg/L	21	21	2.4	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0013054	CP	mg/L	130	130	1.4	30%	Pass	
Magnesium	M23-De0013054	CP	mg/L	130	120	<1	30%	Pass	
Potassium	M23-De0013054	CP	mg/L	31	31	<1	30%	Pass	
Sodium	M23-De0013054	CP	mg/L	1200	1200	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0013055	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Arsenic (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Barium (filtered)	M23-De0013055	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Beryllium (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-De0013055	CP	mg/L	0.95	0.94	2.0	30%	Pass	
Cadmium (filtered)	M23-De0013055	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chromium (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cobalt (filtered)	M23-De0013055	CP	mg/L	0.17	0.16	3.0	30%	Pass	
Copper (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Iron (filtered)	M23-De0013055	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Lead (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Lithium (filtered)	M23-De0013055	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-De0013055	CP	mg/L	0.45	0.43	4.0	30%	Pass	
Mercury (filtered)	M23-De0013055	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-De0013055	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-De0013055	CP	mg/L	0.19	0.19	2.0	30%	Pass	
Selenium (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silver (filtered)	M23-De0013055	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M23-De0013055	CP	mg/L	1.6	1.5	3.0	30%	Pass	
Uranium (filtered)	M23-De0013055	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Vanadium (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Zinc (filtered)	M23-De0013055	CP	mg/L	< 0.01	< 0.01	<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

Authorised by:

Amy Meunier	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.

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Envirocopper Ltd
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SA 5061

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
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Attention: **Leon Faulkner**

Report **1076374-W**
Project name KAPUNDA
Project ID 2
Received Date Mar 08, 2024

Client Sample ID			**PP_060324_KPFRT02**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Ma0019380**
Date Sampled			**Mar 06, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	1.8
Bromide	1	mg/L	1300
Chloride	1	mg/L	3200
Conductivity (at 25 °C)	10	uS/cm	16000
Fluoride	0.5	mg/L	200
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	2
pH (at 25 °C)	0.1	pH Units	2.9
Phosphorus reactive (as P)	0.01	mg/L	0.06
Salinity (expressed as TDS)*	10	mg/L	8900
Sulphate (as SO4)	5	mg/L	4900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.8
Total Nitrogen (as N)*	0.2	mg/L	3.8
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	310
Phosphate total (as P)	0.01	mg/L	0.17
Silicon (filtered)	0.5	mg/L	110
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	0.26
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	0.27
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	0.008
Iron (filtered)	0.05	mg/L	1.6

Client Sample ID			PP_060324_KPFRT02
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Ma0019380**
Date Sampled			**Mar 06, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lead (filtered)	0.001	mg/L	< 0.001
Lithium (filtered)	0.005	mg/L	0.016
Manganese (filtered)	0.005	mg/L	0.083
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.009
Selenium (filtered)	0.001	mg/L	0.002
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	0.48
Uranium (filtered)	0.005	mg/L	< 0.005
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.24
Alkali Metals			
Calcium	0.5	mg/L	480
Magnesium	0.5	mg/L	430
Potassium	0.5	mg/L	51
Sodium	0.5	mg/L	2000

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	Mar 12, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Mar 12, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Mar 08, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Mar 12, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Mar 12, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Mar 12, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Mar 12, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Mar 12, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Mar 15, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Mar 12, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Mar 12, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Mar 12, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Address: Suite 4, Level 1, 155 King William Road
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Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1076374
Phone: 08 7127 1110
Fax:

Received: Mar 8, 2024 4:14 PM
Due: Mar 18, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_060324_KPFRT02	Mar 06, 2024		Water	M24-Ma0019380	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 seven 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 6.0
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 6.0, 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							
Bromide	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	90			70-130	Pass	
Bromide	%	98			70-130	Pass	
Chloride	%	101			70-130	Pass	
Conductivity (at 25 °C)	%	102			70-130	Pass	
Fluoride	%	93			70-130	Pass	
Nitrate & Nitrite (as N)	%	102			70-130	Pass	
Nitrite (as N)	%	104			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)	%	101			70-130	Pass	
Sulphate (as SO4)	%	102			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	109			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
Phosphate total (as P)	%	101			70-130	Pass	
Silicon (filtered)	%	107			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	83			70-130	Pass	
Total Alkalinity (as CaCO3)	%	85			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	106			80-120	Pass	
Arsenic (filtered)	%	96			80-120	Pass	
Boron (filtered)	%	109			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Cobalt (filtered)	%	94			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron (filtered)	%	97			80-120	Pass	
Lead (filtered)	%	92			80-120	Pass	
Lithium (filtered)	%	111			80-120	Pass	
Manganese (filtered)	%	101			80-120	Pass	
Mercury (filtered)	%	89			80-120	Pass	
Molybdenum (filtered)	%	95			80-120	Pass	
Nickel (filtered)	%	95			80-120	Pass	
Selenium (filtered)	%	99			80-120	Pass	
Silver (filtered)	%	92			80-120	Pass	
Strontium (filtered)	%	103			80-120	Pass	
Uranium (filtered)	%	93			80-120	Pass	
Zinc (filtered)	%	95			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	97			80-120	Pass	
Magnesium	%	102			80-120	Pass	
Potassium	%	95			80-120	Pass	
Sodium	%	99			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M24-Ma0018819	NCP	%	86			70-130	Pass	
Nitrate & Nitrite (as N)	B24-Ma0010239	NCP	%	78			70-130	Pass	
Nitrite (as N)	M24-Ma0019114	NCP	%	85			70-130	Pass	
Sulphate (as SO4)	M24-Ma0018920	NCP	%	99			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Ma0019882	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Ma0019124	NCP	%	88			75-125	Pass	
Arsenic (filtered)	M24-Ma0019124	NCP	%	114			75-125	Pass	
Barium (filtered)	M24-Ma0019124	NCP	%	120			75-125	Pass	
Beryllium (filtered)	M24-Ma0019124	NCP	%	102			75-125	Pass	
Boron (filtered)	B24-Ma0012603	NCP	%	97			75-125	Pass	
Cadmium (filtered)	M24-Ma0019124	NCP	%	84			75-125	Pass	
Chromium (filtered)	M24-Ma0019124	NCP	%	111			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cobalt (filtered)	M24-Ma0019124	NCP	%	111			75-125	Pass	
Copper (filtered)	M24-Ma0019124	NCP	%	103			75-125	Pass	
Iron (filtered)	M24-Ma0019124	NCP	%	107			75-125	Pass	
Lead (filtered)	M24-Ma0019124	NCP	%	99			75-125	Pass	
Lithium (filtered)	M24-Ma0019124	NCP	%	100			75-125	Pass	
Manganese (filtered)	M24-Ma0019124	NCP	%	113			75-125	Pass	
Mercury (filtered)	M24-Ma0019124	NCP	%	98			75-125	Pass	
Molybdenum (filtered)	M24-Ma0019124	NCP	%	99			75-125	Pass	
Nickel (filtered)	M24-Ma0019124	NCP	%	108			75-125	Pass	
Selenium (filtered)	M24-Ma0019124	NCP	%	109			75-125	Pass	
Silver (filtered)	M24-Ma0019124	NCP	%	97			75-125	Pass	
Strontium (filtered)	B24-Ma0012603	NCP	%	109			75-125	Pass	
Uranium (filtered)	M24-Ma0019124	NCP	%	86			75-125	Pass	
Vanadium (filtered)	M24-Ma0019124	NCP	%	100			75-125	Pass	
Zinc (filtered)	M24-Ma0019124	NCP	%	120			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Ma0019215	NCP	%	95			75-125	Pass	
Magnesium	M24-Ma0019215	NCP	%	96			75-125	Pass	
Potassium	M24-Ma0019215	NCP	%	94			75-125	Pass	
Sodium	M24-Ma0019215	NCP	%	103			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)	M24-Ma0018915	NCP	mg/L	0.01	< 0.01	16	30%	Pass	
Bromide	M24-Ma0032270	NCP	mg/L	< 1	< 1	<1	30%	Pass	
Chloride	M24-Ma0019977	NCP	mg/L	3300	3200	5.0	30%	Pass	
Conductivity (at 25 °C)	M24-Ma0025707	NCP	uS/cm	16000	15000	1.5	30%	Pass	
Fluoride	M24-Ma0032270	NCP	mg/L	0.6	0.6	6.3	30%	Pass	
Nitrate & Nitrite (as N)	M24-Ma0018915	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-Ma0018915	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-Ma0025707	NCP	pH Units	8.4	8.2	pass	30%	Pass	
Salinity (expressed as TDS)*	M24-Ma0028082	NCP	mg/L	2400	1900	23	30%	Pass	
Sulphate (as SO4)	M24-Ma0019977	NCP	mg/L	460	470	2.5	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ma0019125	NCP	mg/L	150	150	1.9	30%	Pass	
Phosphate total (as P)	M24-Ma0019380	CP	mg/L	0.17	0.16	9.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-Ma0019124	NCP	mg/L	0.003	0.003	3.0	30%	Pass	
Barium (filtered)	M24-Ma0019124	NCP	mg/L	0.03	0.03	<1	30%	Pass	
Beryllium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Ma0019215	NCP	mg/L	4.6	4.5	3.1	30%	Pass	
Cadmium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M24-Ma0019124	NCP	mg/L	0.001	0.001	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron (filtered)	M24-Ma0019124	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	M24-Ma0019124	NCP	mg/L	0.009	0.009	2.4	30%	Pass	
Mercury (filtered)	M24-Ma0019124	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Ma0019124	NCP	mg/L	0.004	0.004	<1	30%	Pass	
Selenium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-Ma0019124	NCP	mg/L	0.39	0.38	2.0	30%	Pass	
Uranium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Ma0019124	NCP	mg/L	0.074	0.073	2.1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Ma0019215	NCP	mg/L	64	64	<1	30%	Pass	
Magnesium	M24-Ma0019215	NCP	mg/L	95	94	1.0	30%	Pass	
Potassium	M24-Ma0019215	NCP	mg/L	31	31	<1	30%	Pass	
Sodium	M24-Ma0019215	NCP	mg/L	2200	2200	1.2	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

Authorised by:

Catherine Wilson	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Caitlin Breeze	Senior Analyst-Metal
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.

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NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
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Attention: **Leon Faulkner**

Report **1068023-W**
Project name KAPUNDA
Project ID 2
Received Date Feb 13, 2024

Client Sample ID			**PP_080224_KPFRT02**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Fe0030911**
Date Sampled			**Feb 08, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	< 0.01
Bromide	0.5	mg/L	240
Chloride	1	mg/L	3400
Conductivity (at 25 °C)	10	uS/cm	10000
Fluoride	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	4.2
pH (at 25 °C)	0.1	pH Units	2.9
Phosphorus reactive (as P)	0.01	mg/L	0.17
Salinity (expressed as TDS)*	10	mg/L	13000
Sulphate (as SO4)	5	mg/L	5500
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	4.2
Total Nitrogen (as N)*	0.2	mg/L	4.2
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	24
Phosphate total (as P)	0.01	mg/L	0.30
Silicon (filtered)	0.5	mg/L	97
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	69
Barium (filtered)	0.02	mg/L	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01
Boron (filtered)	0.05	mg/L	2.3
Cadmium (filtered)	0.0002	mg/L	0.050
Chromium (filtered)	0.001	mg/L	0.092
Cobalt (filtered)	0.001	mg/L	4.8
Copper (filtered)	0.001	mg/L	69
Iron (filtered)	0.05	mg/L	990
Lead (filtered)	0.001	mg/L	0.074

Client Sample ID			PP_080224_KPFRT02
Sample Matrix			Water
Eurofins Sample No.			M24-Fe0030911
Date Sampled			Feb 08, 2024
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	< 0.05
Manganese (filtered)	0.005	mg/L	2.2
Mercury (filtered)	0.0001	mg/L	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05
Nickel (filtered)	0.001	mg/L	7.7
Selenium (filtered)	0.001	mg/L	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05
Uranium (filtered)	0.005	mg/L	0.37
Vanadium (filtered)	0.005	mg/L	< 0.05
Zinc (filtered)	0.005	mg/L	65
Alkali Metals			
Calcium	0.5	mg/L	460
Magnesium	0.5	mg/L	410
Potassium	0.5	mg/L	51
Sodium	0.5	mg/L	2000

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	Feb 14, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Feb 14, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Feb 13, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Feb 14, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Feb 14, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Sydney	Feb 16, 2024	28 Days
- Method: In-house method LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Feb 14, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Feb 14, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Feb 14, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Feb 14, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Feb 14, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Feb 14, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Feb 14, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1068023
Phone: 08 7127 1110
Fax:

Received: Feb 13, 2024 3:30 PM
Due: Feb 20, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217					X																										
External Laboratory																															

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																													
1	PP_080224_KPFRT02	Feb 08, 2024		Water	M24-Fe0030911	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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	**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	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			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	
Silicon (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	113			70-130	Pass	
Bromide	%	88			70-130	Pass	
Chloride	%	113			70-130	Pass	
Conductivity (at 25 °C)	%	102			70-130	Pass	
Fluoride	%	90			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrate & Nitrite (as N)	%	109			70-130	Pass	
Nitrite (as N)	%	94			70-130	Pass	
Sulphate (as SO4)	%	105			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	97			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	94			70-130	Pass	
Phosphate total (as P)	%	99			70-130	Pass	
Silicon (filtered)	%	92			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	88			70-130	Pass	
Total Alkalinity (as CaCO3)	%	107			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	91			80-120	Pass	
Boron (filtered)	%	111			80-120	Pass	
Cadmium (filtered)	%	92			80-120	Pass	
Chromium (filtered)	%	91			80-120	Pass	
Cobalt (filtered)	%	91			80-120	Pass	
Copper (filtered)	%	91			80-120	Pass	
Iron (filtered)	%	100			80-120	Pass	
Lead (filtered)	%	91			80-120	Pass	
Lithium (filtered)	%	94			80-120	Pass	
Manganese (filtered)	%	93			80-120	Pass	
Mercury (filtered)	%	91			80-120	Pass	
Molybdenum (filtered)	%	91			80-120	Pass	
Nickel (filtered)	%	92			80-120	Pass	
Selenium (filtered)	%	93			80-120	Pass	
Silver (filtered)	%	87			80-120	Pass	
Uranium (filtered)	%	88			80-120	Pass	
Zinc (filtered)	%	91			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	95			80-120	Pass	
Magnesium	%	96			80-120	Pass	
Potassium	%	95			80-120	Pass	
Sodium	%	96			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Bromide	M24-Fe0030911	CP	%	94			70-130	Pass	
Fluoride	M24-Ja0038077	NCP	%	92			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Fe0032204	NCP	%	84			70-130	Pass	
Phosphate total (as P)	M24-Fe0035519	NCP	%	107			70-130	Pass	
Silicon (filtered)	M24-Fe0034265	NCP	%	95			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Fe0027551	NCP	%	103			75-125	Pass	
Barium (filtered)	M24-Fe0027551	NCP	%	101			75-125	Pass	
Beryllium (filtered)	M24-Fe0027551	NCP	%	99			75-125	Pass	
Boron (filtered)	M24-Fe0027551	NCP	%	93			75-125	Pass	
Cadmium (filtered)	M24-Fe0027551	NCP	%	92			75-125	Pass	
Chromium (filtered)	M24-Fe0027551	NCP	%	103			75-125	Pass	
Cobalt (filtered)	M24-Fe0027551	NCP	%	101			75-125	Pass	
Copper (filtered)	M24-Fe0038848	NCP	%	105			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Iron (filtered)	M24-Fe0038848	NCP	%	108			75-125	Pass	
Lead (filtered)	M24-Fe0027551	NCP	%	97			75-125	Pass	
Lithium (filtered)	M24-Fe0027551	NCP	%	105			75-125	Pass	
Mercury (filtered)	M24-Fe0027551	NCP	%	95			75-125	Pass	
Molybdenum (filtered)	M24-Fe0027551	NCP	%	93			75-125	Pass	
Nickel (filtered)	M24-Fe0027551	NCP	%	102			75-125	Pass	
Selenium (filtered)	M24-Fe0027551	NCP	%	100			75-125	Pass	
Silver (filtered)	M24-Fe0027551	NCP	%	97			75-125	Pass	
Uranium (filtered)	M24-Fe0027551	NCP	%	99			75-125	Pass	
Vanadium (filtered)	M24-Fe0027551	NCP	%	91			75-125	Pass	
Zinc (filtered)	M24-Fe0038848	NCP	%	108			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Fe0034265	NCP	%	95			75-125	Pass	
Magnesium	M24-Fe0034265	NCP	%	98			75-125	Pass	
Potassium	M24-Fe0034265	NCP	%	98			75-125	Pass	
Sodium	M24-Fe0027552	NCP	%	83			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Fe0030911	CP	mg/L	240	230	2.5	30%	Pass	
Conductivity (at 25 °C)	M24-Fe0033265	NCP	uS/cm	1200	1200	3.6	30%	Pass	
Fluoride	M24-Fe0033331	NCP	mg/L	35	27	26	30%	Pass	
Nitrate & Nitrite (as N)	M24-Fe0033265	NCP	mg/L	2.0	2.0	<1	30%	Pass	
Nitrite (as N)	M24-Fe0033265	NCP	mg/L	0.18	0.18	<1	30%	Pass	
pH (at 25 °C)	M24-Fe0033265	NCP	pH Units	8.0	8.0	pass	30%	Pass	
Sulphate (as SO4)	M24-Fe0033347	NCP	mg/L	1100	1100	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Fe0031907	NCP	mg/L	3.4	3.6	5.4	30%	Pass	
Phosphate total (as P)	M24-Fe0031907	NCP	mg/L	9.6	9.8	2.2	30%	Pass	
Silicon (filtered)	M24-Fe0034265	NCP	mg/L	< 0.5	0.5	20	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Fe0022757	NCP	mg/L		640	13	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Fe0022757	NCP	mg/L		< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Fe0022757	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Fe0022757	NCP	mg/L	560	640	13	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Fe0027551	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Barium (filtered)	M24-Fe0027551	NCP	mg/L	0.02	0.03	1.7	30%	Pass	
Beryllium (filtered)	M24-Fe0027551	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Fe0027551	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	M24-Fe0027551	NCP	mg/L	0.011	0.011	1.9	30%	Pass	
Chromium (filtered)	M24-Fe0027551	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-Fe0027551	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M24-Fe0038848	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M24-Fe0038848	NCP	mg/L	1.0	1.1	<1	30%	Pass	
Lead (filtered)	M24-Fe0027551	NCP	mg/L	0.096	0.097	<1	30%	Pass	
Lithium (filtered)	M24-Fe0027551	NCP	mg/L	0.005	0.005	3.7	30%	Pass	
Manganese (filtered)	M24-Fe0027551	NCP	mg/L	2.2	2.2	<1	30%	Pass	
Mercury (filtered)	M24-Fe0027551	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Fe0027551	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Fe0027551	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Selenium (filtered)	M24-Fe0027551	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Silver (filtered)	M24-Fe0027551	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Uranium (filtered)	M24-Fe0027551	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Fe0027551	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Fe0038848	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Fe0034265	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Magnesium	M24-Fe0034265	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Potassium	M24-Fe0034265	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Sodium	M24-Fe0034265	NCP	mg/L	28	28	<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
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
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal
Ryan Phillips	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.

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Envirocopper Ltd
Suite 4, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1054689-W**
Project name KAPUNDA
Project ID 2
Received Date Dec 15, 2023

Client Sample ID			**PP_151223_KPFRT02#1**	**PP_151223_KPFRT03#1**	**PP_151223_KPFRT04#1**	**PP_151223_KPFRT06#1**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0039580**	**M23-De0039581**	**M23-De0039582**	**M23-De0039583**
Date Sampled			**Dec 15, 2023**	**Dec 15, 2023**	**Dec 15, 2023**	**Dec 15, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	0.13	0.35	0.24
Bromide	1	mg/L	960	120	14	10
Chloride	1	mg/L	3300	2600	2400	2800
Conductivity (at 25 °C)	10	uS/cm	43000	5400	3600	8900
Fluoride	0.5	mg/L	< 1	< 1	< 1	< 1
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.06	1.4	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.06	1.4	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.5	< 0.2	< 0.2	3.86
pH (at 25 °C)	0.1	pH Units	0.8	4.2	7.4	3.9
Phosphorus reactive (as P)	0.01	mg/L	0.32	0.01	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	25000	8700	6800	11000
Sulphate (as SO4)	5	mg/L	4900	2700	900	5800
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.5	0.3	0.4	4.1
Total Nitrogen (as N)*	0.2	mg/L	1.5	0.4	1.8	4.1
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	330	140	80	78
Phosphate total (as P)	0.01	mg/L	1.2	0.01	< 0.01	0.08
Silicon (filtered)	0.5	mg/L	100	36	18	57
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	210	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	210	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	130	5.3	< 0.05	95
Arsenic (filtered)	0.001	mg/L	0.27	< 0.1	0.002	< 0.1
Barium (filtered)	0.02	mg/L	< 2	< 2	0.03	< 2
Beryllium (filtered)	0.001	mg/L	< 0.1	< 0.5	< 0.001	< 0.1
Boron (filtered)	0.05	mg/L	3.9	2.3	1.1	3.2
Cadmium (filtered)	0.0002	mg/L	0.049	< 0.02	0.0005	0.046
Chromium (filtered)	0.001	mg/L	0.33	< 0.1	< 0.001	< 0.1
Cobalt (filtered)	0.001	mg/L	5.6	2.0	0.25	5.5
Copper (filtered)	0.001	mg/L	130	5.7	1.1	240
Iron (filtered)	0.05	mg/L	1200	440	< 0.05	800

Client Sample ID			PP_151223_KPFRT02#1	PP_151223_KPFRT03#1	PP_151223_KPFRT04#1	PP_151223_KPFRT06#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0039580**	**M23-De0039581**	**M23-De0039582**	**M23-De0039583**
Date Sampled			**Dec 15, 2023**	**Dec 15, 2023**	**Dec 15, 2023**	**Dec 15, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	0.26	< 0.1	< 0.001	< 0.1
Lithium (filtered)	0.005	mg/L	< 0.5	< 0.5	< 0.005	< 0.5
Manganese (filtered)	0.005	mg/L	4.1	0.87	0.33	2.3
Mercury (filtered)	0.0001	mg/L	< 0.01	< 0.01	< 0.0001	< 0.01
Molybdenum (filtered)	0.005	mg/L	< 0.5	< 0.5	< 0.005	< 0.5
Nickel (filtered)	0.001	mg/L	9.0	3.2	0.36	9.1
Selenium (filtered)	0.001	mg/L	< 0.1	< 0.1	0.006	< 0.1
Silver (filtered)	0.005	mg/L	< 0.5	< 0.5	< 0.005	< 0.5
Strontium (filtered)	0.005	mg/L	5.8	3.3	2.1	5.1
Uranium (filtered)	0.005	mg/L	1.0	< 0.5	0.018	< 0.5
Vanadium (filtered)	0.005	mg/L	< 0.5	< 0.5	< 0.005	< 0.5
Zinc (filtered)	0.005	mg/L	77	28	1.1	54
Alkali Metals						
Calcium	0.5	mg/L	440	250	170	470
Magnesium	0.5	mg/L	360	250	200	340
Potassium	0.5	mg/L	41	36	30	32
Sodium	0.5	mg/L	2100	1500	1400	1700

Client Sample ID			PP_151223_KPMON01#1	PP_151223_KPMON02#1	PP_151223_KPMON03#1
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0039584**	**M23-De0039585**	**M23-De0039586**
Date Sampled			**Dec 15, 2023**	**Dec 15, 2023**	**Dec 15, 2023**
Test/Reference	LOR	Unit			
Ammonia (as N)	0.01	mg/L	0.38	0.18	1.1
Bromide	1	mg/L	7.3	4.7	7.2
Chloride	1	mg/L	1700	1800	2400
Conductivity (at 25 °C)	10	uS/cm	5100	4500	13000
Fluoride	0.5	mg/L	3.8	2.2	5.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.21	0.07	4.6
Nitrate (as N)	0.02	mg/L	0.21	0.07	4.6
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.72	2.12	0.2
pH (at 25 °C)	0.1	pH Units	8.1	7.2	4.8
Phosphorus reactive (as P)	0.01	mg/L	0.03	< 0.01	0.02
Salinity (expressed as TDS)*	10	mg/L	4100	4500	9900
Sulphate (as SO4)	5	mg/L	560	660	4200
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.1	2.3	1.3
Total Nitrogen (as N)*	0.2	mg/L	1.3	2.4	5.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	53	170	180
Phosphate total (as P)	0.01	mg/L	0.05	< 0.01	0.02
Silicon (filtered)	0.5	mg/L	19	8.7	36
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	270	240	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	270	240	< 20

Client Sample ID			PP_151223_KPMON01#1	PP_151223_KPMON02#1	PP_151223_KPMON03#1
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0039584**	**M23-De0039585**	**M23-De0039586**
Date Sampled			**Dec 15, 2023**	**Dec 15, 2023**	**Dec 15, 2023**
Test/Reference	LOR	Unit			
Heavy Metals					
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	2.9
Arsenic (filtered)	0.001	mg/L	0.003	< 0.001	< 0.1
Barium (filtered)	0.02	mg/L	0.04	0.04	< 2
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.1
Boron (filtered)	0.05	mg/L	0.87	1.1	2.2
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.02
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.1
Cobalt (filtered)	0.001	mg/L	0.003	0.15	2.3
Copper (filtered)	0.001	mg/L	0.033	< 0.001	< 0.1
Iron (filtered)	0.05	mg/L	< 0.05	3.1	790
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.1
Lithium (filtered)	0.005	mg/L	0.021	0.019	< 0.5
Manganese (filtered)	0.005	mg/L	0.036	0.47	1.5
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.01
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.5
Nickel (filtered)	0.001	mg/L	0.005	0.15	3.8
Selenium (filtered)	0.001	mg/L	0.005	< 0.001	< 0.1
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.5
Strontium (filtered)	0.005	mg/L	1.7	1.5	3.2
Uranium (filtered)	0.005	mg/L	< 0.005	0.049	< 0.5
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.5
Zinc (filtered)	0.005	mg/L	0.019	< 0.005	47
Alkali Metals					
Calcium	0.5	mg/L	120	120	380
Magnesium	0.5	mg/L	130	130	370
Potassium	0.5	mg/L	29	35	35
Sodium	0.5	mg/L	1100	1300	1600

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 19, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Nitrate & Nitrite (as N)	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrate (as N)	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrite (as N)	Melbourne	Dec 19, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Organic Nitrogen (as N)*	Melbourne	Dec 16, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Dec 19, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Dec 19, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Dec 19, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Dec 19, 2023	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Dec 19, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Dec 22, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
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 19, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Dec 19, 2023	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Dec 19, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Dec 19, 2023	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1054689
Phone: 08 7127 1110
Fax:

Received: Dec 15, 2023 4:00 PM
Due: Jan 2, 2024
Priority: 10 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X
External Laboratory																														

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																											
1	PP_151223_KPFRT02#1	Dec 15, 2023		Water	M23-De0039580	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
2	PP_151223_KPFRT03#1	Dec 15, 2023		Water	M23-De0039581	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
3	PP_151223_KPFRT04#1	Dec 15, 2023		Water	M23-De0039582	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
4	PP_151223_KPFRT06#1	Dec 15, 2023		Water	M23-De0039583	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
5	PP_151223_KPMON01#1	Dec 15, 2023		Water	M23-De0039584	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
6	PP_151223_KPMON02#1	Dec 15, 2023		Water	M23-De0039585	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
7	PP_151223_KPMON03#1	Dec 15, 2023		Water	M23-De0039586	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
Test Counts	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

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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 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphorus reactive (as P)	mg/L	0.01			0.01	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ammonia (as N)	%	109			70-130	Pass	
Bromide	%	93			70-130	Pass	
Chloride	%	102			70-130	Pass	
Conductivity (at 25 °C)	%	86			70-130	Pass	
Fluoride	%	92			70-130	Pass	
Nitrate & Nitrite (as N)	%	114			70-130	Pass	
Nitrite (as N)	%	106			70-130	Pass	
Phosphorus reactive (as P)	%	75			70-130	Pass	
Sulphate (as SO4)	%	110			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	119			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	106			70-130	Pass	
Phosphate total (as P)	%	94			70-130	Pass	
Silicon (filtered)	%	95			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	73			70-130	Pass	
Total Alkalinity (as CaCO3)	%	77			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	102			80-120	Pass	
Arsenic (filtered)	%	100			80-120	Pass	
Boron (filtered)	%	100			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium (filtered)	%	99			80-120	Pass	
Cobalt (filtered)	%	99			80-120	Pass	
Copper (filtered)	%	98			80-120	Pass	
Iron (filtered)	%	104			80-120	Pass	
Lead (filtered)	%	96			80-120	Pass	
Lithium (filtered)	%	106			80-120	Pass	
Manganese (filtered)	%	103			80-120	Pass	
Mercury (filtered)	%	99			80-120	Pass	
Molybdenum (filtered)	%	98			80-120	Pass	
Nickel (filtered)	%	98			80-120	Pass	
Selenium (filtered)	%	102			80-120	Pass	
Silver (filtered)	%	94			80-120	Pass	
Strontium (filtered)	%	103			80-120	Pass	
Uranium (filtered)	%	97			80-120	Pass	
Zinc (filtered)	%	92			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	91			80-120	Pass	
Magnesium	%	98			80-120	Pass	
Potassium	%	96			80-120	Pass	
Sodium	%	93			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	M23-De0039256	NCP	%	75			70-130	Pass	
Nitrate & Nitrite (as N)	M23-De0041021	NCP	%	112			70-130	Pass	
Nitrite (as N)	M23-De0041021	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-De0038418	NCP	%	98			75-125	Pass	
Arsenic (filtered)	M23-De0038418	NCP	%	103			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Barium (filtered)	M23-De0038418	NCP	%	87			75-125	Pass	
Beryllium (filtered)	M23-De0038418	NCP	%	98			75-125	Pass	
Cadmium (filtered)	M23-De0038418	NCP	%	90			75-125	Pass	
Chromium (filtered)	M23-De0038418	NCP	%	94			75-125	Pass	
Cobalt (filtered)	M23-De0038418	NCP	%	92			75-125	Pass	
Copper (filtered)	M23-De0038418	NCP	%	83			75-125	Pass	
Iron (filtered)	M23-De0038418	NCP	%	86			75-125	Pass	
Lead (filtered)	M23-De0038418	NCP	%	91			75-125	Pass	
Lithium (filtered)	M23-De0038418	NCP	%	98			75-125	Pass	
Manganese (filtered)	M23-De0039254	NCP	%	120			75-125	Pass	
Mercury (filtered)	M23-De0038418	NCP	%	75			75-125	Pass	
Molybdenum (filtered)	M23-De0038418	NCP	%	87			75-125	Pass	
Nickel (filtered)	M23-De0038418	NCP	%	88			75-125	Pass	
Selenium (filtered)	M23-De0038418	NCP	%	110			75-125	Pass	
Silver (filtered)	M23-De0038418	NCP	%	82			75-125	Pass	
Uranium (filtered)	M23-De0038418	NCP	%	94			75-125	Pass	
Vanadium (filtered)	M23-De0038418	NCP	%	85			75-125	Pass	
Zinc (filtered)	M23-De0038418	NCP	%	87			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-De0039255	NCP	%	96			75-125	Pass	
Magnesium	M23-De0039255	NCP	%	118			75-125	Pass	
Potassium	M23-De0039580	CP	%	104			75-125	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-De0039581	CP	%	92			70-130	Pass	
Phosphate total (as P)	M23-De0039581	CP	%	88			70-130	Pass	
Spike - % Recovery									
				Result 1					
Bromide	M23-De0039583	CP	%	75			70-130	Pass	
Fluoride	M23-De0039583	CP	%	82			70-130	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-De0039580	CP	mg/L	< 0.01	0.06	<1	30%	Pass	
Chloride	M23-De0039580	CP	mg/L	3300	3300	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0039580	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M23-De0039580	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Sulphate (as SO4)	M23-De0039580	CP	mg/L	4900	4900	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0039580	CP	mg/L	1.5	1.7	12	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-De0036841	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Phosphate total (as P)	M23-De0039580	CP	mg/L	1.2	1.2	<1	30%	Pass	
Silicon (filtered)	M23-De0039580	CP	mg/L	100	100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0039580	CP	mg/L	130	120	5.0	30%	Pass	
Arsenic (filtered)	M23-De0039580	CP	mg/L	0.27	0.24	9.0	30%	Pass	
Barium (filtered)	M23-De0039580	CP	mg/L	< 2	< 2	<1	30%	Pass	
Beryllium (filtered)	M23-De0039580	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Boron (filtered)	M23-De0039580	CP	mg/L	3.9	3.4	14	30%	Pass	
Cadmium (filtered)	M23-De0039580	CP	mg/L	0.049	0.046	6.0	30%	Pass	
Chromium (filtered)	M23-De0039580	CP	mg/L	0.33	0.31	8.0	30%	Pass	
Cobalt (filtered)	M23-De0039580	CP	mg/L	5.6	5.3	5.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper (filtered)	M23-De0039580	CP	mg/L	130	120	6.0	30%	Pass	
Iron (filtered)	M23-De0039580	CP	mg/L	1200	1100	5.0	30%	Pass	
Lead (filtered)	M23-De0039580	CP	mg/L	0.26	0.25	5.0	30%	Pass	
Lithium (filtered)	M23-De0039580	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Manganese (filtered)	M23-De0039580	CP	mg/L	4.1	3.9	5.0	30%	Pass	
Mercury (filtered)	M23-De0039580	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Molybdenum (filtered)	M23-De0039580	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nickel (filtered)	M23-De0039580	CP	mg/L	9.0	8.6	4.0	30%	Pass	
Selenium (filtered)	M23-De0039580	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Silver (filtered)	M23-De0039580	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Strontium (filtered)	M23-De0039580	CP	mg/L	5.8	5.6	4.0	30%	Pass	
Uranium (filtered)	M23-De0039580	CP	mg/L	1.0	0.98	4.0	30%	Pass	
Vanadium (filtered)	M23-De0039580	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Zinc (filtered)	M23-De0039580	CP	mg/L	77	73	6.0	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0039580	CP	mg/L	440	450	1.8	30%	Pass	
Magnesium	M23-De0039580	CP	mg/L	360	360	<1	30%	Pass	
Potassium	M23-De0039580	CP	mg/L	41	41	<1	30%	Pass	
Sodium	M23-De0039580	CP	mg/L	2100	2100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25 °C)	M23-De0039581	CP	uS/cm	5400	6100	12	30%	Pass	
pH (at 25 °C)	M23-De0039581	CP	pH Units	4.2	4.2	pass	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-De0039581	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-De0039581	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-De0039581	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-De0039581	CP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	B23-De0039904	NCP	mg/L	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0039586	CP	mg/L	1.1	1.2	7.9	30%	Pass	
Chloride	M23-De0039586	CP	mg/L	2400	2400	1.4	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0039586	CP	mg/L	4.6	4.7	1.6	30%	Pass	
Nitrate (as N)	M23-De0039586	CP	mg/L	4.6	4.7	1.6	30%	Pass	
Nitrite (as N)	M23-De0039586	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Sulphate (as SO4)	M23-De0039586	CP	mg/L	4200	4200	<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
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
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.

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Envirocopper Ltd
Suite 4, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1061174-W**
Project name KAPUNDA
Project ID 2
Received Date Jan 19, 2024

Client Sample ID			**KP_170124_KPFRT02**	**KPSELTX01_Waste**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M24-Ja0028522**	**M24-Ja0028523**
Date Sampled			**Jan 17, 2024**	**Jan 17, 2024**
Test/Reference	LOR	Unit		
Ammonia (as N)	0.01	mg/L	1.7	< 0.01
Bromide	1	mg/L	310	< 1
Chloride	1	mg/L	3200	240
Conductivity (at 25 °C)	10	uS/cm	17000	1700
Fluoride	0.5	mg/L	< 0.5	0.6
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1	37
pH (at 25 °C)	0.1	pH Units	2.4	7.2
Phosphorus reactive (as P)	0.01	mg/L	0.25	0.21
Salinity (expressed as TDS)*	10	mg/L	7400	910
Sulphate (as SO4)	5	mg/L	5400	150
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.7	37
Total Nitrogen (as N)*	0.2	mg/L	2.7	37
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	< 5	< 5
Phosphate total (as P)	0.01	mg/L	0.52	66
Silicon (filtered)	0.5	mg/L	120	12
Alkalinity (speciated)				
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	210
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	210
Heavy Metals				
Aluminium (filtered)	0.05	mg/L	74	0.07
Arsenic (filtered)	0.001	mg/L	0.083	0.035
Barium (filtered)	0.02	mg/L	< 0.02	0.16
Beryllium (filtered)	0.001	mg/L	0.004	< 0.001
Boron (filtered)	0.05	mg/L	2.5	0.59
Cadmium (filtered)	0.0002	mg/L	0.051	0.0005
Chromium (filtered)	0.001	mg/L	0.061	0.008
Cobalt (filtered)	0.001	mg/L	3.8	0.055
Copper (filtered)	0.001	mg/L	54	25
Iron (filtered)	0.05	mg/L	910	0.91

Client Sample ID			KP_170124_KPFRT02	KPSELTX01_Waste
Sample Matrix			Water	Water
Eurofins Sample No.			M24-Ja0028522	M24-Ja0028523
Date Sampled			Jan 17, 2024	Jan 17, 2024
Test/Reference	LOR	Unit		
Heavy Metals				
Lead (filtered)	0.001	mg/L	0.070	< 0.001
Lithium (filtered)	0.005	mg/L	0.022	< 0.005
Manganese (filtered)	0.005	mg/L	1.8	0.20
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005	0.018
Nickel (filtered)	0.001	mg/L	6.1	0.11
Selenium (filtered)	0.001	mg/L	< 0.001	0.011
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	4.2	0.46
Uranium (filtered)	0.005	mg/L	0.47	0.017
Vanadium (filtered)	0.005	mg/L	0.095	< 0.005
Zinc (filtered)	0.005	mg/L	56	0.19
Alkali Metals				
Calcium	0.5	mg/L	510	67
Magnesium	0.5	mg/L	470	36
Potassium	0.5	mg/L	67	100
Sodium	0.5	mg/L	2300	190

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	Jan 22, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jan 22, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Jan 20, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Jan 22, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jan 22, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Jan 23, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Jan 22, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Jan 22, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Jan 22, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Jan 22, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Jan 22, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Jan 22, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Jan 22, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
Address: Suite 4, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1061174
Phone: 08 7127 1110
Fax:

Received: Jan 19, 2024 3:00 PM
Due: Jan 22, 2024
Priority: 1 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KP_170124_KPFRT02	Jan 17, 2024		Water	M24-Ja0028522	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
2	KPSELTX01_Waste	Jan 17, 2024		Water	M24-Ja0028523	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
Test Counts						2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	
Bromide	mg/L	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	118			70-130	Pass	
Bromide	%	73			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Conductivity (at 25 °C)	%	108			70-130	Pass	
Fluoride	%	94			70-130	Pass	
Nitrite (as N)	%	100			70-130	Pass	
Phosphorus reactive (as P)	%	106			70-130	Pass	
Sulphate (as SO4)	%	105			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	110			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	94			70-130	Pass	
Phosphate total (as P)	%	101			70-130	Pass	
Silicon (filtered)	%	105			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	78			70-130	Pass	
Total Alkalinity (as CaCO3)	%	89			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	96			80-120	Pass	
Arsenic (filtered)	%	93			80-120	Pass	
Boron (filtered)	%	104			80-120	Pass	
Cadmium (filtered)	%	113			80-120	Pass	
Chromium (filtered)	%	90			80-120	Pass	
Cobalt (filtered)	%	91			80-120	Pass	
Copper (filtered)	%	88			80-120	Pass	
Iron (filtered)	%	95			80-120	Pass	
Lead (filtered)	%	86			80-120	Pass	
Lithium (filtered)	%	102			80-120	Pass	
Manganese (filtered)	%	93			80-120	Pass	
Mercury (filtered)	%	97			80-120	Pass	
Molybdenum (filtered)	%	89			80-120	Pass	
Nickel (filtered)	%	92			80-120	Pass	
Selenium (filtered)	%	89			80-120	Pass	
Silver (filtered)	%	108			80-120	Pass	
Strontium (filtered)	%	92			80-120	Pass	
Uranium (filtered)	%	88			80-120	Pass	
Zinc (filtered)	%	92			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	106			80-120	Pass	
Magnesium	%	109			80-120	Pass	
Potassium	%	114			80-120	Pass	
Sodium	%	113			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M24-Ja0023520	NCP	%	91			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ja0026681	NCP	%	117			70-130	Pass	
Phosphate total (as P)	M24-Ja0028113	NCP	%	111			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Ja0024588	NCP	%	92			75-125	Pass	
Arsenic (filtered)	M24-Ja0024588	NCP	%	94			75-125	Pass	
Barium (filtered)	M24-Ja0024588	NCP	%	88			75-125	Pass	
Beryllium (filtered)	M24-Ja0024588	NCP	%	95			75-125	Pass	
Boron (filtered)	M24-Ja0024588	NCP	%	97			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium (filtered)	M24-Ja0024588	NCP	%	106			75-125	Pass	
Chromium (filtered)	M24-Ja0024588	NCP	%	88			75-125	Pass	
Cobalt (filtered)	M24-Ja0024588	NCP	%	88			75-125	Pass	
Copper (filtered)	M24-Ja0024588	NCP	%	84			75-125	Pass	
Lead (filtered)	M24-Ja0024588	NCP	%	84			75-125	Pass	
Lithium (filtered)	M24-Ja0024588	NCP	%	99			75-125	Pass	
Manganese (filtered)	M24-Ja0024588	NCP	%	73			75-125	Fail	Q08
Mercury (filtered)	M24-Ja0024588	NCP	%	86			75-125	Pass	
Molybdenum (filtered)	M24-Ja0024588	NCP	%	79			75-125	Pass	
Nickel (filtered)	M24-Ja0024588	NCP	%	86			75-125	Pass	
Selenium (filtered)	M24-Ja0024588	NCP	%	88			75-125	Pass	
Silver (filtered)	M24-Ja0024588	NCP	%	105			75-125	Pass	
Strontium (filtered)	M24-Ja0024588	NCP	%	65			75-125	Fail	Q08
Uranium (filtered)	M24-Ja0024588	NCP	%	88			75-125	Pass	
Vanadium (filtered)	M24-Ja0024588	NCP	%	91			75-125	Pass	
Zinc (filtered)	M24-Ja0024588	NCP	%	89			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Ja0024093	NCP	%	102			75-125	Pass	
Magnesium	M24-Ja0024093	NCP	%	107			75-125	Pass	
Sodium	M24-Ja0024093	NCP	%	113			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)	M24-Ja0028719	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chloride	M24-Ja0028522	CP	mg/L	3200	3300	1.2	30%	Pass	
Fluoride	M24-Ja0022972	NCP	mg/L	2.1	2.1	1.0	30%	Pass	
Nitrate & Nitrite (as N)	M24-Ja0028719	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-Ja0028719	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Sulphate (as SO4)	M24-Ja0028522	CP	mg/L	5400	5400	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	N24-Ja0021742	NCP	mg/L	0.5	0.5	1.4	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ja0027411	NCP	mg/L	1100	1100	<1	30%	Pass	
Phosphate total (as P)	M24-Ja0026676	NCP	mg/L	1.0	1.0	4.7	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-Ja0024588	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M24-Ja0024588	NCP	mg/L	0.06	0.06	1.5	30%	Pass	
Beryllium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Ja0024588	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-Ja0024588	NCP	mg/L	0.003	0.003	<1	30%	Pass	
Copper (filtered)	M24-Ja0024588	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M24-Ja0024588	NCP	mg/L	7.2	7.3	1.7	30%	Pass	
Lead (filtered)	M24-Ja0024588	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	M24-Ja0024588	NCP	mg/L	0.23	0.23	1.9	30%	Pass	
Mercury (filtered)	M24-Ja0024588	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Ja0024588	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Ja0024588	NCP	mg/L	0.003	0.003	8.0	30%	Pass	
Selenium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-Ja0024588	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Strontium (filtered)	M24-Ja0024588	NCP	mg/L	0.36	0.36	2.0	30%	Pass	
Uranium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Ja0024588	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Ja0024588	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Ja0025969	NCP	mg/L	21	20	2.2	30%	Pass	
Magnesium	M24-Ja0025969	NCP	mg/L	39	38	2.8	30%	Pass	
Potassium	M24-Ja0025969	NCP	mg/L	4.5	4.4	3.4	30%	Pass	
Sodium	M24-Ja0025969	NCP	mg/L	290	280	4.2	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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
Caitlin Breeze	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.

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SA 5061

NATA Accredited
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Site Number 1254

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Attention: **Leon Faulkner**

Report **1048099-W**
Project name KAPUNDA
Project ID 2
Received Date Nov 27, 2023

Client Sample ID			**PP_231123_KPFRT02#2**	**PP_231123_KPFRT06#2**	**PP_231123_KPFRT03#1**	**PP_231123_KPFRT04#1**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065618**	**M23-No0065619**	**M23-No0065620**	**M23-No0065621**
Date Sampled			**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.6	0.22	0.59	0.02
Bromide	1	mg/L	1200	8.9	260	14
Chloride	1	mg/L	4000	2900	2900	2500
Conductivity (at 25 °C)	10	uS/cm	17000	13000	11000	9000
Fluoride	0.5	mg/L	< 0.5	6.4	2.1	5.6
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	19
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	0.04	19
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.5	4.48	0.41	2.18
pH (at 25 °C)	0.1	pH Units	2.6	3.8	3.6	7.1
Phosphorus reactive (as P)	0.01	mg/L	0.07	0.06	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	2000	11000	5600	4600
Sulphate (as SO4)	5	mg/L	5700	4600	2000	860
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.1	4.7	1.0	2.2
Total Nitrogen (as N)*	0.2	mg/L	3.1	4.7	1.0	21
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	92	71	490	60
Phosphate total (as P)	0.01	mg/L	0.07	0.06	< 0.01	< 0.01
Silicon (filtered)	0.5	mg/L	57	56	32	21
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	300
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	300
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	15	61	1.9	< 0.05
Arsenic (filtered)	0.001	mg/L	0.019	0.023	< 0.01	0.007
Barium (filtered)	0.02	mg/L	< 0.2	< 0.2	< 0.2	0.03
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.001
Boron (filtered)	0.05	mg/L	2.3	2.2	1.4	1.1
Cadmium (filtered)	0.0002	mg/L	0.044	0.032	0.0078	0.0006
Chromium (filtered)	0.001	mg/L	0.043	0.14	< 0.01	< 0.001
Cobalt (filtered)	0.001	mg/L	5.0	3.8	1.3	0.11
Copper (filtered)	0.001	mg/L	50	200	4.1	0.30
Iron (filtered)	0.05	mg/L	1100	450	260	< 0.05

Client Sample ID			PP_231123_KPFRT02#2	PP_231123_KPFRT06#2	PP_231123_KPFRT03#1	PP_231123_KPFRT04#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0065618	M23-No0065619	M23-No0065620	M23-No0065621
Date Sampled			Nov 23, 2023	Nov 23, 2023	Nov 23, 2023	Nov 23, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	< 0.01	0.019	< 0.01	< 0.001
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.005
Manganese (filtered)	0.005	mg/L	2.2	2.1	0.60	0.11
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.005
Nickel (filtered)	0.001	mg/L	7.8	6.3	2.1	0.18
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	0.015
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.005
Strontium (filtered)	0.005	mg/L	4.6	4.4	2.8	2.3
Uranium (filtered)	0.005	mg/L	0.13	0.16	< 0.05	0.034
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.005
Zinc (filtered)	0.005	mg/L	71	37	19	0.63
Alkali Metals						
Calcium	0.5	mg/L	450	490	230	150
Magnesium	0.5	mg/L	420	370	230	180
Potassium	0.5	mg/L	37	33	35	28
Sodium	0.5	mg/L	2300	1600	1600	1500

Client Sample ID			PP_231123_KPMON03#1	PP_231123_KPMON01#1	PP_231123_KPMON02#1	PP_241123_KPFRT02#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0065622	M23-No0065623	M23-No0065624	M23-No0065625
Date Sampled			Nov 23, 2023	Nov 23, 2023	Nov 23, 2023	Nov 24, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.67	0.22	0.75	1.4
Bromide	1	mg/L	6.9	61	31	9.3
Chloride	1	mg/L	2700	2100	1900	4500
Conductivity (at 25 °C)	10	uS/cm	12000	7500	7100	18000
Fluoride	0.5	mg/L	1.3	0.8	1.6	1.1
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.38	0.20	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.37	0.15	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	0.05	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.43	0.68	1.65	0.7
pH (at 25 °C)	0.1	pH Units	3.4	7.0	7.9	2.3
Phosphorus reactive (as P)	0.01	mg/L	0.01	< 0.01	< 0.01	0.04
Salinity (expressed as TDS)*	10	mg/L	10000	4900	1900	8200
Sulphate (as SO4)	5	mg/L	4000	690	530	5700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.1	0.9	2.4	2.1
Total Nitrogen (as N)*	0.2	mg/L	2.1	1.3	2.6	2.1
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	51	41	17	86
Phosphate total (as P)	0.01	mg/L	0.01	0.02	< 0.01	0.07
Silicon (filtered)	0.5	mg/L	29	18	< 5	57
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	160	200	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	160	200	< 20

Client Sample ID			PP_231123_KP MON03#1	PP_231123_KP MON01#1	PP_231123_KP MON02#1	PP_241123_KP FRT02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065622**	**M23-No0065623**	**M23-No0065624**	**M23-No0065625**
Date Sampled			**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**	**Nov 24, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.5	< 0.05	< 0.05	16
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.001	0.003	0.018
Barium (filtered)	0.02	mg/L	< 0.2	0.04	0.07	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	1.6	0.94	0.82	2.6
Cadmium (filtered)	0.0002	mg/L	< 0.002	0.0002	< 0.0002	0.045
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.001	0.13
Cobalt (filtered)	0.001	mg/L	1.9	0.047	0.004	4.9
Copper (filtered)	0.001	mg/L	2.6	0.049	0.004	51
Iron (filtered)	0.05	mg/L	630	0.37	< 0.05	950
Lead (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.001	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05	0.031	0.065	< 0.05
Manganese (filtered)	0.005	mg/L	1.4	0.10	0.15	2.3
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.0001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	0.008	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	3.2	0.092	0.020	7.7
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.001	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	3.5	2.2	1.6	4.7
Uranium (filtered)	0.005	mg/L	< 0.05	0.007	0.016	0.13
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	37	0.46	0.10	73
Alkali Metals						
Calcium	0.5	mg/L	400	130	53	470
Magnesium	0.5	mg/L	400	130	63	430
Potassium	0.5	mg/L	40	33	53	29
Sodium	0.5	mg/L	1600	1300	1300	2500

Client Sample ID			PP_241123_KP FRT06#1	PP_241123_KP FRT03#1	PP_241123_KP FRT04#1	PP_241123_KP MON03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065626**	**M23-No0065627**	**M23-No0065628**	**M23-No0065629**
Date Sampled			**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.19	0.93	0.11	0.69
Bromide	1	mg/L	7.7	230	9.9	9.3
Chloride	1	mg/L	2800	2700	2500	2600
Conductivity (at 25 °C)	10	uS/cm	14000	11000	9200	12000
Fluoride	0.5	mg/L	1.8	5.5	3.1	5.4
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.06	14	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.05	14	0.03
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	5.31	0.37	1.09	1.01
pH (at 25 °C)	0.1	pH Units	3.6	3.7	6.9	3.5
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	6800	6700	5200	7200

Client Sample ID			PP_241123_KPFRT06#1	PP_241123_KPFRT03#1	PP_241123_KPFRT04#1	PP_241123_KPMON03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065626**	**M23-No0065627**	**M23-No0065628**	**M23-No0065629**
Date Sampled			**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**
Test/Reference	LOR	Unit				
Sulphate (as SO4)	5	mg/L	4500	2100	790	3900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	5.5	1.3	1.2	1.7
Total Nitrogen (as N)*	0.2	mg/L	5.5	1.4	15	1.7
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	83	71	100	13
Phosphate total (as P)	0.01	mg/L	0.07	< 0.01	< 0.01	0.02
Silicon (filtered)	0.5	mg/L	58	32	19	26
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	420	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	420	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	62	2.2	< 0.05	< 0.5
Arsenic (filtered)	0.001	mg/L	0.022	< 0.01	0.006	< 0.01
Barium (filtered)	0.02	mg/L	< 0.2	< 0.2	0.03	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	2.3	1.5	1.1	1.6
Cadmium (filtered)	0.0002	mg/L	0.034	0.0089	0.0006	< 0.002
Chromium (filtered)	0.001	mg/L	0.11	< 0.01	< 0.001	< 0.01
Cobalt (filtered)	0.001	mg/L	4.0	1.6	0.15	2.0
Copper (filtered)	0.001	mg/L	210	4.2	0.54	2.6
Iron (filtered)	0.05	mg/L	460	340	< 0.05	500
Lead (filtered)	0.001	mg/L	0.017	< 0.01	< 0.001	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Manganese (filtered)	0.005	mg/L	2.2	0.76	0.15	1.4
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	6.5	2.6	0.25	3.3
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	0.014	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	4.4	3.0	2.4	3.4
Uranium (filtered)	0.005	mg/L	0.16	< 0.05	0.043	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	37	21	0.72	35
Alkali Metals						
Calcium	0.5	mg/L	500	230	150	360
Magnesium	0.5	mg/L	390	220	170	360
Potassium	0.5	mg/L	34	34	27	36
Sodium	0.5	mg/L	1700	1500	1400	1400

Client Sample ID			PP_241123_KP MON01#1	PP_241123_KP MON02#1	PP_241123_KP FRT04#2	PP_241123_KP FRT03#2
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065630**	**M23-No0065631**	**M23-No0065632**	**M23-No0065633**
Date Sampled			**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.26	0.78	0.17	0.84
Bromide	1	mg/L	56	27	7.8	210
Chloride	1	mg/L	2000	1900	2600	2800
Conductivity (at 25 °C)	10	uS/cm	7500	7200	9400	12000
Fluoride	0.5	mg/L	2.1	3.7	2.2	1.4
Nitrate & Nitrite (as N)	0.05	mg/L	0.07	0.07	10	0.05
Nitrate (as N)	0.02	mg/L	0.07	0.06	10	0.05
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	0.03	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.24	2.22	0.63	0.36
pH (at 25 °C)	0.1	pH Units	7.5	7.4	6.4	3.5
Phosphorus reactive (as P)	0.01	mg/L	0.02	< 0.01	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	3800	3700	5200	10000
Sulphate (as SO4)	5	mg/L	610	530	780	3000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.5	3.0	0.8	1.2
Total Nitrogen (as N)*	0.2	mg/L	0.6	3.1	11	1.3
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	44	52	59	70
Phosphate total (as P)	0.01	mg/L	0.03	0.01	< 0.01	0.02
Silicon (filtered)	0.5	mg/L	18	< 5	18	39
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	280	230	340	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	280	230	340	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	4.4
Arsenic (filtered)	0.001	mg/L	0.001	0.003	0.004	< 0.01
Barium (filtered)	0.02	mg/L	0.04	0.07	0.03	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	0.97	0.82	1.1	1.7
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	0.0010	0.015
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.01
Cobalt (filtered)	0.001	mg/L	0.032	0.004	0.21	2.4
Copper (filtered)	0.001	mg/L	< 0.001	0.003	1.5	5.5
Iron (filtered)	0.05	mg/L	0.08	< 0.05	< 0.05	500
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.01
Lithium (filtered)	0.005	mg/L	0.030	0.064	< 0.005	< 0.05
Manganese (filtered)	0.005	mg/L	0.099	0.17	0.15	1.1
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	0.007	< 0.005	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	0.067	0.021	0.35	3.7
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001	0.011	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	2.3	1.6	2.5	3.3
Uranium (filtered)	0.005	mg/L	0.006	0.016	0.052	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	0.075	0.040	1.0	33

Client Sample ID			PP_241123_KPMON01#1	PP_241123_KPMON02#1	PP_241123_KPFRT04#2	PP_241123_KPFRT03#2
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0065630	M23-No0065631	M23-No0065632	M23-No0065633
Date Sampled			Nov 24, 2023	Nov 24, 2023	Nov 24, 2023	Nov 24, 2023
Test/Reference	LOR	Unit				
Alkali Metals						
Calcium	0.5	mg/L	120	50	150	280
Magnesium	0.5	mg/L	120	58	180	270
Potassium	0.5	mg/L	30	50	28	38
Sodium	0.5	mg/L	1200	1200	1400	1600

Client Sample ID			PP_241123_KPFRT06#2	PP_241123_KPMON01#2	PP_241123_KPMON03#2	PP_241123_KPMON02#2
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0065634	M23-No0065635	M23-No0065636	M23-No0065637
Date Sampled			Nov 24, 2023	Nov 24, 2023	Nov 24, 2023	Nov 24, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.20	0.36	0.73	0.85
Bromide	1	mg/L	8.4	35	5.8	10
Chloride	1	mg/L	2800	2000	2600	1900
Conductivity (at 25 °C)	10	uS/cm	13000	7600	12000	7200
Fluoride	0.5	mg/L	6.6	11	1.8	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	4.8	0.54	0.97	1.15
pH (at 25 °C)	0.1	pH Units	3.7	7.3	3.5	7.3
Phosphorus reactive (as P)	0.01	mg/L	0.01	0.02	0.02	< 0.01
Salinity (expressed as TDS)*	10	mg/L	9000	4500	10000	490
Sulphate (as SO4)	5	mg/L	4300	610	3900	550
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	5.0	0.9	1.7	2.0
Total Nitrogen (as N)*	0.2	mg/L	5.0	0.9	1.7	2.0
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	200	54	100	< 5
Phosphate total (as P)	0.01	mg/L	0.07	0.03	0.03	< 0.01
Silicon (filtered)	0.5	mg/L	58	19	28	< 5
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	270	< 20	170
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	270	< 20	170
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	69	< 0.05	< 0.5	< 0.05
Arsenic (filtered)	0.001	mg/L	0.028	< 0.001	< 0.01	0.002
Barium (filtered)	0.02	mg/L	< 0.2	0.04	< 0.2	0.07
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.01	< 0.001
Boron (filtered)	0.05	mg/L	2.3	0.97	1.5	0.82
Cadmium (filtered)	0.0002	mg/L	0.034	0.0004	0.0021	< 0.0002
Chromium (filtered)	0.001	mg/L	0.064	< 0.001	< 0.01	< 0.001
Cobalt (filtered)	0.001	mg/L	4.0	0.058	1.9	0.007
Copper (filtered)	0.001	mg/L	260	0.36	2.5	0.005
Iron (filtered)	0.05	mg/L	470	0.16	490	0.52
Lead (filtered)	0.001	mg/L	0.022	< 0.001	< 0.01	< 0.001

Client Sample ID			PP_241123_KP FRT06#2	PP_241123_KP MON01#2	PP_241123_KP MON03#2	PP_241123_KP MON02#2
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065634**	**M23-No0065635**	**M23-No0065636**	**M23-No0065637**
Date Sampled			**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**	**Nov 24, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Lithium (filtered)	0.005	mg/L	< 0.05	0.030	< 0.05	0.062
Manganese (filtered)	0.005	mg/L	2.0	0.11	1.4	0.21
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.0001	< 0.001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.5	0.007	< 0.05	< 0.005
Nickel (filtered)	0.001	mg/L	6.6	0.11	3.1	0.026
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.01	< 0.001
Silver (filtered)	0.005	mg/L	< 0.5	< 0.005	< 0.05	< 0.005
Strontium (filtered)	0.005	mg/L	4.5	2.3	3.5	1.6
Uranium (filtered)	0.005	mg/L	0.17	0.006	< 0.05	0.018
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.05	< 0.005
Zinc (filtered)	0.005	mg/L	38	0.48	36	0.073
Alkali Metals						
Calcium	0.5	mg/L	490	130	390	56
Magnesium	0.5	mg/L	380	130	390	64
Potassium	0.5	mg/L	33	32	39	51
Sodium	0.5	mg/L	1700	1200	1600	1200

Client Sample ID			PP_241123_KP FRT02#2	PP_251123_KP FRT02#1	PP_251123_KP FRT06#1	PP_251123_KP FRT03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065638**	**M23-No0065639**	**M23-No0065640**	**M23-No0065641**
Date Sampled			**Nov 24, 2023**	**Nov 25, 2023**	**Nov 25, 2023**	**Nov 25, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.3	1.2	0.21	0.98
Bromide	1	mg/L	2100	2100	24	150
Chloride	1	mg/L	4800	4600	2900	2700
Conductivity (at 25 °C)	10	uS/cm	20000	21000	14000	12000
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5	0.8
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	0.03
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.6	1.2	5.29	0.62
pH (at 25 °C)	0.1	pH Units	2.1	1.9	3.7	3.7
Phosphorus reactive (as P)	0.01	mg/L	0.02	0.06	< 0.01	0.01
Salinity (expressed as TDS)*	10	mg/L	16000	16000	13000	9000
Sulphate (as SO4)	5	mg/L	5700	5500	4500	2700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.9	2.4	5.5	1.6
Total Nitrogen (as N)*	0.2	mg/L	2.9	2.4	5.5	1.6
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	150	97	92	52
Phosphate total (as P)	0.01	mg/L	0.07	0.08	0.11	0.02
Silicon (filtered)	0.5	mg/L	58	58	57	37
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20

Client Sample ID			PP_241123_KPFRT02#2	PP_251123_KPFRT02#1	PP_251123_KPFRT06#1	PP_251123_KPFRT03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065638**	**M23-No0065639**	**M23-No0065640**	**M23-No0065641**
Date Sampled			**Nov 24, 2023**	**Nov 25, 2023**	**Nov 25, 2023**	**Nov 25, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	17	15	67	3.4
Arsenic (filtered)	0.001	mg/L	0.016	0.018	0.027	< 0.01
Barium (filtered)	0.02	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	2.4	2.6	2.1	1.5
Cadmium (filtered)	0.0002	mg/L	0.045	0.043	0.034	0.012
Chromium (filtered)	0.001	mg/L	0.074	0.085	0.068	< 0.05
Cobalt (filtered)	0.001	mg/L	5.3	4.8	3.9	2.1
Copper (filtered)	0.001	mg/L	66	50	210	4.7
Iron (filtered)	0.05	mg/L	1000	1000	460	450
Lead (filtered)	0.001	mg/L	0.013	0.015	0.020	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	2.5	2.3	1.9	0.97
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	8.1	7.5	6.4	3.2
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Strontium (filtered)	0.005	mg/L	4.8	4.7	4.4	3.1
Uranium (filtered)	0.005	mg/L	0.14	0.13	0.17	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc (filtered)	0.005	mg/L	74	73	38	29
Alkali Metals						
Calcium	0.5	mg/L	480	470	480	270
Magnesium	0.5	mg/L	440	440	370	260
Potassium	0.5	mg/L	22	22	33	37
Sodium	0.5	mg/L	2600	2600	1700	1600

Client Sample ID			PP_251123_KPFRT04#1	PP_251123_KPMON03#1	PP_251123_KPMON01#1	PP_251123_KPMON02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065642**	**M23-No0065643**	**M23-No0065644**	**M23-No0065645**
Date Sampled			**Nov 25, 2023**	**Nov 25, 2023**	**Nov 25, 2023**	**Nov 26, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.04	0.70	0.31	0.31
Bromide	1	mg/L	25	1.2	22	9.4
Chloride	1	mg/L	2500	2600	2000	2100
Conductivity (at 25 °C)	10	uS/cm	9200	12000	7800	7800
Fluoride	0.5	mg/L	27	78	21	13
Nitrate & Nitrite (as N)	0.05	mg/L	13	0.08	1.7	< 0.05
Nitrate (as N)	0.02	mg/L	13	0.08	1.7	< 0.02
Nitrite (as N)	0.02	mg/L	0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.76	1.4	0.29	< 0.2
pH (at 25 °C)	0.1	pH Units	6.8	3.5	6.8	6.7
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	0.02	< 0.01
Salinity (expressed as TDS)*	10	mg/L	4700	8600	3100	4500

Client Sample ID			PP_251123_KP FRT04#1	PP_251123_KP MON03#1	PP_251123_KP MON01#1	PP_251123_KP MON02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065642**	**M23-No0065643**	**M23-No0065644**	**M23-No0065645**
Date Sampled			**Nov 25, 2023**	**Nov 25, 2023**	**Nov 25, 2023**	**Nov 26, 2023**
Test/Reference	LOR	Unit				
Sulphate (as SO4)	5	mg/L	790	3900	610	660
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.8	2.1	0.6	0.4
Total Nitrogen (as N)*	0.2	mg/L	14	2.2	2.3	0.4
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	74	41	63	58
Phosphate total (as P)	0.01	mg/L	< 0.01	0.02	0.05	< 0.01
Silicon (filtered)	0.5	mg/L	20	29	19	7.3
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	330	< 20	230	260
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	330	< 20	230	260
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.5	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	0.004	< 0.01	0.002	< 0.001
Barium (filtered)	0.02	mg/L	0.03	< 0.2	0.05	0.06
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.01	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	1.1	1.5	0.95	1.0
Cadmium (filtered)	0.0002	mg/L	0.0007	< 0.002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.01	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	0.15	1.9	0.007	0.10
Copper (filtered)	0.001	mg/L	0.37	2.5	< 0.001	< 0.001
Iron (filtered)	0.05	mg/L	0.49	500	0.60	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.01	< 0.001	< 0.001
Lithium (filtered)	0.005	mg/L	< 0.005	< 0.05	0.031	0.030
Manganese (filtered)	0.005	mg/L	0.17	1.4	0.088	0.95
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.001	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.05	0.006	< 0.005
Nickel (filtered)	0.001	mg/L	0.25	3.2	0.027	0.078
Selenium (filtered)	0.001	mg/L	0.014	< 0.01	< 0.001	< 0.001
Silver (filtered)	0.005	mg/L	< 0.005	< 0.05	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	2.4	3.5	2.3	1.9
Uranium (filtered)	0.005	mg/L	0.042	< 0.05	< 0.005	0.059
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.05	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.71	36	0.089	0.023
Alkali Metals						
Calcium	0.5	mg/L	150	400	130	110
Magnesium	0.5	mg/L	180	410	130	100
Potassium	0.5	mg/L	28	40	32	36
Sodium	0.5	mg/L	1500	1600	1200	1300

Client Sample ID			PP_261123_KPFRT02#1	PP_261123_KPFRT06#1	PP_261123_KPFRT03#1	PP_261123_KPMON03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065646**	**M23-No0065647**	**M23-No0065648**	**M23-No0065649**
Date Sampled			**Nov 26, 2023**	**Nov 26, 2023**	**Nov 26, 2023**	**Nov 26, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.2	0.16	0.92	0.73
Bromide	1	mg/L	< 1	9.5	< 1	10
Chloride	1	mg/L	4700	2800	2800	2500
Conductivity (at 25 °C)	10	uS/cm	21000	14000	12000	12000
Fluoride	0.5	mg/L	< 0.5	30	< 0.5	17
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	0.07	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	0.06	0.04
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.9	5.04	< 0.2	1.17
pH (at 25 °C)	0.1	pH Units	1.9	3.7	3.7	3.4
Phosphorus reactive (as P)	0.01	mg/L	0.03	0.02	0.01	0.01
Salinity (expressed as TDS)*	10	mg/L	13000	9100	8300	9400
Sulphate (as SO4)	5	mg/L	5500	4500	2800	3900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.1	5.2	1.1	1.9
Total Nitrogen (as N)*	0.2	mg/L	2.1	5.2	1.2	1.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	94	39	80	74
Phosphate total (as P)	0.01	mg/L	0.07	0.08	0.01	0.03
Silicon (filtered)	0.5	mg/L	56	59	37	28
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	15	71	3.1	< 0.5
Arsenic (filtered)	0.001	mg/L	0.018	0.031	< 0.01	0.012
Barium (filtered)	0.02	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	2.4	2.4	1.5	1.5
Cadmium (filtered)	0.0002	mg/L	0.043	0.035	0.013	< 0.002
Chromium (filtered)	0.001	mg/L	0.16	0.085	< 0.01	< 0.01
Cobalt (filtered)	0.001	mg/L	4.7	4.0	2.2	2.0
Copper (filtered)	0.001	mg/L	51	200	5.5	2.2
Iron (filtered)	0.05	mg/L	910	490	460	490
Lead (filtered)	0.001	mg/L	0.015	0.022	< 0.01	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	2.3	1.9	0.98	1.4
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	7.5	6.6	3.4	3.3
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Strontium (filtered)	0.005	mg/L	4.7	4.4	3.3	3.6
Uranium (filtered)	0.005	mg/L	0.13	0.19	< 0.05	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc (filtered)	0.005	mg/L	73	38	31	39

Client Sample ID			PP_261123_KPFRT02#1	PP_261123_KPFRT06#1	PP_261123_KPFRT03#1	PP_261123_KPMON03#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-No0065646	M23-No0065647	M23-No0065648	M23-No0065649
Date Sampled			Nov 26, 2023	Nov 26, 2023	Nov 26, 2023	Nov 26, 2023
Test/Reference	LOR	Unit				
Alkali Metals						
Calcium	0.5	mg/L	460	490	280	390
Magnesium	0.5	mg/L	440	380	270	390
Potassium	0.5	mg/L	21	33	37	38
Sodium	0.5	mg/L	2600	1700	1600	1600

Client Sample ID			PP_261123_KPFRT04#1	PP_271123_KPMON02#1	PP_261123_KPMON01#1
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M23-No0065650	M23-No0065651	M23-No0065652
Date Sampled			Nov 26, 2023	Nov 26, 2023	Nov 26, 2023
Test/Reference	LOR	Unit			
Ammonia (as N)	0.01	mg/L	0.04	0.25	0.36
Bromide	1	mg/L	< 1	10	23
Chloride	1	mg/L	2400	2100	1900
Conductivity (at 25 °C)	10	uS/cm	9100	7800	7400
Fluoride	0.5	mg/L	< 0.5	7.0	0.9
Nitrate & Nitrite (as N)	0.05	mg/L	15	0.09	0.20
Nitrate (as N)	0.02	mg/L	15	0.08	0.20
Nitrite (as N)	0.02	mg/L	0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.96	0.55	0.34
pH (at 25 °C)	0.1	pH Units	6.5	6.8	6.9
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	0.02
Salinity (expressed as TDS)*	10	mg/L	4900	3900	4100
Sulphate (as SO4)	5	mg/L	810	630	580
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	0.8	0.7
Total Nitrogen (as N)*	0.2	mg/L	16	0.9	0.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	64	41	42
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	0.06
Silicon (filtered)	0.5	mg/L	18	7.0	19
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	380	290	260
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	380	290	260
Heavy Metals					
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	0.003	< 0.001	0.002
Barium (filtered)	0.02	mg/L	0.02	0.05	0.05
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	1.1	1.1	0.96
Cadmium (filtered)	0.0002	mg/L	0.0006	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	0.12	0.11	0.003
Copper (filtered)	0.001	mg/L	0.17	< 0.001	< 0.001
Iron (filtered)	0.05	mg/L	0.33	0.09	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001

Client Sample ID			PP_261123_KPFRT04#1	PP_271123_KPMON02#1	PP_261123_KPMON01#1
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0065650**	**M23-No0065651**	**M23-No0065652**
Date Sampled			**Nov 26, 2023**	**Nov 26, 2023**	**Nov 26, 2023**
Test/Reference	LOR	Unit			
Heavy Metals					
Lithium (filtered)	0.005	mg/L	< 0.005	0.029	0.032
Manganese (filtered)	0.005	mg/L	0.13	0.83	0.058
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	0.007
Nickel (filtered)	0.001	mg/L	0.21	0.091	0.016
Selenium (filtered)	0.001	mg/L	0.011	< 0.001	0.002
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	2.3	1.9	2.4
Uranium (filtered)	0.005	mg/L	0.028	0.052	< 0.005
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.46	0.013	0.050
Alkali Metals					
Calcium	0.5	mg/L	150	110	130
Magnesium	0.5	mg/L	180	110	120
Potassium	0.5	mg/L	28	37	31
Sodium	0.5	mg/L	1500	1300	1200

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	Nov 28, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 28, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 27, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 28, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 28, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Nov 28, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Nov 28, 2023	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 28, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Nov 28, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Nov 28, 2023	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Nov 28, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Nov 28, 2023	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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Company Name: Envirocopper Ltd
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SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1048099
Phone: 08 7127 1110
Fax:

Received: Nov 27, 2023 4:46 PM
Due: Nov 30, 2023
Priority: 3 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_231123_KPFRT02#2	Nov 23, 2023		Water	M23-No0065618	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
2	PP_231123_KPFRT06#2	Nov 23, 2023		Water	M23-No0065619	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
3	PP_231123_KPFRT03#1	Nov 23, 2023		Water	M23-No0065620	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
4	PP_231123_KPFRT04#1	Nov 23, 2023		Water	M23-No0065621	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
5	PP_231123_KPMON03#1	Nov 23, 2023		Water	M23-No0065622	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
6	PP_231123_KPMON01#1	Nov 23, 2023		Water	M23-No0065623	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
7	PP_231123_KPMON02#1	Nov 23, 2023		Water	M23-No0065624	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
8	PP_241123_KPFRT02#1	Nov 24, 2023		Water	M23-No0065625	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

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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	X	X	X	X	X	X	X	X	X	X	X	X
9	PP_241123_KPFRT06#1	Nov 24, 2023		Water	M23-No0065626	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
10	PP_241123_KPFRT03#1	Nov 24, 2023		Water	M23-No0065627	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
11	PP_241123_KPFRT04#1	Nov 24, 2023		Water	M23-No0065628	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
12	PP_241123_KPMON03#1	Nov 24, 2023		Water	M23-No0065629	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
13	PP_241123_KPMON01#1	Nov 24, 2023		Water	M23-No0065630	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
14	PP_241123_KPMON02#1	Nov 24, 2023		Water	M23-No0065631	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
15	PP_241123_KPFRT04#2	Nov 24, 2023		Water	M23-No0065632	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
16	PP_241123_KPFRT03#2	Nov 24, 2023		Water	M23-No0065633	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
17	PP_241123_KPFRT06#2	Nov 24, 2023		Water	M23-No0065634	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
18	PP_241123_K	Nov 24, 2023		Water	M23-No0065635	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

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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	X	X	X	X	X	X	X	X	X	X	X	X
18	PP_241123_KPMON01#2	Nov 24, 2023		Water	M23-No0065635																																
19	PP_241123_KPMON03#2	Nov 24, 2023		Water	M23-No0065636	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
20	PP_241123_KPMON02#2	Nov 24, 2023		Water	M23-No0065637	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
21	PP_241123_KPFRT02#2	Nov 24, 2023		Water	M23-No0065638	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
22	PP_251123_KPFRT02#1	Nov 25, 2023		Water	M23-No0065639	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
23	PP_251123_KPFRT06#1	Nov 25, 2023		Water	M23-No0065640	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
24	PP_251123_KPFRT03#1	Nov 25, 2023		Water	M23-No0065641	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
25	PP_251123_KPFRT04#1	Nov 25, 2023		Water	M23-No0065642	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
26	PP_251123_KPMON03#1	Nov 25, 2023		Water	M23-No0065643	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
27	PP_251123_K	Nov 25, 2023		Water	M23-No0065644	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

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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	X	X	X	X	X	X	X	X	X	X	X	X
	PMON01#1																																				
28	PP_251123_KPMON02#1	Nov 26, 2023		Water	M23-No0065645	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
29	PP_261123_KPFRT02#1	Nov 26, 2023		Water	M23-No0065646	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
30	PP_261123_KPFRT06#1	Nov 26, 2023		Water	M23-No0065647	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
31	PP_261123_KPFRT03#1	Nov 26, 2023		Water	M23-No0065648	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
32	PP_261123_KPMON03#1	Nov 26, 2023		Water	M23-No0065649	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
33	PP_261123_KPFRT04#1	Nov 26, 2023		Water	M23-No0065650	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
34	PP_271123_KPMON02#1	Nov 26, 2023		Water	M23-No0065651	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
35	PP_261123_KPMON01#1	Nov 26, 2023		Water	M23-No0065652	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
Test Counts						35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	118			70-130	Pass	
Bromide	%	88			70-130	Pass	
Chloride	%	119			70-130	Pass	
Fluoride	%	92			70-130	Pass	
Nitrate & Nitrite (as N)	%	103			70-130	Pass	
Nitrite (as N)	%	92			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)	%	80			70-130	Pass	
Sulphate (as SO4)	%	107			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	125			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	94			70-130	Pass	
Phosphate total (as P)	%	100			70-130	Pass	
Silicon (filtered)	%	96			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	70			70-130	Pass	
Total Alkalinity (as CaCO3)	%	77			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	96			80-120	Pass	
Arsenic (filtered)	%	89			80-120	Pass	
Boron (filtered)	%	108			80-120	Pass	
Cadmium (filtered)	%	90			80-120	Pass	
Chromium (filtered)	%	97			80-120	Pass	
Cobalt (filtered)	%	97			80-120	Pass	
Copper (filtered)	%	97			80-120	Pass	
Iron (filtered)	%	97			80-120	Pass	
Lead (filtered)	%	95			80-120	Pass	
Lithium (filtered)	%	120			80-120	Pass	
Manganese (filtered)	%	97			80-120	Pass	
Mercury (filtered)	%	90			80-120	Pass	
Molybdenum (filtered)	%	92			80-120	Pass	
Nickel (filtered)	%	97			80-120	Pass	
Selenium (filtered)	%	91			80-120	Pass	
Silver (filtered)	%	91			80-120	Pass	
Strontium (filtered)	%	95			80-120	Pass	
Uranium (filtered)	%	96			80-120	Pass	
Zinc (filtered)	%	94			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	95			80-120	Pass	
Magnesium	%	97			80-120	Pass	
Potassium	%	95			80-120	Pass	
Sodium	%	97			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-No0065619	CP	%	86			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-No0065619	CP	%	93			75-125	Pass	
Magnesium	M23-No0065619	CP	%	90			75-125	Pass	
Potassium	M23-No0065619	CP	%	79			75-125	Pass	
Sodium	M23-No0065619	CP	%	87			75-125	Pass	
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	M23-No0065627	CP	%	103			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M23-No0065628	CP	%	111			75-125	Pass	
Arsenic (filtered)	M23-No0065628	CP	%	117			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Barium (filtered)	M23-No0065628	CP	%	112			75-125	Pass	
Beryllium (filtered)	M23-No0065628	CP	%	104			75-125	Pass	
Cadmium (filtered)	M23-No0065628	CP	%	100			75-125	Pass	
Chromium (filtered)	M23-No0065628	CP	%	109			75-125	Pass	
Cobalt (filtered)	M23-No0065628	CP	%	100			75-125	Pass	
Copper (filtered)	M23-No0065628	CP	%	64			75-125	Fail	Q08
Iron (filtered)	M23-No0065628	CP	%	128			75-125	Fail	Q08
Lead (filtered)	M23-No0065628	CP	%	98			75-125	Pass	
Lithium (filtered)	M23-No0065628	CP	%	105			75-125	Pass	
Manganese (filtered)	M23-No0065628	CP	%	107			75-125	Pass	
Mercury (filtered)	M23-No0065628	CP	%	101			75-125	Pass	
Molybdenum (filtered)	M23-No0065628	CP	%	118			75-125	Pass	
Nickel (filtered)	M23-No0065628	CP	%	89			75-125	Pass	
Selenium (filtered)	M23-No0065628	CP	%	107			75-125	Pass	
Silver (filtered)	M23-No0065628	CP	%	109			75-125	Pass	
Uranium (filtered)	M23-No0065628	CP	%	106			75-125	Pass	
Vanadium (filtered)	M23-No0065628	CP	%	107			75-125	Pass	
Zinc (filtered)	M23-No0065628	CP	%	53			75-125	Fail	Q08
Spike - % Recovery									
				Result 1					
Fluoride	M23-No0065629	CP	%	74			70-130	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-No0065630	CP	%	81			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-No0065630	CP	%	86			75-125	Pass	
Magnesium	M23-No0065630	CP	%	86			75-125	Pass	
Potassium	M23-No0065630	CP	%	76			75-125	Pass	
Sodium	M23-No0065630	CP	%	85			75-125	Pass	
Spike - % Recovery									
				Result 1					
Total Kjeldahl Nitrogen (as N)	M23-No0065633	CP	%	95			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M23-No0065636	CP	%	80			70-130	Pass	
Nitrite (as N)	M23-No0065636	CP	%	80			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	M23-No0065637	CP	%	105			70-130	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-No0065640	CP	%	88			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-No0065640	CP	%	94			75-125	Pass	
Magnesium	M23-No0065640	CP	%	94			75-125	Pass	
Potassium	M23-No0065640	CP	%	80			75-125	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-No0065643	CP	%	84			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-No0065643	CP	%	89			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Magnesium	M23-No0065643	CP	%	89			75-125	Pass	
Potassium	M23-No0065643	CP	%	80			75-125	Pass	
Sodium	M23-No0065643	CP	%	81			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Fluoride	M23-No0065618	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0065618	CP	mg/L	15	15	3.4	30%	Pass	
Arsenic (filtered)	M23-No0065618	CP	mg/L	0.019	0.020	8.4	30%	Pass	
Barium (filtered)	M23-No0065618	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Beryllium (filtered)	M23-No0065618	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-No0065618	CP	mg/L	2.3	2.5	5.4	30%	Pass	
Cadmium (filtered)	M23-No0065618	CP	mg/L	0.044	0.045	2.8	30%	Pass	
Chromium (filtered)	M23-No0065618	CP	mg/L	0.043	0.043	1.9	30%	Pass	
Cobalt (filtered)	M23-No0065618	CP	mg/L	5.0	4.6	8.5	30%	Pass	
Copper (filtered)	M23-No0065618	CP	mg/L	50	47	4.3	30%	Pass	
Iron (filtered)	M23-No0065618	CP	mg/L	1100	1100	<1	30%	Pass	
Lead (filtered)	M23-No0065618	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Lithium (filtered)	M23-No0065618	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-No0065618	CP	mg/L	2.2	2.1	6.9	30%	Pass	
Mercury (filtered)	M23-No0065618	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-No0065618	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-No0065618	CP	mg/L	7.8	7.3	6.2	30%	Pass	
Selenium (filtered)	M23-No0065618	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silver (filtered)	M23-No0065618	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium (filtered)	M23-No0065618	CP	mg/L	4.6	4.5	1.4	30%	Pass	
Uranium (filtered)	M23-No0065618	CP	mg/L	0.13	0.12	2.2	30%	Pass	
Vanadium (filtered)	M23-No0065618	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-No0065618	CP	mg/L	71	71	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Silicon (filtered)	M23-No0065619	CP	mg/L	56	55	1.2	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-No0065619	CP	mg/L	490	490	<1	30%	Pass	
Magnesium	M23-No0065619	CP	mg/L	370	370	<1	30%	Pass	
Potassium	M23-No0065619	CP	mg/L	33	33	<1	30%	Pass	
Sodium	M23-No0065619	CP	mg/L	1600	1700	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Fluoride	M23-No0065620	CP	mg/L	2.1	2.7	25	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0065621	CP	mg/L	0.02	0.03	15	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0065621	CP	mg/L	19	19	3.0	30%	Pass	
Nitrate (as N)	M23-No0065621	CP	mg/L	19	19	3.0	30%	Pass	
Nitrite (as N)	M23-No0065621	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-No0065623	CP	mg/L	2100	2200	1.2	30%	Pass	
Sulphate (as SO4)	M23-No0065623	CP	mg/L	690	690	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0065624	CP	mg/L	0.75	0.75	<1	30%	Pass	
Chloride	M23-No0065624	CP	mg/L	1900	1900	<1	30%	Pass	
Nitrite (as N)	M23-No0065624	CP	mg/L	0.05	0.05	1.4	30%	Pass	
Sulphate (as SO4)	M23-No0065624	CP	mg/L	530	530	1.6	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25 °C)	M23-No0065625	CP	uS/cm	18000	19000	<1	30%	Pass	
pH (at 25 °C)	M23-No0065625	CP	pH Units	2.3	2.3	pass	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-No0065625	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-No0065625	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-No0065625	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-No0065625	CP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	M23-No0065627	CP	mg/L	71	84	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Fluoride	M23-No0065628	CP	mg/L	3.1	3.2	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0065628	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M23-No0065628	CP	mg/L	0.006	0.006	1.1	30%	Pass	
Barium (filtered)	M23-No0065628	CP	mg/L	0.03	0.03	<1	30%	Pass	
Beryllium (filtered)	M23-No0065628	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M23-No0065628	CP	mg/L	1.1	1.1	<1	30%	Pass	
Cadmium (filtered)	M23-No0065628	CP	mg/L	0.0006	0.0006	2.7	30%	Pass	
Chromium (filtered)	M23-No0065628	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M23-No0065628	CP	mg/L	0.15	0.15	<1	30%	Pass	
Copper (filtered)	M23-No0065628	CP	mg/L	0.54	0.54	1.3	30%	Pass	
Iron (filtered)	M23-No0065628	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M23-No0065628	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M23-No0065628	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	M23-No0065628	CP	mg/L	0.15	0.15	<1	30%	Pass	
Mercury (filtered)	M23-No0065628	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M23-No0065628	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M23-No0065628	CP	mg/L	0.25	0.24	<1	30%	Pass	
Selenium (filtered)	M23-No0065628	CP	mg/L	0.014	0.014	2.9	30%	Pass	
Silver (filtered)	M23-No0065628	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M23-No0065628	CP	mg/L	2.4	2.4	<1	30%	Pass	
Uranium (filtered)	M23-No0065628	CP	mg/L	0.043	0.043	<1	30%	Pass	
Vanadium (filtered)	M23-No0065628	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M23-No0065628	CP	mg/L	0.72	0.72	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25 °C)	M23-No0065629	CP	uS/cm	12000	12000	<1	30%	Pass	
pH (at 25 °C)	M23-No0065629	CP	pH Units	3.5	3.5	pass	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-No0065629	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-No0065629	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-No0065629	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-No0065629	CP	mg/L	< 20	< 20	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Silicon (filtered)	M23-No0065630	CP	mg/L	18	17	2.6	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-No0065630	CP	mg/L	120	120	1.7	30%	Pass	
Magnesium	M23-No0065630	CP	mg/L	120	120	2.0	30%	Pass	
Potassium	M23-No0065630	CP	mg/L	30	29	2.2	30%	Pass	
Sodium	M23-No0065630	CP	mg/L	1200	1100	1.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-No0065633	CP	mg/L	2800	2800	1.1	30%	Pass	
Sulphate (as SO4)	M23-No0065633	CP	mg/L	3000	3000	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0065635	CP	mg/L	0.36	0.37	1.1	30%	Pass	
Nitrate & Nitrite (as N)	M23-No0065635	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M23-No0065635	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0065638	CP	mg/L	17	16	5.8	30%	Pass	
Arsenic (filtered)	M23-No0065638	CP	mg/L	0.016	0.016	<1	30%	Pass	
Barium (filtered)	M23-No0065638	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Beryllium (filtered)	M23-No0065638	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-No0065638	CP	mg/L	2.4	2.5	3.5	30%	Pass	
Cadmium (filtered)	M23-No0065638	CP	mg/L	0.045	0.045	<1	30%	Pass	
Chromium (filtered)	M23-No0065638	CP	mg/L	0.074	0.070	5.2	30%	Pass	
Cobalt (filtered)	M23-No0065638	CP	mg/L	5.3	4.8	9.5	30%	Pass	
Copper (filtered)	M23-No0065638	CP	mg/L	66	66	<1	30%	Pass	
Iron (filtered)	M23-No0065638	CP	mg/L	1000	1000	<1	30%	Pass	
Lead (filtered)	M23-No0065638	CP	mg/L	0.013	0.012	3.4	30%	Pass	
Lithium (filtered)	M23-No0065638	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-No0065638	CP	mg/L	2.5	2.4	7.4	30%	Pass	
Mercury (filtered)	M23-No0065638	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-No0065638	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-No0065638	CP	mg/L	8.1	7.7	6.0	30%	Pass	
Selenium (filtered)	M23-No0065638	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silver (filtered)	M23-No0065638	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium (filtered)	M23-No0065638	CP	mg/L	4.8	4.8	<1	30%	Pass	
Uranium (filtered)	M23-No0065638	CP	mg/L	0.14	0.13	4.6	30%	Pass	
Vanadium (filtered)	M23-No0065638	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-No0065638	CP	mg/L	74	84	13	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Silicon (filtered)	M23-No0065640	CP	mg/L	57	59	2.9	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-No0065640	CP	mg/L	480	490	2.8	30%	Pass	
Magnesium	M23-No0065640	CP	mg/L	370	380	2.8	30%	Pass	
Potassium	M23-No0065640	CP	mg/L	33	33	2.8	30%	Pass	
Sodium	M23-No0065640	CP	mg/L	1700	1700	3.9	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M23-No0065642	CP	mg/L	0.8	0.9	4.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Silicon (filtered)	M23-No0065643	CP	mg/L	29	28	<1	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-No0065643	CP	mg/L	400	400	<1	30%	Pass	
Magnesium	M23-No0065643	CP	mg/L	410	400	<1	30%	Pass	
Potassium	M23-No0065643	CP	mg/L	40	39	1.6	30%	Pass	
Sodium	M23-No0065643	CP	mg/L	1600	1600	1.8	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-No0065645	CP	mg/L	0.31	0.27	13	30%	Pass	
Nitrite (as N)	M23-No0065645	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0065648	CP	mg/L	3.1	3.0	2.5	30%	Pass	
Arsenic (filtered)	M23-No0065648	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Barium (filtered)	M23-No0065648	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Beryllium (filtered)	M23-No0065648	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-No0065648	CP	mg/L	1.5	1.5	3.3	30%	Pass	
Cadmium (filtered)	M23-No0065648	CP	mg/L	0.013	0.013	<1	30%	Pass	
Chromium (filtered)	M23-No0065648	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cobalt (filtered)	M23-No0065648	CP	mg/L	2.2	2.1	3.8	30%	Pass	
Copper (filtered)	M23-No0065648	CP	mg/L	5.5	5.3	4.1	30%	Pass	
Iron (filtered)	M23-No0065648	CP	mg/L	460	440	3.6	30%	Pass	
Lead (filtered)	M23-No0065648	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Lithium (filtered)	M23-No0065648	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-No0065648	CP	mg/L	0.98	0.94	4.2	30%	Pass	
Mercury (filtered)	M23-No0065648	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-No0065648	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-No0065648	CP	mg/L	3.4	3.3	4.7	30%	Pass	
Selenium (filtered)	M23-No0065648	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silver (filtered)	M23-No0065648	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium (filtered)	M23-No0065648	CP	mg/L	3.3	3.2	3.0	30%	Pass	
Uranium (filtered)	M23-No0065648	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Vanadium (filtered)	M23-No0065648	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-No0065648	CP	mg/L	31	30	3.8	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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:

Michael Morrison	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.

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SA 5061

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: **Leon Faulkner**

Report **1049319-W**
Project name KAPUNDA
Project ID 2
Received Date Nov 29, 2023

Client Sample ID			PP_271123_KPFRT02#1	PP_271123_KPFRT03#1	PP_271123_KPFRT04#1	PP_271123_KPFRT06#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0074795**	**M23-No0074796**	**M23-No0074797**	**M23-No0074798**
Date Sampled			**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.3	0.86	0.26	0.12
Bromide	1	mg/L	1900	220	16	9.6
Chloride	1	mg/L	4300	2500	2400	2900
Conductivity (at 25 °C)	10	uS/cm	21000	12000	9000	14000
Fluoride	0.5	mg/L	< 0.5	1.5	2.6	9.2
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	14	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.02	14	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.6	< 0.2	0.34	4.48
pH (at 25 °C)	0.1	pH Units	2.0	3.8	7.3	3.8
Phosphorus reactive (as P)	0.01	mg/L	0.04	< 0.01	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	15000	12000	4800	8300
Sulphate (as SO4)	5	mg/L	5500	3200	760	4800
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.9	1.0	0.6	4.6
Total Nitrogen (as N)*	0.2	mg/L	1.9	1.0	15	4.6
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	120	93	54	150
Phosphate total (as P)	0.01	mg/L	0.07	0.03	< 0.01	0.10
Silicon (filtered)	0.5	mg/L	59	42	20	61
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	290	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	290	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	16	6.0	< 0.05	81
Arsenic (filtered)	0.001	mg/L	0.018	0.014	0.006	0.037
Barium (filtered)	0.02	mg/L	< 0.05	< 0.05	0.03	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	2.4	1.7	1.0	2.4
Cadmium (filtered)	0.0002	mg/L	0.048	0.021	0.0005	0.045
Chromium (filtered)	0.001	mg/L	0.34	< 0.01	< 0.001	0.028
Cobalt (filtered)	0.001	mg/L	5.0	2.7	0.15	4.9
Copper (filtered)	0.001	mg/L	64	8.3	0.33	280
Iron (filtered)	0.05	mg/L	940	620	< 0.05	670

Client Sample ID			PP_271123_KPFRT02#1	PP_271123_KPFRT03#1	PP_271123_KPFRT04#1	PP_271123_KPFRT06#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0074795**	**M23-No0074796**	**M23-No0074797**	**M23-No0074798**
Date Sampled			**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	0.019	< 0.01	< 0.001	0.031
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Manganese (filtered)	0.005	mg/L	2.5	1.2	0.15	2.1
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	8.1	4.4	0.23	8.1
Selenium (filtered)	0.001	mg/L	0.018	< 0.01	0.013	0.016
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	4.9	3.6	2.4	4.8
Uranium (filtered)	0.005	mg/L	0.13	< 0.05	0.039	0.24
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	82	38	0.65	47
Alkali Metals						
Calcium	0.5	mg/L	450	280	140	460
Magnesium	0.5	mg/L	420	270	170	370
Potassium	0.5	mg/L	20	36	27	32
Sodium	0.5	mg/L	2400	1600	1400	1700

Client Sample ID			PP_271123_KPMON01#1	PP_271123_KPMON02#1	PP_271123_KPMON03#1
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0074799**	**M23-No0074800**	**M23-No0074801**
Date Sampled			**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**
Test/Reference	LOR	Unit			
Ammonia (as N)	0.01	mg/L	0.52	0.31	0.72
Bromide	1	mg/L	< 1	8.0	9.0
Chloride	1	mg/L	1900	2100	2800
Conductivity (at 25 °C)	10	uS/cm	7100	7600	12000
Fluoride	0.5	mg/L	2.4	3.1	5.1
Nitrate & Nitrite (as N)	0.05	mg/L	1.8	0.13	< 0.05
Nitrate (as N)	0.02	mg/L	1.8	0.13	0.05
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.28	< 0.2	0.38
pH (at 25 °C)	0.1	pH Units	8.3	7.4	3.7
Phosphorus reactive (as P)	0.01	mg/L	0.01	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	4200	4500	1100
Sulphate (as SO4)	5	mg/L	570	620	4000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.8	0.5	1.1
Total Nitrogen (as N)*	0.2	mg/L	2.6	0.6	1.1
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	38	72	47
Phosphate total (as P)	0.01	mg/L	0.04	0.01	0.02
Silicon (filtered)	0.5	mg/L	20	7.6	30
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	260	210	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	260	210	< 20

Client Sample ID			PP_271123_KPMON01#1	PP_271123_KPMON02#1	PP_271123_KPMON03#1
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-No0074799**	**M23-No0074800**	**M23-No0074801**
Date Sampled			**Nov 23, 2023**	**Nov 23, 2023**	**Nov 23, 2023**
Test/Reference	LOR	Unit			
Heavy Metals					
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.5
Arsenic (filtered)	0.001	mg/L	0.003	< 0.001	0.013
Barium (filtered)	0.02	mg/L	0.06	0.06	< 0.05
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	0.95	1.1	1.6
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	0.0023
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	0.010
Cobalt (filtered)	0.001	mg/L	0.002	0.10	2.0
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	2.4
Iron (filtered)	0.05	mg/L	< 0.05	1.3	600
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01
Lithium (filtered)	0.005	mg/L	0.031	0.032	< 0.05
Manganese (filtered)	0.005	mg/L	0.069	0.88	1.5
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	0.007	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	0.010	0.086	3.5
Selenium (filtered)	0.001	mg/L	0.004	< 0.001	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	2.4	2.0	3.6
Uranium (filtered)	0.005	mg/L	< 0.005	0.060	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	0.023	0.017	39
Alkali Metals					
Calcium	0.5	mg/L	120	110	400
Magnesium	0.5	mg/L	110	99	410
Potassium	0.5	mg/L	29	35	39
Sodium	0.5	mg/L	1100	1300	1600

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	Nov 30, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Nov 30, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Nov 30, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Nov 30, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 30, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Nov 30, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Nov 30, 2023	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Nov 30, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Dec 04, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Nov 30, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Nov 30, 2023	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Nov 30, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Nov 30, 2023	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1049319
Phone: 08 7127 1110
Fax:

Received: Nov 29, 2023 4:36 PM
Due: Dec 4, 2023
Priority: 3 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_271123_KPFRT02#1	Nov 23, 2023		Water	M23-No0074795	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
2	PP_271123_KPFRT03#1	Nov 23, 2023		Water	M23-No0074796	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
3	PP_271123_KPFRT04#1	Nov 23, 2023		Water	M23-No0074797	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
4	PP_271123_KPFRT06#1	Nov 23, 2023		Water	M23-No0074798	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
5	PP_271123_KPMON01#1	Nov 23, 2023		Water	M23-No0074799	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
6	PP_271123_KPMON02#1	Nov 23, 2023		Water	M23-No0074800	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
7	PP_271123_KPMON03#1	Nov 23, 2023		Water	M23-No0074801	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
Test Counts						7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

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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 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	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	117			70-130	Pass	
Bromide	%	114			70-130	Pass	
Chloride	%	108			70-130	Pass	
Conductivity (at 25 °C)	%	97			70-130	Pass	
Fluoride	%	72			70-130	Pass	
Nitrite (as N)	%	93			70-130	Pass	
Sulphate (as SO4)	%	109			70-130	Pass	
Silicon (filtered)	%	98			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	80			70-130	Pass	
Total Alkalinity (as CaCO3)	%	84			70-130	Pass	
LCS - % Recovery							
Alkali Metals							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Calcium			%	92			80-120	Pass	
Magnesium			%	97			80-120	Pass	
Potassium			%	92			80-120	Pass	
Sodium			%	97			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-No0074795	CP	%	82			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-No0074795	CP	%	80			75-125	Pass	
Magnesium	M23-No0074795	CP	%	90			75-125	Pass	
Potassium	M23-No0074795	CP	%	81			75-125	Pass	
Sodium	M23-No0074795	CP	%	97			75-125	Pass	
Spike - % Recovery									
				Result 1					
Chloride	M23-No0074796	CP	%	121			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25 °C)	M23-No0074795	CP	uS/cm	21000	21000	<1	30%	Pass	
Fluoride	M23-No0074795	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
pH (at 25 °C)	M23-No0074795	CP	pH Units	2.0	2.0	pass	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-No0074795	CP	mg/L	1.9	2.0	4.1	30%	Pass	
Phosphate total (as P)	M23-No0074795	CP	mg/L	0.07	0.07	2.8	30%	Pass	
Silicon (filtered)	M23-No0074795	CP	mg/L	59	59	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-No0074795	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-No0074795	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-No0074795	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-No0074795	CP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-No0074795	CP	mg/L	16	16	1.0	30%	Pass	
Arsenic (filtered)	M23-No0074795	CP	mg/L	0.018	0.019	4.3	30%	Pass	
Barium (filtered)	M23-No0074795	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Beryllium (filtered)	M23-No0074795	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-No0074795	CP	mg/L	2.4	2.5	1.9	30%	Pass	
Cadmium (filtered)	M23-No0074795	CP	mg/L	0.048	0.048	<1	30%	Pass	
Chromium (filtered)	M23-No0074795	CP	mg/L	0.34	0.34	1.1	30%	Pass	
Cobalt (filtered)	M23-No0074795	CP	mg/L	5.0	5.1	<1	30%	Pass	
Lead (filtered)	M23-No0074795	CP	mg/L	0.019	0.019	1.1	30%	Pass	
Lithium (filtered)	M23-No0074795	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-No0074795	CP	mg/L	2.5	2.5	<1	30%	Pass	
Mercury (filtered)	M23-No0074795	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-No0074795	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-No0074795	CP	mg/L	8.1	8.1	<1	30%	Pass	
Selenium (filtered)	M23-No0074795	CP	mg/L	0.018	0.018	2.6	30%	Pass	
Silver (filtered)	M23-No0074795	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium (filtered)	M23-No0074795	CP	mg/L	4.9	4.9	<1	30%	Pass	
Uranium (filtered)	M23-No0074795	CP	mg/L	0.13	0.13	<1	30%	Pass	
Vanadium (filtered)	M23-No0074795	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-No0074795	CP	mg/L	450	460	3.7	30%	Pass	
Magnesium	M23-No0074795	CP	mg/L	420	430	2.3	30%	Pass	
Potassium	M23-No0074795	CP	mg/L	20	21	6.1	30%	Pass	
Sodium	M23-No0074795	CP	mg/L	2400	2500	2.2	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-No0074797	CP	mg/L	2400	2400	3.2	30%	Pass	
Sulphate (as SO4)	M23-No0074797	CP	mg/L	760	770	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-No0074799	CP	mg/L	1900	1900	<1	30%	Pass	
Sulphate (as SO4)	M23-No0074799	CP	mg/L	570	560	2.3	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-No0074799	CP	mg/L	38	44	15	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

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.

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Attention: **Leon Faulkner**

Report **1050046-W**
Project name KAPUNDA
Project ID 2
Received Date Dec 04, 2023

Client Sample ID			PP_281123_KPFRT02#1	PP_281123_KPFRT03#1	PP_281123_KPFRT04#1	PP_281223_KPFRT06#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0004008	M23-De0004009	M23-De0004010	M23-De0004011
Date Sampled			Nov 28, 2023	Nov 28, 2023	Nov 28, 2023	Nov 28, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.4	0.99	0.08	0.10
Bromide	1	mg/L	1600	140	15	9.0
Chloride	1	mg/L	5100	2900	2600	2900
Conductivity (at 25 °C)	10	uS/cm	21000	12000	9400	14000
Fluoride	0.5	mg/L	< 0.5	1.7	2.5	10
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	7.1	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.03	7.1	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.5	0.21	< 0.2	4.4
pH (at 25 °C)	0.1	pH Units	2.1	3.9	7.0	3.8
Phosphorus reactive (as P)	0.01	mg/L	0.05	0.01	0.01	0.10
Salinity (expressed as TDS)*	10	mg/L	13000	8400	5200	7100
Sulphate (as SO4)	5	mg/L	5000	2800	780	4700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.9	1.2	0.2	4.5
Total Nitrogen (as N)*	0.2	mg/L	1.9	1.2	7.3	4.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	130	69	53	56
Phosphate total (as P)	0.01	mg/L	0.11	0.02	0.02	0.13
Silicon (filtered)	0.5	mg/L	57	36	19	59
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	310	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	310	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	19	4.6	< 0.05	70
Arsenic (filtered)	0.001	mg/L	0.024	0.013	0.006	0.036
Barium (filtered)	0.02	mg/L	< 0.2	< 0.2	0.04	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	< 2	< 2	< 2	< 2
Cadmium (filtered)	0.0002	mg/L	0.047	0.016	0.0006	0.042
Chromium (filtered)	0.001	mg/L	0.19	< 0.01	< 0.001	0.073
Cobalt (filtered)	0.001	mg/L	5.1	2.2	0.15	4.5
Copper (filtered)	0.001	mg/L	58	7.1	0.44	230
Iron (filtered)	0.05	mg/L	810	470	0.35	570

Client Sample ID			PP_281123_KPFRT02#1	PP_281123_KPFRT03#1	PP_281123_KPFRT04#1	PP_281223_KPFRT06#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0004008	M23-De0004009	M23-De0004010	M23-De0004011
Date Sampled			Nov 28, 2023	Nov 28, 2023	Nov 28, 2023	Nov 28, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	0.024	< 0.01	< 0.001	0.026
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Manganese (filtered)	0.005	mg/L	2.5	0.97	0.22	2.1
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	8.1	3.6	0.25	7.6
Selenium (filtered)	0.001	mg/L	0.018	< 0.01	0.010	0.016
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	4.9	3.2	2.0	4.5
Uranium (filtered)	0.005	mg/L	0.13	< 0.05	0.041	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	66	32	0.62	44
Alkali Metals						
Calcium	0.5	mg/L	450	260	160	470
Magnesium	0.5	mg/L	410	260	190	360
Potassium	0.5	mg/L	20	36	28	33
Sodium	0.5	mg/L	2400	1600	1500	1600

Client Sample ID			PP_281123_KPMON01#1	PP_281123_KPMON02#1	PP_281123_KPMON03#1	PP_291123_KPFRT02#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0004012	M23-De0004013	M23-De0004014	M23-De0004015
Date Sampled			Nov 28, 2023	Nov 28, 2023	Nov 28, 2023	Nov 29, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.42	0.49	0.86	0.61
Bromide	1	mg/L	12	6.4	6.7	1200
Chloride	1	mg/L	2000	2100	2600	2600
Conductivity (at 25 °C)	10	uS/cm	7100	7700	12000	35000
Fluoride	0.5	mg/L	4.1	0.9	1.6	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	0.03	< 0.02	< 0.02	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.68	< 0.2	0.24	1.69
pH (at 25 °C)	0.1	pH Units	7.8	7.2	3.7	1.3
Phosphorus reactive (as P)	0.01	mg/L	0.02	< 0.01	< 0.01	0.04
Salinity (expressed as TDS)*	10	mg/L	3700	4100	7300	25000
Sulphate (as SO4)	5	mg/L	580	640	4000	2800
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.1	0.5	1.1	2.3
Total Nitrogen (as N)*	0.2	mg/L	2.1	0.5	1.1	2.3
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	53	25	10	78
Phosphate total (as P)	0.01	mg/L	0.04	< 0.01	0.03	0.10
Silicon (filtered)	0.5	mg/L	19	7.0	29	51
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	320	280	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	320	280	< 20	< 20

Client Sample ID			PP_281123_KP MON01#1	PP_281123_KP MON02#1	PP_281123_KP MON03#1	PP_291123_KP FRT02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0004012**	**M23-De0004013**	**M23-De0004014**	**M23-De0004015**
Date Sampled			**Nov 28, 2023**	**Nov 28, 2023**	**Nov 28, 2023**	**Nov 29, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	0.16	< 0.5	15
Arsenic (filtered)	0.001	mg/L	0.002	< 0.001	< 0.01	0.032
Barium (filtered)	0.02	mg/L	0.06	0.06	< 0.2	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	< 2	< 2	< 2	< 2
Cadmium (filtered)	0.0002	mg/L	< 0.0002	0.0002	< 0.002	0.045
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	0.22
Cobalt (filtered)	0.001	mg/L	0.004	0.10	1.9	4.6
Copper (filtered)	0.001	mg/L	0.032	0.62	2.1	50
Iron (filtered)	0.05	mg/L	0.15	2.6	530	840
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	0.025
Lithium (filtered)	0.005	mg/L	0.025	0.025	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.11	0.73	1.4	2.2
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	0.006	< 0.005	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	0.010	0.10	3.2	7.6
Selenium (filtered)	0.001	mg/L	0.005	< 0.001	< 0.01	0.016
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05	< 0.05
Strontium (filtered)	0.005	mg/L	1.9	1.5	2.8	4.6
Uranium (filtered)	0.005	mg/L	< 0.005	0.032	< 0.05	0.12
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05	< 0.05
Zinc (filtered)	0.005	mg/L	0.042	0.17	37	68
Alkali Metals						
Calcium	0.5	mg/L	130	110	300	410
Magnesium	0.5	mg/L	120	100	380	380
Potassium	0.5	mg/L	30	36	37	21
Sodium	0.5	mg/L	1100	1300	1500	2300

Client Sample ID			PP_291123_KP FRT03#1	PP_291123_KP FRT04#1	PP_291123_KP FRT06#1	PP_291123_KP MON01#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0004016**	**M23-De0004017**	**M23-De0004018**	**M23-De0004019**
Date Sampled			**Nov 29, 2023**	**Nov 29, 2023**	**Nov 29, 2023**	**Nov 29, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.99	0.10	< 0.01	0.46
Bromide	1	mg/L	150	9.9	8.9	10
Chloride	1	mg/L	2800	1100	3000	2000
Conductivity (at 25 °C)	10	uS/cm	12000	4300	14000	7200
Fluoride	0.5	mg/L	0.7	0.7	0.7	3.7
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	3.2	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	0.02	3.2	< 0.02	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.21	1.1	4	< 0.2
pH (at 25 °C)	0.1	pH Units	3.8	6.8	3.3	7.2
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	0.03
Salinity (expressed as TDS)*	10	mg/L	7400	3200	7900	3700

Client Sample ID			PP_291123_KPFRT03#1	PP_291123_KPFRT04#1	PP_291123_KPFRT06#1	PP_291123_KPMON01#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0004016**	**M23-De0004017**	**M23-De0004018**	**M23-De0004019**
Date Sampled			**Nov 29, 2023**	**Nov 29, 2023**	**Nov 29, 2023**	**Nov 29, 2023**
Test/Reference	LOR	Unit				
Sulphate (as SO4)	5	mg/L	3000	330	5400	570
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.2	1.2	4.0	0.5
Total Nitrogen (as N)*	0.2	mg/L	1.2	4.4	4.0	0.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	94	21	100	54
Phosphate total (as P)	0.01	mg/L	0.02	< 0.01	0.14	0.04
Silicon (filtered)	0.5	mg/L	38	9.8	58	19
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	150	< 20	310
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	150	< 20	310
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	5.2	< 0.05	76	< 0.05
Arsenic (filtered)	0.001	mg/L	0.012	0.003	0.053	0.002
Barium (filtered)	0.02	mg/L	< 0.2	< 0.02	< 0.2	0.04
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.01	< 0.001
Boron (filtered)	0.05	mg/L	< 2	< 2	6.0	< 2
Cadmium (filtered)	0.0002	mg/L	0.018	0.0003	0.044	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.001	0.055	< 0.001
Cobalt (filtered)	0.001	mg/L	2.4	0.083	5.0	< 0.001
Copper (filtered)	0.001	mg/L	7.4	0.30	230	0.012
Iron (filtered)	0.05	mg/L	500	0.28	650	0.20
Lead (filtered)	0.001	mg/L	< 0.01	< 0.001	0.031	< 0.001
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.05	0.024
Manganese (filtered)	0.005	mg/L	1.1	0.079	2.0	0.011
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.0001	< 0.001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.05	0.006
Nickel (filtered)	0.001	mg/L	3.8	0.14	8.1	0.004
Selenium (filtered)	0.001	mg/L	< 0.01	0.006	0.018	0.006
Silver (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.05	< 0.005
Strontium (filtered)	0.005	mg/L	3.3	1.1	4.6	1.9
Uranium (filtered)	0.005	mg/L	< 0.05	0.020	0.23	< 0.005
Vanadium (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.05	< 0.005
Zinc (filtered)	0.005	mg/L	34	0.33	47	0.014
Alkali Metals						
Calcium	0.5	mg/L	280	85	460	120
Magnesium	0.5	mg/L	270	100	360	120
Potassium	0.5	mg/L	37	15	34	29
Sodium	0.5	mg/L	1600	810	1700	1100

Client Sample ID			PP_291123_KP MON02#1	PP_291123_KP MON03#1	PP_011223_KP FRT02#1	PP_011223_KP FRT03#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0004020**	**M23-De0004021**	**M23-De0004022**	**M23-De0004023**
Date Sampled			**Nov 29, 2023**	**Nov 29, 2023**	**Dec 01, 2023**	**Dec 01, 2023**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.29	< 0.01	0.02	0.98
Bromide	1	mg/L	6.4	5.5	740	120
Chloride	1	mg/L	2100	770	4400	2900
Conductivity (at 25 °C)	10	uS/cm	7800	6400	75000	12000
Fluoride	0.5	mg/L	2.1	1.6	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.13	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	0.13	0.02	< 0.02	0.03
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.51	2.4	3.58	0.82
pH (at 25 °C)	0.1	pH Units	7.0	3.9	1.0	3.9
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	0.02	0.11	0.01
Salinity (expressed as TDS)*	10	mg/L	4200	3400	42000	8700
Sulphate (as SO4)	5	mg/L	680	1200	4600	3000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.8	2.4	3.6	1.8
Total Nitrogen (as N)*	0.2	mg/L	0.9	2.4	3.6	1.8
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	66	56	540	82
Phosphate total (as P)	0.01	mg/L	< 0.01	0.02	0.37	0.02
Silicon (filtered)	0.5	mg/L	7.7	28	50	36
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	240	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	240	< 20	< 20	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	0.09	< 0.5	16	5.1
Arsenic (filtered)	0.001	mg/L	0.001	0.016	0.081	0.015
Barium (filtered)	0.02	mg/L	0.06	< 0.2	< 0.2	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.01	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	< 2	< 5	5.4	< 5
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.002	0.042	0.019
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.01	0.51	< 0.01
Cobalt (filtered)	0.001	mg/L	0.14	2.0	4.4	2.4
Copper (filtered)	0.001	mg/L	0.024	1.6	51	7.5
Iron (filtered)	0.05	mg/L	6.8	580	790	500
Lead (filtered)	0.001	mg/L	0.002	< 0.01	0.043	< 0.01
Lithium (filtered)	0.005	mg/L	0.019	< 0.05	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.62	1.4	2.1	1.0
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.05	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	0.16	3.3	7.3	3.9
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.01	0.016	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.05	< 0.05	< 0.05
Strontium (filtered)	0.005	mg/L	1.6	3.2	4.3	3.4
Uranium (filtered)	0.005	mg/L	0.034	< 0.05	0.12	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.05	< 0.05	< 0.05
Zinc (filtered)	0.005	mg/L	0.092	38	63	34

Client Sample ID			PP_291123_KPMON02#1	PP_291123_KPMON03#1	PP_011223_KPFRT02#1	PP_011223_KPFRT03#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0004020	M23-De0004021	M23-De0004022	M23-De0004023
Date Sampled			Nov 29, 2023	Nov 29, 2023	Dec 01, 2023	Dec 01, 2023
Test/Reference	LOR	Unit				
Alkali Metals						
Calcium	0.5	mg/L	110	380	400	270
Magnesium	0.5	mg/L	110	360	360	260
Potassium	0.5	mg/L	33	35	22	37
Sodium	0.5	mg/L	1200	1500	2100	1600

Client Sample ID			PP_011223_KPFRT04#1	PP_011223_KPFRT06#1	PP_011223_KPMON01#1	PP_011223_KPMON02#1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M23-De0004024	M23-De0004025	M23-De0004026	M23-De0004027
Date Sampled			Dec 01, 2023	Dec 01, 2023	Dec 01, 2023	Dec 01, 2023
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.03	0.06	0.38	0.20
Bromide	1	mg/L	13	8.3	9.0	8.9
Chloride	1	mg/L	2400	3000	1900	2100
Conductivity (at 25 °C)	10	uS/cm	9100	14000	7100	8000
Fluoride	0.5	mg/L	2.0	4.2	1.0	1.4
Nitrate & Nitrite (as N)	0.05	mg/L	11	< 0.05	< 0.05	0.21
Nitrate (as N)	0.02	mg/L	11	< 0.02	< 0.02	0.21
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.37	5.44	1.02	1.6
pH (at 25 °C)	0.1	pH Units	6.8	3.9	7.6	6.6
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	0.04	< 0.01
Salinity (expressed as TDS)*	10	mg/L	5300	7700	3600	4100
Sulphate (as SO4)	5	mg/L	770	5000	630	660
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.4	5.5	1.4	1.8
Total Nitrogen (as N)*	0.2	mg/L	12	5.5	1.4	2.0
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	60	110	< 5	65
Phosphate total (as P)	0.01	mg/L	< 0.01	0.16	0.04	< 0.01
Silicon (filtered)	0.5	mg/L	19	57	20	9.8
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	300	< 20	290	260
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	300	< 20	290	260
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	76	< 0.05	< 0.05
Arsenic (filtered)	0.001	mg/L	0.008	0.052	0.003	0.006
Barium (filtered)	0.02	mg/L	0.02	< 0.2	0.05	0.06
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.01	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	< 2	< 5	< 2	< 2
Cadmium (filtered)	0.0002	mg/L	0.0005	0.046	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	0.064	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	0.14	5.0	0.004	0.17
Copper (filtered)	0.001	mg/L	0.50	230	0.12	0.010
Iron (filtered)	0.05	mg/L	0.67	650	0.38	31
Lead (filtered)	0.001	mg/L	< 0.001	0.029	< 0.001	< 0.001

Client Sample ID			PP_011223_KP FRT04#1	PP_011223_KP FRT06#1	PP_011223_KP MON01#1	PP_011223_KP MON02#1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M23-De0004024**	**M23-De0004025**	**M23-De0004026**	**M23-De0004027**
Date Sampled			**Dec 01, 2023**	**Dec 01, 2023**	**Dec 01, 2023**	**Dec 01, 2023**
Test/Reference	LOR	Unit				
Heavy Metals						
Lithium (filtered)	0.005	mg/L	< 0.005	< 0.05	0.023	0.019
Manganese (filtered)	0.005	mg/L	0.12	2.1	0.055	0.58
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.001	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.05	0.006	< 0.005
Nickel (filtered)	0.001	mg/L	0.23	8.2	0.009	0.20
Selenium (filtered)	0.001	mg/L	0.012	0.018	0.006	< 0.001
Silver (filtered)	0.005	mg/L	< 0.005	< 0.05	< 0.005	< 0.005
Strontium (filtered)	0.005	mg/L	2.0	4.6	1.9	1.5
Uranium (filtered)	0.005	mg/L	0.036	0.23	< 0.005	0.055
Vanadium (filtered)	0.005	mg/L	< 0.005	0.038	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.61	48	0.048	0.038
Alkali Metals						
Calcium	0.5	mg/L	150	470	130	120
Magnesium	0.5	mg/L	180	370	120	120
Potassium	0.5	mg/L	26	34	29	34
Sodium	0.5	mg/L	1400	1700	1100	1300

Client Sample ID			PP_011223_KP MON03#1
Sample Matrix			**Water**
Eurofins Sample No.			**M23-De0004028**
Date Sampled			**Dec 01, 2023**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.76
Bromide	1	mg/L	9.2
Chloride	1	mg/L	2700
Conductivity (at 25 °C)	10	uS/cm	12000
Fluoride	0.5	mg/L	1.8
Nitrate & Nitrite (as N)	0.05	mg/L	0.16
Nitrate (as N)	0.02	mg/L	0.16
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1.34
pH (at 25 °C)	0.1	pH Units	3.9
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	9600
Sulphate (as SO4)	5	mg/L	3900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.1
Total Nitrogen (as N)*	0.2	mg/L	2.3
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	98
Phosphate total (as P)	0.01	mg/L	0.03
Silicon (filtered)	0.5	mg/L	18
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20

Client Sample ID			PP_011223_KP MON03#1
Sample Matrix			**Water**
Eurofins Sample No.			**M23-De0004028**
Date Sampled			**Dec 01, 2023**
Test/Reference	LOR	Unit	
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.5
Arsenic (filtered)	0.001	mg/L	0.010
Barium (filtered)	0.02	mg/L	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01
Boron (filtered)	0.05	mg/L	< 5
Cadmium (filtered)	0.0002	mg/L	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01
Cobalt (filtered)	0.001	mg/L	1.1
Copper (filtered)	0.001	mg/L	1.0
Iron (filtered)	0.05	mg/L	330
Lead (filtered)	0.001	mg/L	< 0.01
Lithium (filtered)	0.005	mg/L	< 0.05
Manganese (filtered)	0.005	mg/L	0.78
Mercury (filtered)	0.0001	mg/L	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05
Nickel (filtered)	0.001	mg/L	1.9
Selenium (filtered)	0.001	mg/L	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05
Strontium (filtered)	0.005	mg/L	2.0
Uranium (filtered)	0.005	mg/L	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05
Zinc (filtered)	0.005	mg/L	22
Alkali Metals			
Calcium	0.5	mg/L	250
Magnesium	0.5	mg/L	230
Potassium	0.5	mg/L	23
Sodium	0.5	mg/L	970

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 05, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Dec 05, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Dec 04, 2023	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Dec 05, 2023	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Dec 05, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Dec 05, 2023	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Dec 05, 2023	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Dec 05, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Dec 05, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Dec 05, 2023	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Dec 05, 2023	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Dec 05, 2023	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
Address: Suite 4, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1050046
Phone: 08 7127 1110
Fax:

Received: Dec 4, 2023 11:53 AM
Due: Dec 7, 2023
Priority: 3 Day
Contact Name: - All INOVICES & STATEMENTS -

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																															

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																												
1	PP_281123_KPFRT02#1	Nov 28, 2023		Water	M23-De0004008	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
2	PP_281123_KPFRT03#1	Nov 28, 2023		Water	M23-De0004009	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
3	PP_281123_KPFRT04#1	Nov 28, 2023		Water	M23-De0004010	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
4	PP_281223_KPFRT06#1	Nov 28, 2023		Water	M23-De0004011	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
5	PP_281123_KPMON01#1	Nov 28, 2023		Water	M23-De0004012	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
6	PP_281123_KPMON02#1	Nov 28, 2023		Water	M23-De0004013	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
7	PP_281123_KPMON03#1	Nov 28, 2023		Water	M23-De0004014	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
8	PP_291123_KPFRT02#1	Nov 29, 2023		Water	M23-De0004015	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

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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	X	X	X	X	X	X	X	X	X	X	X	X
9	PP_291123_KPFRT03#1	Nov 29, 2023		Water	M23-De0004016	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
10	PP_291123_KPFRT04#1	Nov 29, 2023		Water	M23-De0004017	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
11	PP_291123_KPFRT06#1	Nov 29, 2023		Water	M23-De0004018	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
12	PP_291123_KPMON01#1	Nov 29, 2023		Water	M23-De0004019	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
13	PP_291123_KPMON02#1	Nov 29, 2023		Water	M23-De0004020	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
14	PP_291123_KPMON03#1	Nov 29, 2023		Water	M23-De0004021	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
15	PP_011223_KPFRT02#1	Dec 01, 2023		Water	M23-De0004022	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
16	PP_011223_KPFRT03#1	Dec 01, 2023		Water	M23-De0004023	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
17	PP_011223_KPFRT04#1	Dec 01, 2023		Water	M23-De0004024	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
18	PP_011223_K	Dec 01, 2023		Water	M23-De0004025	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

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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	X	X	X	X	X	X	X	X	X	X	X	X
18	PP_011223_KPFRT06#1	Dec 01, 2023		Water	M23-De0004025																																
19	PP_011223_KPMON01#1	Dec 01, 2023		Water	M23-De0004026	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
20	PP_011223_KPMON02#1	Dec 01, 2023		Water	M23-De0004027	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
21	PP_011223_KPMON03#1	Dec 01, 2023		Water	M23-De0004028	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
Test Counts						21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21

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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ammonia (as N)	%	120			70-130	Pass	
Bromide	%	103			70-130	Pass	
Chloride	%	110			70-130	Pass	
Conductivity (at 25 °C)	%	98			70-130	Pass	
Fluoride	%	73			70-130	Pass	
Nitrate & Nitrite (as N)	%	109			70-130	Pass	
Nitrite (as N)	%	104			70-130	Pass	
Phosphorus reactive (as P)	%	90			70-130	Pass	
Sulphate (as SO4)	%	113			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	77			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
Phosphate total (as P)	%	98			70-130	Pass	
Silicon (filtered)	%	88			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	74			70-130	Pass	
Total Alkalinity (as CaCO3)	%	74			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	94			80-120	Pass	
Arsenic (filtered)	%	91			80-120	Pass	
Boron (filtered)	%	117			80-120	Pass	
Cadmium (filtered)	%	95			80-120	Pass	
Chromium (filtered)	%	94			80-120	Pass	
Cobalt (filtered)	%	92			80-120	Pass	
Copper (filtered)	%	93			80-120	Pass	
Iron (filtered)	%	95			80-120	Pass	
Lead (filtered)	%	93			80-120	Pass	
Lithium (filtered)	%	87			80-120	Pass	
Manganese (filtered)	%	91			80-120	Pass	
Mercury (filtered)	%	95			80-120	Pass	
Molybdenum (filtered)	%	94			80-120	Pass	
Nickel (filtered)	%	93			80-120	Pass	
Selenium (filtered)	%	91			80-120	Pass	
Silver (filtered)	%	95			80-120	Pass	
Strontium (filtered)	%	91			80-120	Pass	
Uranium (filtered)	%	92			80-120	Pass	
Zinc (filtered)	%	92			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	91			80-120	Pass	
Magnesium	%	93			80-120	Pass	
Potassium	%	93			80-120	Pass	
Sodium	%	95			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Sulphate (as SO4)	K23-No0063771	NCP	%	96			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0008735	NCP	%	122			70-130	Pass	
Phosphate total (as P)	M23-De0011154	NCP	%	95			70-130	Pass	
Silicon (filtered)	M23-De0004008	CP	%	86			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M23-De0007869	NCP	%	91			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Barium (filtered)	M23-De0007869	NCP	%	86			75-125	Pass	
Beryllium (filtered)	M23-De0007869	NCP	%	91			75-125	Pass	
Cadmium (filtered)	M23-De0007869	NCP	%	95			75-125	Pass	
Chromium (filtered)	M23-De0007869	NCP	%	94			75-125	Pass	
Cobalt (filtered)	M23-De0007869	NCP	%	91			75-125	Pass	
Copper (filtered)	M23-De0007869	NCP	%	93			75-125	Pass	
Iron (filtered)	M23-De0007869	NCP	%	94			75-125	Pass	
Lead (filtered)	M23-De0007869	NCP	%	95			75-125	Pass	
Manganese (filtered)	M23-De0007869	NCP	%	89			75-125	Pass	
Mercury (filtered)	M23-De0007869	NCP	%	89			75-125	Pass	
Molybdenum (filtered)	M23-De0007869	NCP	%	88			75-125	Pass	
Nickel (filtered)	M23-De0007869	NCP	%	92			75-125	Pass	
Selenium (filtered)	M23-De0007869	NCP	%	92			75-125	Pass	
Silver (filtered)	M23-De0007869	NCP	%	95			75-125	Pass	
Strontium (filtered)	M23-De0007869	NCP	%	87			75-125	Pass	
Uranium (filtered)	M23-De0007869	NCP	%	94			75-125	Pass	
Vanadium (filtered)	M23-De0007869	NCP	%	93			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-De0004008	CP	%	98			75-125	Pass	
Magnesium	M23-De0004008	CP	%	95			75-125	Pass	
Potassium	M23-De0004008	CP	%	93			75-125	Pass	
Sodium	M23-De0004008	CP	%	121			75-125	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-De0004017	CP	%	84			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-De0004017	CP	%	86			75-125	Pass	
Magnesium	M23-De0004017	CP	%	87			75-125	Pass	
Potassium	M23-De0004017	CP	%	89			75-125	Pass	
Spike - % Recovery									
				Result 1					
Silicon (filtered)	M23-De0004026	CP	%	83			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M23-De0004026	CP	%	80			75-125	Pass	
Magnesium	M23-De0004026	CP	%	82			75-125	Pass	
Potassium	M23-De0004026	CP	%	87			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M23-De0004008	CP	mg/L	1600	1700	1.7	30%	Pass	
Conductivity (at 25 °C)	M23-De0004008	CP	uS/cm	21000	21000	<1	30%	Pass	
Fluoride	M23-De0004008	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
pH (at 25 °C)	M23-De0004008	CP	pH Units	2.1	2.1	pass	30%	Pass	
Phosphate total (as P)	M23-De0004008	CP	mg/L	0.11	0.11	<1	30%	Pass	
Silicon (filtered)	M23-De0004008	CP	mg/L	57	56	2.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-De0004008	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-De0004008	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-De0004008	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-De0004008	CP	mg/L	< 20	< 20	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0004008	CP	mg/L	19	19	<1	30%	Pass	
Arsenic (filtered)	M23-De0004008	CP	mg/L	0.024	0.026	<1	30%	Pass	
Barium (filtered)	M23-De0004008	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Beryllium (filtered)	M23-De0004008	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-De0004008	CP	mg/L	< 2	< 2	<1	30%	Pass	
Cadmium (filtered)	M23-De0004008	CP	mg/L	0.047	0.048	<1	30%	Pass	
Chromium (filtered)	M23-De0004008	CP	mg/L	0.19	0.19	<1	30%	Pass	
Cobalt (filtered)	M23-De0004008	CP	mg/L	5.1	5.1	<1	30%	Pass	
Copper (filtered)	M23-De0004008	CP	mg/L	58	65	11	30%	Pass	
Iron (filtered)	M23-De0004008	CP	mg/L	810	880	7.7	30%	Pass	
Lead (filtered)	M23-De0004008	CP	mg/L	0.024	0.025	<1	30%	Pass	
Lithium (filtered)	M23-De0004008	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-De0004008	CP	mg/L	2.5	2.5	<1	30%	Pass	
Mercury (filtered)	M23-De0004008	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-De0004008	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-De0004008	CP	mg/L	8.1	8.1	<1	30%	Pass	
Selenium (filtered)	M23-De0004008	CP	mg/L	0.018	0.019	<1	30%	Pass	
Silver (filtered)	M23-De0004008	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium (filtered)	M23-De0004008	CP	mg/L	4.9	4.9	<1	30%	Pass	
Uranium (filtered)	M23-De0004008	CP	mg/L	0.13	0.14	<1	30%	Pass	
Vanadium (filtered)	M23-De0004008	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-De0004008	CP	mg/L	66	72	7.9	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0004008	CP	mg/L	450	450	<1	30%	Pass	
Magnesium	M23-De0004008	CP	mg/L	410	410	1.5	30%	Pass	
Potassium	M23-De0004008	CP	mg/L	20	20	<1	30%	Pass	
Sodium	M23-De0004008	CP	mg/L	2400	2400	1.4	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0004009	CP	mg/L	0.99	1.1	6.8	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0004009	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M23-De0004009	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	M23-De0004010	CP	mg/L	53	63	17	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Silicon (filtered)	M23-De0004017	CP	mg/L	9.8	9.0	8.5	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0004017	CP	mg/L	85	83	3.0	30%	Pass	
Magnesium	M23-De0004017	CP	mg/L	100	100	<1	30%	Pass	
Potassium	M23-De0004017	CP	mg/L	15	15	<1	30%	Pass	
Sodium	M23-De0004017	CP	mg/L	810	810	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-De0004018	CP	mg/L	3000	3000	<1	30%	Pass	
Conductivity (at 25 °C)	M23-De0004018	CP	uS/cm	14000	15000	2.9	30%	Pass	
pH (at 25 °C)	M23-De0004018	CP	pH Units	3.3	3.3	pass	30%	Pass	
Sulphate (as SO4)	M23-De0004018	CP	mg/L	5400	5300	<1	30%	Pass	
Phosphate total (as P)	M23-De0004018	CP	mg/L	0.14	0.12	11	30%	Pass	

Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-De0004018	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-De0004018	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-De0004018	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-De0004018	CP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M23-De0004018	CP	mg/L	76	77	<1	30%	Pass	
Arsenic (filtered)	M23-De0004018	CP	mg/L	0.053	0.053	1.4	30%	Pass	
Barium (filtered)	M23-De0004018	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Beryllium (filtered)	M23-De0004018	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Boron (filtered)	M23-De0004018	CP	mg/L	6.0	6.0	<1	30%	Pass	
Cadmium (filtered)	M23-De0004018	CP	mg/L	0.044	0.046	3.8	30%	Pass	
Chromium (filtered)	M23-De0004018	CP	mg/L	0.055	0.055	<1	30%	Pass	
Cobalt (filtered)	M23-De0004018	CP	mg/L	5.0	5.0	<1	30%	Pass	
Copper (filtered)	M23-De0004018	CP	mg/L	230	230	<1	30%	Pass	
Iron (filtered)	M23-De0004018	CP	mg/L	650	660	<1	30%	Pass	
Lead (filtered)	M23-De0004018	CP	mg/L	0.031	0.031	1.5	30%	Pass	
Lithium (filtered)	M23-De0004018	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	M23-De0004018	CP	mg/L	2.0	2.0	<1	30%	Pass	
Mercury (filtered)	M23-De0004018	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M23-De0004018	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nickel (filtered)	M23-De0004018	CP	mg/L	8.1	8.2	1.2	30%	Pass	
Selenium (filtered)	M23-De0004018	CP	mg/L	0.018	0.020	6.6	30%	Pass	
Silver (filtered)	M23-De0004018	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium (filtered)	M23-De0004018	CP	mg/L	4.6	4.6	<1	30%	Pass	
Uranium (filtered)	M23-De0004018	CP	mg/L	0.23	0.24	<1	30%	Pass	
Vanadium (filtered)	M23-De0004018	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M23-De0004018	CP	mg/L	47	48	1.9	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M23-De0004019	CP	mg/L	10	12	11	30%	Pass	
Chloride	M23-De0004019	CP	mg/L	2000	2000	<1	30%	Pass	
Fluoride	M23-De0004019	CP	mg/L	3.7	3.7	<1	30%	Pass	
Sulphate (as SO4)	M23-De0004019	CP	mg/L	570	590	4.3	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M23-De0004019	CP	mg/L	54	52	3.8	30%	Pass	
Phosphate total (as P)	M23-De0004019	CP	mg/L	0.04	0.04	12	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M23-De0004020	CP	mg/L	6.4	6.3	1.3	30%	Pass	
Fluoride	M23-De0004020	CP	mg/L	2.1	1.8	12	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	M23-De0004024	CP	mg/L	60	56	8.3	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Silicon (filtered)	M23-De0004026	CP	mg/L	20	19	2.8	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M23-De0004026	CP	mg/L	130	120	3.2	30%	Pass	
Magnesium	M23-De0004026	CP	mg/L	120	120	1.3	30%	Pass	
Potassium	M23-De0004026	CP	mg/L	29	29	1.7	30%	Pass	
Sodium	M23-De0004026	CP	mg/L	1100	1100	1.8	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M23-De0004028	CP	mg/L	0.76	0.79	4.5	30%	Pass	
Conductivity (at 25 °C)	M23-De0004028	CP	uS/cm	12000	12000	<1	30%	Pass	
Nitrate & Nitrite (as N)	M23-De0004028	CP	mg/L	0.16	0.16	1.2	30%	Pass	
Nitrite (as N)	M23-De0004028	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M23-De0004028	CP	pH Units	3.9	3.9	pass	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M23-De0004028	CP	mg/L	2.1	2.1	1.6	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M23-De0004028	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M23-De0004028	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M23-De0004028	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M23-De0004028	CP	mg/L	< 20	< 20	<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

Authorised by:

Amy Meunier	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Metal
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.

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Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 55 King William Rd.,
Unley SA 5061
Australia

Attention: Leon Faulkner

Project Name **23PEAD0003041**
Client Ref: 00202112

Customer Sample ID		**PP_151223_KPF RT02_BV**	**PP_151223_KPF RT03_BV**	**PP_151223_KPF RT04_BV**
Date Collected		**15/12/2023**	**15/12/2023**	**15/12/2023**
Date Started		**20/12/2023**	**20/12/2023**	**20/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.26	<0.1	<0.1
Beryllium*	mg/L	<0.1	<0.1	<0.1
Cobalt*	mg/L	5.8	2.2	0.26
Mercury*	mg/L	<0.01	<0.01	<0.01
Selenium*	mg/L	<0.1	<0.1	<0.1
Silver*	mg/L	<0.5	<0.5	<0.5
Uranium*	mg/L	1.1	<0.5	<0.5
Nutrient Suite *				
Ammonia (as N)*	mg/L	<0.01	0.86	1.40
Nitrate (as N)*	mg/L	<0.02	0.06	7.20
Nitrite (as N)*	mg/L	<0.02	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	2.10	0.44	0.60
Total Kjeldahl Nitrogen (as N)*	mg/L	2.10	1.30	2.00
Total Nitrogen (as N)*	mg/L	2.10	1.40	9.20
Nutrient Suite - P *				
Phosphorus reactive (as P)*	mg/L	0.31	<0.01	<0.01
Phosphate total (as P)*	mg/L	1.20	<0.01	<0.01
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	1600	880	300
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		0.9	3.7	6.2
Measured Temp.	°C	22.7	22.7	22.8
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	96000	12000	10000
Resistivity @ 25°C	ohm.m	0.10	0.83	1.00
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	<1	<1	260
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	5000	2500	2400
Nitrate as NO3	mg/L	<0.1	<0.1	29
Sulphate as SO4	mg/L	18000	3100	1000

Customer Sample ID		PP_151223_KPF RT02_BV	PP_151223_KPF RT03_BV	PP_151223_KPF RT04_BV
Date Collected		**15/12/2023**	**15/12/2023**	**15/12/2023**
Date Started		**20/12/2023**	**20/12/2023**	**20/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Total Anions	mg/L	23000	5600	3700
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	<0.01	<0.01	5
Chloride as Cl*	meq/L	140	71	68
Nitrate as NO3*	meq/L	<0.01	<0.01	0.47
Sulphate as SO4*	meq/L	380	64	21
Total Anions*	meq/L	520	140	95
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	61	42	33
Sodium as Na	mg/L	2600	1700	1600
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	570	290	190
Iron as Fe	mg/L	1200	460	0.15
Magnesium as Mg	mg/L	510	280	220
Strontium as Sr	mg/L	6	3	2
Aluminium as Al	mg/L	130	6	<0.1
Boron as B	mg/L	<0.1	<0.1	1
Silicon as Si	mg/L	110	38	18
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	0.4	0.1	<0.1
Chromium as Cr	mg/L	1	0.3	<0.1
Vanadium as V	mg/L	0.3	<0.1	<0.1
Nickel as Ni	mg/L	9	3	0.4
Zinc as Zn	mg/L	89	29	0.7
Lead as Pb	mg/L	130	6	<0.1
Copper as Cu	mg/L	140	6	<0.1
Manganese as Mn	mg/L	5	1	0.3
Tin as Sn	mg/L	9	7	<0.1
Phosphorus as P	mg/L	<0.2	8	<0.2
Molybdenum as Mo	mg/L	0.3	<0.1	0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	5100	2800	2100
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	2	1	0.85
Sodium as Na*	meq/L	110	74	70
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	28	15	10
Iron as Fe*	meq/L	66	25	<0.01
Magnesium as Mg*	meq/L	42	23	18
Strontium as Sr*	meq/L	0.13	0.08	0.05
Aluminium as Al*	meq/L	5	0.21	<0.01
Total Cations*	meq/L	260	140	99
DERIVED PARAMETERS APHA 4110 & 3120				

Customer Sample ID		PP_151223_KPF RT02_BV	PP_151223_KPF RT03_BV	PP_151223_KPF RT04_BV
Date Collected		**15/12/2023**	**15/12/2023**	**15/12/2023**
Date Started		**20/12/2023**	**20/12/2023**	**20/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Ion balance (Diff * 100/Sum)	%	34	1	2
Acceptance Criteria	%	5	5	5
Satisfactory		No	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	0	0	260
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	28000	8400	5800
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	3500	1900	1400
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	61000	7800	6400

Customer Sample ID		PP_151223_KPF RT06_BV	PP_151223_KPM ON01_BV	PP_151223_KPM ON02_BV
Date Collected		**15/12/2023**	**15/12/2023**	**15/12/2023**
Date Started		**20/12/2023**	**20/12/2023**	**20/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.051	<0.01	<0.01
Beryllium*	mg/L	<0.1	<0.01	<0.01
Cobalt*	mg/L	6.0	<0.01	0.19
Mercury*	mg/L	<0.001	<0.001	<0.001
Selenium*	mg/L	<0.01	<0.01	<0.01
Silver*	mg/L	<0.05	<0.05	<0.05
Uranium*	mg/L	<0.05	<0.05	<0.05
Nutrient Suite *				
Ammonia (as N)*	mg/L	0.06	0.47	0.38
Nitrate (as N)*	mg/L	<0.02	0.05	0.06
Nitrite (as N)*	mg/L	<0.02	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	3.04	0.23	<0.20
Total Kjeldahl Nitrogen (as N)*	mg/L	3.10	0.70	0.50
Total Nitrogen (as N)*	mg/L	3.10	0.70	0.60
Nutrient Suite - P *				
Phosphorus reactive (as P)*	mg/L	<0.01	0.02	<0.01
Phosphate total (as P)*	mg/L	0.08	0.03	<0.01
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	1900	180	220
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		3.8	7.3	6.5
Measured Temp.	°C	22.9	22.7	23.0
PROPERTIES: APHA 2510 A,B				

Customer Sample ID		PP_151223_KPF RT06_BV	PP_151223_KPM ON01_BV	PP_151223_KPM ON02_BV
Date Collected		**15/12/2023**	**15/12/2023**	**15/12/2023**
Date Started		**20/12/2023**	**20/12/2023**	**20/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Electrical Conductivity @ 25°C	µS/cm	15000	7600	8400
Resistivity @ 25°C	ohm.m	0.67	1.32	1.19
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	<1	310	280
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	2800	1700	1900
Nitrate as NO3	mg/L	18	0.7	<0.1
Sulphate as SO4	mg/L	5200	600	680
Total Anions	mg/L	8000	2600	2800
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	<0.01	6	6
Chloride as Cl*	meq/L	80	48	53
Nitrate as NO3*	meq/L	0.29	0.01	<0.01
Sulphate as SO4*	meq/L	110	12	14
Total Anions*	meq/L	190	67	73
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	43	33	39
Sodium as Na	mg/L	2000	1200	1400
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	550	140	130
Iron as Fe	mg/L	820	<0.1	<0.1
Magnesium as Mg	mg/L	440	140	140
Strontium as Sr	mg/L	5	2	2
Aluminium as Al	mg/L	92	0.12	<0.1
Boron as B	mg/L	<0.1	0.9	1
Silicon as Si	mg/L	62	20	8
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	0.2	<0.1	<0.1
Chromium as Cr	mg/L	0.5	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	9	0.1	0.2
Zinc as Zn	mg/L	55	<0.1	<0.1
Lead as Pb	mg/L	250	<0.1	<0.1
Copper as Cu	mg/L	260	<0.1	<0.1
Manganese as Mn	mg/L	3	<0.1	0.4
Tin as Sn	mg/L	13	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	1	3
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	3900	1500	1700
CATIONS meq/L APHA 1050 A*				

Customer Sample ID		PP_151223_KPF RT06_BV	PP_151223_KPM ON01_BV	PP_151223_KPM ON02_BV
Date Collected		**15/12/2023**	**15/12/2023**	**15/12/2023**
Date Started		**20/12/2023**	**20/12/2023**	**20/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Potassium as K*	meq/L	1	0.83	1
Sodium as Na*	meq/L	86	53	61
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	27	7	6
Iron as Fe*	meq/L	44	<0.01	<0.01
Magnesium as Mg*	meq/L	36	11	11
Strontium as Sr*	meq/L	0.12	0.04	0.04
Aluminium as Al*	meq/L	3	<0.01	<0.01
Total Cations*	meq/L	200	72	80
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	3	4	4
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	0	310	280
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	12000	4200	4500
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	3200	920	900
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	9900	4900	5400

Customer Sample ID		PP_151223_KPM ON03_BV
Date Collected		**15/12/2023**
Date Started		**20/12/2023**
Sample Type		**Water**
Test/Reference	Unit	
Heavy Metals *		
Arsenic*	mg/L	0.18
Beryllium*	mg/L	<0.01
Cobalt*	mg/L	2.4
Mercury*	mg/L	<0.001
Selenium*	mg/L	<0.01
Silver*	mg/L	<0.05
Uranium*	mg/L	<0.05
Nutrient Suite *		
Ammonia (as N)*	mg/L	1.20
Nitrate (as N)*	mg/L	<0.02
Nitrite (as N)*	mg/L	<0.02
Organic Nitrogen (as N)*	mg/L	<0.20
Total Kjeldahl Nitrogen (as N)*	mg/L	1.30
Total Nitrogen (as N)*	mg/L	1.30
Nutrient Suite - P *		

Customer Sample ID		**PP_151223_KPM ON03_BV**
Date Collected		**15/12/2023**
Date Started		**20/12/2023**
Sample Type		**Water**
Test/Reference	Unit	
Phosphorus reactive (as P)*	mg/L	<0.01
Phosphate total (as P)*	mg/L	0.01
Sulphur *		
Total Oxidised Sulphur (as S)*	mg/L	1400

WATER ANALYSIS

Test/Reference	Unit	
PROPERTIES: APHA 4500-H+ A,B		
pH at Measured Temp.		4.5
Measured Temp.	°C	22.8
PROPERTIES: APHA 2510 A,B		
Electrical Conductivity @ 25°C	µS/cm	13000
Resistivity @ 25°C	ohm.m	0.77
ANIONS mg/L APHA 2320 A,B		
Hydroxide as CaCO3	mg/L	<1
Carbonate as CaCO3	mg/L	<1
Bicarbonate as CaCO3	mg/L	<1
ANIONS mg/L APHA 4110		
Chloride as Cl	mg/L	2600
Nitrate as NO3	mg/L	<0.1
Sulphate as SO4	mg/L	3900
Total Anions	mg/L	6500
ANIONS meq/L APHA 1050 A*		
Hydroxide as OH*	meq/L	<0.01
Carbonate as CO3*	meq/L	<0.01
Bicarbonate as HCO3*	meq/L	<0.01
Chloride as Cl*	meq/L	74
Nitrate as NO3*	meq/L	<0.01
Sulphate as SO4*	meq/L	80
Total Anions*	meq/L	150
CATIONS Dissolved mg/L P3100-PW-012		
Potassium as K	mg/L	39
Sodium as Na	mg/L	1800
Barium as Ba	mg/L	<0.1
Calcium as Ca	mg/L	430
Iron as Fe	mg/L	830
Magnesium as Mg	mg/L	410
Strontium as Sr	mg/L	3
Aluminium as Al	mg/L	<0.1
Boron as B	mg/L	<0.1
Silicon as Si	mg/L	36
Lithium as Li	mg/L	<0.1
Cadmium as Cd	mg/L	0.2
Chromium as Cr	mg/L	0.4
Vanadium as V	mg/L	<0.1
Nickel as Ni	mg/L	4
Zinc as Zn	mg/L	48

Customer Sample ID		**PP_151223_KPM ON03_BV**
Date Collected		**15/12/2023**
Date Started		**20/12/2023**
Sample Type		**Water**

WATER ANALYSIS

Test/Reference	Unit	
Lead as Pb	mg/L	0.5
Copper as Cu	mg/L	0.2
Manganese as Mn	mg/L	2
Tin as Sn	mg/L	12
Phosphorus as P	mg/L	3
Molybdenum as Mo	mg/L	<0.1
CATIONS mg/L P3100-PW-012		
Total Cations	mg/L	3500
CATIONS meq/L APHA 1050 A*		
Potassium as K*	meq/L	1
Sodium as Na*	meq/L	77
Barium as Ba*	meq/L	<0.01
Calcium as Ca*	meq/L	22
Iron as Fe*	meq/L	44
Magnesium as Mg*	meq/L	34
Strontium as Sr*	meq/L	0.08
Aluminium as Al*	meq/L	<0.01
Total Cations*	meq/L	180
DERIVED PARAMETERS APHA 4110 & 3120		
Ion balance (Diff * 100/Sum)	%	7
Acceptance Criteria	%	5
Satisfactory		No
DERIVED PARAMETERS APHA 2320 A,B		
Total Alkalinity (calc as CaCO3)	mg/L	0
DERIVED PARAMETERS APHA 4110 & P3100-PW-012		
Total Cations + Anions	mg/L	10000
DERIVED PARAMETERS APHA 2340 B*		
Hardness (calc as CaCO3)*	mg/L	2800
DERIVED PARAMETERS APHA 2540 A,B,C,D*		
Calculated Total Dissolved Solids*	mg/L	8500

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	eurofins, Accreditation: 1261, Report No: 1055141w
Nutrient Suite	eurfins, Accreditation: 1261, Report No: 1055141w
Nutrient Suite - P	eurofins, Accreditation: 1261, Report No: 1055141w
Sulphur	eurofins, Accreditation: 1261, Report No: 1055141w

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 55 King William Rd.,
Unley SA 5061
Australia

Attention: Leon Faulkner

Project Name **23PEAD0002930**
Client Ref: 00202112

Customer Sample ID		**PP_241123_KPF RT04EF #1 BV**	**PP_241123_KPF RT03EF #1 BV**	**PP_241123_KPM ON01EF #1 BV**
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.007	<0.01	0.002
Beryllium*	mg/L	<0.001	<0.01	<0.001
Cobalt*	mg/L	0.14	1.5	0.030
Mercury*	mg/L	<0.0001	<0.001	<0.0001
Selenium*	mg/L	0.013	<0.01	<0.001
Silver*	mg/L	<0.005	<0.05	<0.005
Uranium*	mg/L	0.046	<0.05	0.007
Nutrient Suite *				
Ammonia (as N)*	mg/L	0.04	0.64	0.04
Nitrate (as N)*	mg/L	14.00	0.03	<0.02
Nitrite (as N)*	mg/L	<0.02	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	1.86	0.96	0.66
Total Kjeldahl Nitrogen (as N)*	mg/L	1.90	1.60	0.70
Total Nitrogen (as N)*	mg/L	16.00	1.60	0.70
Nutrient Suite - P *				
Phosphorus reactive (as P)*	mg/L	<0.01	<0.01	0.03
Phosphate total (as P)*	mg/L	<0.01	0.02	0.04
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	270	730	210
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		7.3	3.5	7.8
Measured Temp.	°C	20.9	23.0	22.7
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	9400	11000	7700
Resistivity @ 25°C	ohm.m	1.06	0.91	1.30
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	330	<1	220
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	2200	2500	1800
Nitrate as NO3	mg/L	68	3	0.1
Sulphate as SO4	mg/L	780	2200	640
Total Anions	mg/L	3300	4700	2700

Customer Sample ID		PP_241123_KPF RT04EF #1 BV	PP_241123_KPF RT03EF #1 BV	PP_241123_KPM ON01EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	7	<0.01	4
Chloride as Cl*	meq/L	61	71	52
Nitrate as NO3*	meq/L	1	0.05	<0.01
Sulphate as SO4*	meq/L	16	46	13
Total Anions*	meq/L	85	120	70
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	32	42	36
Sodium as Na	mg/L	1600	1700	1300
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	160	250	130
Iron as Fe	mg/L	<0.1	320	<0.1
Magnesium as Mg	mg/L	190	270	140
Strontium as Sr	mg/L	2	3	2
Aluminium as Al	mg/L	<0.1	2	<0.1
Boron as B	mg/L	0.9	2	1
Silicon as Si	mg/L	20	35	19
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	0.2	3	<0.1
Zinc as Zn	mg/L	0.3	23	<0.1
Lead as Pb	mg/L	0.1	4	<0.1
Copper as Cu	mg/L	0.1	4	<0.1
Manganese as Mn	mg/L	<0.1	1	<0.1
Tin as Sn	mg/L	0.3	6	0.3
Phosphorus as P	mg/L	<0.2	<0.2	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2000	2600	1600
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	0.81	1	0.92
Sodium as Na*	meq/L	68	74	55
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	8	13	7
Iron as Fe*	meq/L	<0.01	17	<0.01
Magnesium as Mg*	meq/L	16	22	11
Strontium as Sr*	meq/L	0.04	0.07	0.04
Aluminium as Al*	meq/L	<0.01	0.07	<0.01
Total Cations*	meq/L	93	130	74
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	4	4	3
Acceptance Criteria	%	5	5	5

Customer Sample ID		PP_241123_KPF RT04EF #1 BV	PP_241123_KPF RT03EF #1 BV	PP_241123_KPM ON01EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	330	0	220
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	5300	7300	4300
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	1200	1700	890
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	6000	7200	5000

Customer Sample ID		PP_241123_KPF RT04 #1 BV	PP_241123_KPM ON03EF #1 BV	PP_241123_KPF RT02EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.002	<0.1	0.25
Beryllium*	mg/L	<0.001	<0.1	<0.1
Cobalt*	mg/L	0.13	1.9	4.9
Mercury*	mg/L	<0.0001	<0.01	<0.01
Selenium*	mg/L	0.007	<0.1	<0.1
Silver*	mg/L	<0.005	<0.5	<0.5
Uranium*	mg/L	0.021	<0.5	<0.5
Nutrient Suite *				
Ammonia (as N)*	mg/L	<0.01	0.78	0.78
Nitrate (as N)*	mg/L	6.60	<0.02	<0.02
Nitrite (as N)*	mg/L	<0.02	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	1.60	1.12	2.22
Total Kjeldahl Nitrogen (as N)*	mg/L	1.60	1.90	3.00
Total Nitrogen (as N)*	mg/L	8.20	1.90	3.00
Nutrient Suite - P *				
Phosphorus reactive (as P)*	mg/L	0.02	0.23	0.02
Phosphate total (as P)*	mg/L	<0.01	-	0.08
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	260	1300	1600
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		6.9	3.4	2.6
Measured Temp.	°C	22.9	22.8	22.7
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	9700	13000	19000
Resistivity @ 25°C	ohm.m	1.03	0.77	0.53
ANIONS mg/L APHA 2320 A,B				

Customer Sample ID		PP_241123_KPF RT04 #1 BV	PP_241123_KPM ON03EF #1 BV	PP_241123_KPF RT02EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	310	<1	<1
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	2300	2800	4000
Nitrate as NO3	mg/L	30	0.2	23
Sulphate as SO4	mg/L	760	3500	5400
Total Anions	mg/L	3400	6300	9400
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	6	<0.01	<0.01
Chloride as Cl*	meq/L	64	79	110
Nitrate as NO3*	meq/L	0.49	<0.01	0.38
Sulphate as SO4*	meq/L	16	74	110
Total Anions*	meq/L	86	150	220
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	34	48	31
Sodium as Na	mg/L	1600	1800	2700
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	170	430	520
Iron as Fe	mg/L	<0.1	570	1000
Magnesium as Mg	mg/L	200	440	490
Strontium as Sr	mg/L	2	4	5
Aluminium as Al	mg/L	<0.1	<0.1	18
Boron as B	mg/L	1	2	3
Silicon as Si	mg/L	19	30	62
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	0.2
Vanadium as V	mg/L	<0.1	<0.1	0.1
Nickel as Ni	mg/L	0.2	4	9
Zinc as Zn	mg/L	0.2	39	76
Lead as Pb	mg/L	<0.1	3	62
Copper as Cu	mg/L	<0.1	3	61
Manganese as Mn	mg/L	<0.1	2	3
Tin as Sn	mg/L	0.3	9	15
Phosphorus as P	mg/L	<0.2	<0.2	6
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2000	3300	4800
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	0.86	1	0.79
Sodium as Na*	meq/L	69	78	120
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	8	22	26

Customer Sample ID		PP_241123_KPF RT04 #1 BV	PP_241123_KPM ON03EF #1 BV	PP_241123_KPF RT02EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Iron as Fe*	meq/L	<0.01	31	54
Magnesium as Mg*	meq/L	16	36	40
Strontium as Sr*	meq/L	0.04	0.08	0.12
Aluminium as Al*	meq/L	<0.01	<0.01	0.66
Total Cations*	meq/L	95	170	240
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	5	5	3
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	310	0	0
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	5400	9600	14000
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	1200	2900	3300
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	6200	8200	12000

Customer Sample ID		PP_291123_KPF RT03 #1 BV	PP_241123_KPF RT06EF #1 BV	PP_241123_KPM ON02EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	<0.1	<0.01	0.003
Beryllium*	mg/L	<0.1	<0.1	<0.001
Cobalt*	mg/L	2.5	4.2	0.012
Mercury*	mg/L	<0.01	<0.01	<0.0001
Selenium*	mg/L	<0.1	<0.01	<0.001
Silver*	mg/L	<0.5	<0.5	<0.005
Uranium*	mg/L	<0.5	<0.5	0.017
Nutrient Suite *				
Ammonia (as N)*	mg/L	1.00	2.30	0.51
Nitrate (as N)*	mg/L	<0.02	<0.02	<0.02
Nitrite (as N)*	mg/L	<0.02	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	0.70	2.80	0.89
Total Kjeldahl Nitrogen (as N)*	mg/L	1.70	5.10	1.40
Total Nitrogen (as N)*	mg/L	1.70	5.10	1.40
Nutrient Suite - P *				
Phosphorus reactive (as P)*	mg/L	<0.01	<0.01	<0.01
Phosphate total (as P)*	mg/L	0.03	0.13	<0.01
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	1000	1500	190
WATER ANALYSIS				
Test/Reference	Unit			

Customer Sample ID		PP_291123_KPF RT03 #1 BV	PP_241123_KPF RT06EF #1 BV	PP_241123_KPM ON02EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		3.6	3.4	7.6
Measured Temp.	°C	22.7	22.8	22.9
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	12000	14000	7300
Resistivity @ 25°C	ohm.m	0.83	0.71	1.37
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	<1	<1	190
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	2600	2700	1700
Nitrate as NO3	mg/L	7	20	<0.1
Sulphate as SO4	mg/L	3200	4600	570
Total Anions	mg/L	5800	7300	2500
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	<0.01	<0.01	4
Chloride as Cl*	meq/L	73	77	49
Nitrate as NO3*	meq/L	0.11	0.32	<0.01
Sulphate as SO4*	meq/L	66	95	12
Total Anions*	meq/L	140	170	65
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	46	41	58
Sodium as Na	mg/L	1800	1900	1300
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	320	570	58
Iron as Fe	mg/L	590	550	<0.1
Magnesium as Mg	mg/L	310	440	69
Strontium as Sr	mg/L	4	5	1
Aluminium as Al	mg/L	6	69	<0.1
Boron as B	mg/L	2	3	0.6
Silicon as Si	mg/L	42	62	5
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	4	8	<0.1
Zinc as Zn	mg/L	37	46	<0.1
Lead as Pb	mg/L	8	250	<0.1
Copper as Cu	mg/L	8	250	<0.1
Manganese as Mn	mg/L	2	3	0.1
Tin as Sn	mg/L	11	8	<0.1
Phosphorus as P	mg/L	5	<0.2	0.7
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1

Customer Sample ID		PP_291123_KPF RT03 #1 BV	PP_241123_KPF RT06EF #1 BV	PP_241123_KPM ON02EF #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	3100	3600	1500
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	1	1	1
Sodium as Na*	meq/L	80	83	58
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	16	28	3
Iron as Fe*	meq/L	32	29	<0.01
Magnesium as Mg*	meq/L	26	36	6
Strontium as Sr*	meq/L	0.08	0.12	0.03
Aluminium as Al*	meq/L	0.22	3	<0.01
Total Cations*	meq/L	150	180	68
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	5	3	3
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	0	0	190
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	8900	11000	4000
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	2100	3200	430
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	7900	8800	4700

Customer Sample ID		PP_291123_KPF RT06 #1 BV	PP_291123_KPM ON03 #1 BV	PP_291123_KPM ON01 #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	<0.1	<0.01	0.004
Beryllium*	mg/L	<0.1	<0.1	<0.001
Cobalt*	mg/L	5.3	2.2	0.001
Mercury*	mg/L	<0.01	<0.01	<0.0001
Selenium*	mg/L	<0.1	<0.1	0.006
Silver*	mg/L	<0.5	<0.5	<0.005
Uranium*	mg/L	<0.5	<0.5	<0.005
Nutrient Suite *				
Ammonia (as N)*	mg/L	0.05	0.84	0.28
Nitrate (as N)*	mg/L	<0.02	<0.02	<0.02
Nitrite (as N)*	mg/L	<0.02	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	5.55	0.96	0.52
Total Kjeldahl Nitrogen (as N)*	mg/L	5.60	1.80	0.80

Customer Sample ID		PP_291123_KPF RT06 #1 BV	PP_291123_KPM ON03 #1 BV	PP_291123_KPM ON01 #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Total Nitrogen (as N)*	mg/L	5.60	1.80	0.80
Nutrient Suite - P *				
Phosphorus reactive (as P)*	mg/L	<0.01	0.02	0.04
Phosphate total (as P)*	mg/L	0.16	0.03	0.07
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	1800	1300	200
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		3.5	3.5	7.6
Measured Temp.	°C	22.8	22.8	23.0
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	15000	13000	7400
Resistivity @ 25°C	ohm.m	0.67	0.77	1.35
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	<1	<1	280
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	2900	3200	1800
Nitrate as NO3	mg/L	18	<0.1	<0.1
Sulphate as SO4	mg/L	5000	3800	600
Total Anions	mg/L	7900	7000	2600
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	<0.01	<0.01	6
Chloride as Cl*	meq/L	81	90	49
Nitrate as NO3*	meq/L	0.30	<0.01	<0.01
Sulphate as SO4*	meq/L	100	79	13
Total Anions*	meq/L	180	170	68
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	45	47	35
Sodium as Na	mg/L	2100	1900	1200
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	570	470	130
Iron as Fe	mg/L	770	760	<0.1
Magnesium as Mg	mg/L	450	460	130
Strontium as Sr	mg/L	5	4	2
Aluminium as Al	mg/L	92	0.12	<0.1
Boron as B	mg/L	2	2	1
Silicon as Si	mg/L	68	36	21
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	9	4	<0.1

Customer Sample ID		PP_291123_KPF RT06 #1 BV	PP_291123_KPM ON03 #1 BV	PP_291123_KPM ON01 #1 BV
Date Started		**07/12/2023**	**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Zinc as Zn	mg/L	54	46	<0.1
Lead as Pb	mg/L	270	2	<0.1
Copper as Cu	mg/L	280	2	<0.1
Manganese as Mn	mg/L	3	2	<0.1
Tin as Sn	mg/L	11	10	<0.1
Phosphorus as P	mg/L	<0.2	<0.2	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	4000	3700	1500
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	1	1	0.89
Sodium as Na*	meq/L	90	84	54
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	28	24	7
Iron as Fe*	meq/L	41	41	<0.01
Magnesium as Mg*	meq/L	37	38	11
Strontium as Sr*	meq/L	0.12	0.09	0.04
Aluminium as Al*	meq/L	3	<0.01	<0.01
Total Cations*	meq/L	200	190	72
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	4	5	3
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	0	0	280
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	12000	11000	4200
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	3300	3100	890
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	9400	8200	4700

Customer Sample ID		PP_291123_KPM ON02 #1 BV	PP_291123_KPF RT02 #1 BV
Date Started		**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**
Test/Reference	Unit		
Heavy Metals *			
Arsenic*	mg/L	0.006	0.023
Beryllium*	mg/L	<0.001	<0.1
Cobalt*	mg/L	0.16	4.7
Mercury*	mg/L	<0.0001	<0.01
Selenium*	mg/L	0.001	<0.1
Silver*	mg/L	<0.005	<0.5

Customer Sample ID		PP_291123_KPM ON02 #1 BV	PP_291123_KPF RT02 #1 BV
Date Started		**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**
Test/Reference	Unit		
Uranium*	mg/L	0.057	<0.5
Nutrient Suite *			
Ammonia (as N)*	mg/L	0.19	1.10
Nitrate (as N)*	mg/L	<0.02	<0.02
Nitrite (as N)*	mg/L	<0.02	<0.02
Organic Nitrogen (as N)*	mg/L	0.31	1.90
Total Kjeldahl Nitrogen (as N)*	mg/L	0.50	3.00
Total Nitrogen (as N)*	mg/L	0.50	3.00
Nutrient Suite - P *			
Phosphorus reactive (as P)*	mg/L	<0.01	0.03
Phosphate total (as P)*	mg/L	<0.01	0.08
Sulphur *			
Total Oxidised Sulphur (as S)*	mg/L	220	1600
WATER ANALYSIS			
Test/Reference	Unit		
PROPERTIES: APHA 4500-H+ A,B			
pH at Measured Temp.		6.8	2.2
Measured Temp.	°C	23.0	23.0
PROPERTIES: APHA 2510 A,B			
Electrical Conductivity @ 25°C	µS/cm	8000	20000
Resistivity @ 25°C	ohm.m	1.25	0.50
ANIONS mg/L APHA 2320 A,B			
Hydroxide as CaCO3	mg/L	<1	<1
Carbonate as CaCO3	mg/L	<1	<1
Bicarbonate as CaCO3	mg/L	240	<1
ANIONS mg/L APHA 4110			
Chloride as Cl	mg/L	1900	3400
Nitrate as NO3	mg/L	<0.1	2
Sulphate as SO4	mg/L	680	5400
Total Anions	mg/L	2800	8900
ANIONS meq/L APHA 1050 A*			
Hydroxide as OH*	meq/L	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	5	<0.01
Chloride as Cl*	meq/L	54	97
Nitrate as NO3*	meq/L	<0.01	0.02
Sulphate as SO4*	meq/L	14	110
Total Anions*	meq/L	73	210
CATIONS Dissolved mg/L P3100-PW-012			
Potassium as K	mg/L	38	27
Sodium as Na	mg/L	1400	2600
Barium as Ba	mg/L	<0.1	<0.1
Calcium as Ca	mg/L	120	490
Iron as Fe	mg/L	0.11	950
Magnesium as Mg	mg/L	130	460
Strontium as Sr	mg/L	2	5
Aluminium as Al	mg/L	<0.1	18

Customer Sample ID		PP_291123_KPM ON02 #1 BV	PP_291123_KPF RT02 #1 BV
Date Started		**07/12/2023**	**07/12/2023**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
Boron as B	mg/L	1	3
Silicon as Si	mg/L	8	58
Lithium as Li	mg/L	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	0.3
Vanadium as V	mg/L	<0.1	0.2
Nickel as Ni	mg/L	0.1	8
Zinc as Zn	mg/L	<0.1	71
Lead as Pb	mg/L	<0.1	60
Copper as Cu	mg/L	<0.1	59
Manganese as Mn	mg/L	0.5	3
Tin as Sn	mg/L	<0.1	14
Phosphorus as P	mg/L	<0.2	1
Molybdenum as Mo	mg/L	<0.1	<0.1
CATIONS mg/L P3100-PW-012			
Total Cations	mg/L	1700	4600
CATIONS meq/L APHA 1050 A*			
Potassium as K*	meq/L	0.98	0.68
Sodium as Na*	meq/L	60	110
Barium as Ba*	meq/L	<0.01	<0.01
Calcium as Ca*	meq/L	6	24
Iron as Fe*	meq/L	<0.01	51
Magnesium as Mg*	meq/L	11	38
Strontium as Sr*	meq/L	0.03	0.12
Aluminium as Al*	meq/L	<0.01	0.67
Total Cations*	meq/L	78	230
DERIVED PARAMETERS APHA 4110 & 3120			
Ion balance (Diff * 100/Sum)	%	3	5
Acceptance Criteria	%	5	5
Satisfactory		Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B			
Total Alkalinity (calc as CaCO3)	mg/L	240	0
DERIVED PARAMETERS APHA 4110 & P3100-PW-012			
Total Cations + Anions	mg/L	4500	13000
DERIVED PARAMETERS APHA 2340 B*			
Hardness (calc as CaCO3)*	mg/L	850	3100
DERIVED PARAMETERS APHA 2540 A,B,C,D*			
Calculated Total Dissolved Solids*	mg/L	5100	13000

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

Sample Comments

PP_241123_KPMON03EF #1 BV

Insufficient sample to complete Phosphate total (as P)

External Testing Details

Heavy Metals	eurofins, Accreditation: 1261, Report No: 1052847w
Nutrient Suite	eurofins, Accreditation: 1261, Report No: 1053325w
Nutrient Suite - P	eurofins, Accreditation: 1261, Report No: 1052847w
Sulphur	eurofins, Accreditation: 1261, Report No: 1052847w

Report Results Information

Subcontracting Info	Pending
Subcontracting Info	Pending
Subcontracting Info	Pending

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Leon Faulkner

Project Name	**24PEAD0000649**
Client Ref:	00202477

Customer Sample ID		**PP-260324-KPPR T03-BV**
Date Started		**03/04/2024**
Sample Type		**Water**
Test/Reference	Unit	
Heavy Metals *		
Arsenic*	mg/L	0.003
Beryllium*	mg/L	<0.001
Cobalt*	mg/L	0.69
Mercury*	mg/L	<0.0001
Selenium*	mg/L	<0.001
Silver*	mg/L	<0.005
Uranium*	mg/L	<0.005
Sulphur *		
Total Oxidised Sulphur (as S)*	mg/L	420
WATER ANALYSIS		
Test/Reference	Unit	
PROPERTIES: APHA 4500-H+ A,B		
pH at Measured Temp.		5.3
Measured Temp.	°C	19.2
PROPERTIES: APHA 2510 A,B		
Electrical Conductivity @ 25°C	µS/cm	9900
Resistivity @ 25°C	ohm.m	1.01
ANIONS mg/L APHA 2320 A,B		
Hydroxide as CaCO3	mg/L	<1
Carbonate as CaCO3	mg/L	<1
Bicarbonate as CaCO3	mg/L	9
ANIONS mg/L APHA 4110		
Bromide as Br	mg/L	36
Chloride as Cl	mg/L	2800
Fluoride as F	mg/L	0.4
Nitrate as NO3	mg/L	3
Sulphate as SO4	mg/L	1500
Total Anions	mg/L	4300
ANIONS meq/L APHA 1050 A*		
Hydroxide as OH*	meq/L	<0.01
Carbonate as CO3*	meq/L	<0.01
Bicarbonate as HCO3*	meq/L	0.17
Bromide as Br*	meq/L	0.45
Chloride as Cl*	meq/L	79
Fluoride as F*	meq/L	0.02
Nitrate as NO3*	meq/L	0.06

Customer Sample ID		**PP-260324-KPPR T03-BV**
Date Started		**03/04/2024**
Sample Type		**Water**

WATER ANALYSIS

Test/Reference	Unit	
Sulphate as SO4*	meq/L	31
Total Anions*	meq/L	110
CATIONS Dissolved mg/L P3100-PW-012		
Potassium as K	mg/L	38
Sodium as Na	mg/L	1500
Barium as Ba	mg/L	<0.1
Calcium as Ca	mg/L	200
Iron as Fe	mg/L	140
Magnesium as Mg	mg/L	210
Strontium as Sr	mg/L	4
Aluminium as Al	mg/L	0.19
Boron as B	mg/L	1
Silicon as Si	mg/L	24
Lithium as Li	mg/L	<0.1
Cadmium as Cd	mg/L	<0.1
Chromium as Cr	mg/L	<0.1
Vanadium as V	mg/L	<0.1
Nickel as Ni	mg/L	0.9
Zinc as Zn	mg/L	8
Lead as Pb	mg/L	<0.1
Copper as Cu	mg/L	0.5
Manganese as Mn	mg/L	0.3
Tin as Sn	mg/L	0.4
Phosphorus as P	mg/L	<0.2
Molybdenum as Mo	mg/L	<0.1
CATIONS mg/L P3100-PW-012		
Total Cations	mg/L	2100
CATIONS meq/L APHA 1050 A*		
Potassium as K*	meq/L	0.96
Sodium as Na*	meq/L	65
Barium as Ba*	meq/L	<0.01
Calcium as Ca*	meq/L	10
Iron as Fe*	meq/L	8
Magnesium as Mg*	meq/L	17
Strontium as Sr*	meq/L	0.09
Aluminium as Al*	meq/L	<0.01
Total Cations*	meq/L	100
DERIVED PARAMETERS APHA 4110 & 3120		
Ion balance (Diff * 100/Sum)	%	5
Acceptance Criteria	%	5
Satisfactory		Yes
DERIVED PARAMETERS APHA 2320 A,B		
Total Alkalinity (calc as CaCO3)	mg/L	9
DERIVED PARAMETERS APHA 4110 & P3100-PW-012		
Total Cations + Anions	mg/L	6400
DERIVED PARAMETERS APHA 2340 B*		

Customer Sample ID		**PP-260324-KPPR**
		T03-BV
Date Started		**03/04/2024**
Sample Type		**Water**

WATER ANALYSIS

Test/Reference	Unit	
Hardness (calc as CaCO3)*	mg/L	1300
DERIVED PARAMETERS APHA 2540 A,B,C,D*		
Calculated Total Dissolved Solids*	mg/L	6300

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1083423-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1083423-W

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1076374-W**
Project name KAPUNDA
Project ID 2
Received Date Mar 08, 2024

Client Sample ID			**PP_060324_KPFRT02**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Ma0019380**
Date Sampled			**Mar 06, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	1.8
Bromide	1	mg/L	1300
Chloride	1	mg/L	3200
Conductivity (at 25 °C)	10	uS/cm	16000
Fluoride	0.5	mg/L	200
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	2
pH (at 25 °C)	0.1	pH Units	2.9
Phosphorus reactive (as P)	0.01	mg/L	0.06
Salinity (expressed as TDS)*	10	mg/L	8900
Sulphate (as SO4)	5	mg/L	4900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.8
Total Nitrogen (as N)*	0.2	mg/L	3.8
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	310
Phosphate total (as P)	0.01	mg/L	0.17
Silicon (filtered)	0.5	mg/L	110
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	0.26
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	0.27
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	0.008
Iron (filtered)	0.05	mg/L	1.6

Client Sample ID			PP_060324_KPFRT02
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Ma0019380**
Date Sampled			**Mar 06, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lead (filtered)	0.001	mg/L	< 0.001
Lithium (filtered)	0.005	mg/L	0.016
Manganese (filtered)	0.005	mg/L	0.083
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.009
Selenium (filtered)	0.001	mg/L	0.002
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	0.48
Uranium (filtered)	0.005	mg/L	< 0.005
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.24
Alkali Metals			
Calcium	0.5	mg/L	480
Magnesium	0.5	mg/L	430
Potassium	0.5	mg/L	51
Sodium	0.5	mg/L	2000

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	Mar 12, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Mar 12, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Mar 08, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Mar 12, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Mar 12, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Mar 12, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Mar 12, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Mar 12, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Mar 15, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Mar 12, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Mar 12, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Mar 12, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Mar 12, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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NZBN: 9429046024954

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Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1076374
Phone: 08 7127 1110
Fax:

Received: Mar 8, 2024 4:14 PM
Due: Mar 18, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_060324_KPFRT02	Mar 06, 2024		Water	M24-Ma0019380	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 seven 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 6.0
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 6.0, 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							
Bromide	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	90			70-130	Pass	
Bromide	%	98			70-130	Pass	
Chloride	%	101			70-130	Pass	
Conductivity (at 25 °C)	%	102			70-130	Pass	
Fluoride	%	93			70-130	Pass	
Nitrate & Nitrite (as N)	%	102			70-130	Pass	
Nitrite (as N)	%	104			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)	%	101			70-130	Pass	
Sulphate (as SO4)	%	102			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	109			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
Phosphate total (as P)	%	101			70-130	Pass	
Silicon (filtered)	%	107			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	83			70-130	Pass	
Total Alkalinity (as CaCO3)	%	85			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	106			80-120	Pass	
Arsenic (filtered)	%	96			80-120	Pass	
Boron (filtered)	%	109			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Cobalt (filtered)	%	94			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron (filtered)	%	97			80-120	Pass	
Lead (filtered)	%	92			80-120	Pass	
Lithium (filtered)	%	111			80-120	Pass	
Manganese (filtered)	%	101			80-120	Pass	
Mercury (filtered)	%	89			80-120	Pass	
Molybdenum (filtered)	%	95			80-120	Pass	
Nickel (filtered)	%	95			80-120	Pass	
Selenium (filtered)	%	99			80-120	Pass	
Silver (filtered)	%	92			80-120	Pass	
Strontium (filtered)	%	103			80-120	Pass	
Uranium (filtered)	%	93			80-120	Pass	
Zinc (filtered)	%	95			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	97			80-120	Pass	
Magnesium	%	102			80-120	Pass	
Potassium	%	95			80-120	Pass	
Sodium	%	99			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M24-Ma0018819	NCP	%	86			70-130	Pass	
Nitrate & Nitrite (as N)	B24-Ma0010239	NCP	%	78			70-130	Pass	
Nitrite (as N)	M24-Ma0019114	NCP	%	85			70-130	Pass	
Sulphate (as SO4)	M24-Ma0018920	NCP	%	99			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Ma0019882	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Ma0019124	NCP	%	88			75-125	Pass	
Arsenic (filtered)	M24-Ma0019124	NCP	%	114			75-125	Pass	
Barium (filtered)	M24-Ma0019124	NCP	%	120			75-125	Pass	
Beryllium (filtered)	M24-Ma0019124	NCP	%	102			75-125	Pass	
Boron (filtered)	B24-Ma0012603	NCP	%	97			75-125	Pass	
Cadmium (filtered)	M24-Ma0019124	NCP	%	84			75-125	Pass	
Chromium (filtered)	M24-Ma0019124	NCP	%	111			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cobalt (filtered)	M24-Ma0019124	NCP	%	111			75-125	Pass	
Copper (filtered)	M24-Ma0019124	NCP	%	103			75-125	Pass	
Iron (filtered)	M24-Ma0019124	NCP	%	107			75-125	Pass	
Lead (filtered)	M24-Ma0019124	NCP	%	99			75-125	Pass	
Lithium (filtered)	M24-Ma0019124	NCP	%	100			75-125	Pass	
Manganese (filtered)	M24-Ma0019124	NCP	%	113			75-125	Pass	
Mercury (filtered)	M24-Ma0019124	NCP	%	98			75-125	Pass	
Molybdenum (filtered)	M24-Ma0019124	NCP	%	99			75-125	Pass	
Nickel (filtered)	M24-Ma0019124	NCP	%	108			75-125	Pass	
Selenium (filtered)	M24-Ma0019124	NCP	%	109			75-125	Pass	
Silver (filtered)	M24-Ma0019124	NCP	%	97			75-125	Pass	
Strontium (filtered)	B24-Ma0012603	NCP	%	109			75-125	Pass	
Uranium (filtered)	M24-Ma0019124	NCP	%	86			75-125	Pass	
Vanadium (filtered)	M24-Ma0019124	NCP	%	100			75-125	Pass	
Zinc (filtered)	M24-Ma0019124	NCP	%	120			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Ma0019215	NCP	%	95			75-125	Pass	
Magnesium	M24-Ma0019215	NCP	%	96			75-125	Pass	
Potassium	M24-Ma0019215	NCP	%	94			75-125	Pass	
Sodium	M24-Ma0019215	NCP	%	103			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)	M24-Ma0018915	NCP	mg/L	0.01	< 0.01	16	30%	Pass	
Bromide	M24-Ma0032270	NCP	mg/L	< 1	< 1	<1	30%	Pass	
Chloride	M24-Ma0019977	NCP	mg/L	3300	3200	5.0	30%	Pass	
Conductivity (at 25 °C)	M24-Ma0025707	NCP	uS/cm	16000	15000	1.5	30%	Pass	
Fluoride	M24-Ma0032270	NCP	mg/L	0.6	0.6	6.3	30%	Pass	
Nitrate & Nitrite (as N)	M24-Ma0018915	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-Ma0018915	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-Ma0025707	NCP	pH Units	8.4	8.2	pass	30%	Pass	
Salinity (expressed as TDS)*	M24-Ma0028082	NCP	mg/L	2400	1900	23	30%	Pass	
Sulphate (as SO4)	M24-Ma0019977	NCP	mg/L	460	470	2.5	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ma0019125	NCP	mg/L	150	150	1.9	30%	Pass	
Phosphate total (as P)	M24-Ma0019380	CP	mg/L	0.17	0.16	9.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Ma0021158	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-Ma0019124	NCP	mg/L	0.003	0.003	3.0	30%	Pass	
Barium (filtered)	M24-Ma0019124	NCP	mg/L	0.03	0.03	<1	30%	Pass	
Beryllium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Ma0019215	NCP	mg/L	4.6	4.5	3.1	30%	Pass	
Cadmium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M24-Ma0019124	NCP	mg/L	0.001	0.001	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron (filtered)	M24-Ma0019124	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	M24-Ma0019124	NCP	mg/L	0.009	0.009	2.4	30%	Pass	
Mercury (filtered)	M24-Ma0019124	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Ma0019124	NCP	mg/L	0.004	0.004	<1	30%	Pass	
Selenium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-Ma0019124	NCP	mg/L	0.39	0.38	2.0	30%	Pass	
Uranium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Ma0019124	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Ma0019124	NCP	mg/L	0.074	0.073	2.1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Ma0019215	NCP	mg/L	64	64	<1	30%	Pass	
Magnesium	M24-Ma0019215	NCP	mg/L	95	94	1.0	30%	Pass	
Potassium	M24-Ma0019215	NCP	mg/L	31	31	<1	30%	Pass	
Sodium	M24-Ma0019215	NCP	mg/L	2200	2200	1.2	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

Authorised by:

Catherine Wilson	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Caitlin Breeze	Senior Analyst-Metal
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.

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Accreditation Number 1261
Site Number 1254

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Attention: **Leon Faulkner**

Report **1081793-W**
Project name KAPUNDA
Project ID 2
Received Date Mar 26, 2024

Client Sample ID			**PP_260324_KPFRT02**	**PP_260324_KPFRT03**	**PP_260324_KPFRT04**	**PP_260324_KPFRT06**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M24-Ma0062908**	**M24-Ma0062909**	**M24-Ma0062910**	**M24-Ma0062911**
Date Sampled			**Mar 26, 2024**	**Mar 26, 2024**	**Mar 26, 2024**	**Mar 26, 2024**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.9	0.28	0.04	0.45
Bromide	1	mg/L	140	18	2.2	3.8
Chloride	1	mg/L	3400	2800	2200	2800
Conductivity (at 25 °C)	10	uS/cm	16000	9800	8000	13000
Fluoride	0.5	mg/L	< 5	0.7	0.8	1.2
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	24	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	23	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	0.14	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.5	1.82	2.36	4.25
pH (at 25 °C)	0.1	pH Units	2.9	3.8	7.4	3.6
Phosphorus reactive (as P)	0.01	mg/L	0.05	0.02	0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	14000	5500	4300	7900
Sulphate (as SO4)	5	mg/L	5400	1300	840	4200
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	2.4	2.1	2.4	4.7
Total Nitrogen (as N)*	0.2	mg/L	2.4	2.1	26	4.7
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	190	47	56	370
Phosphate total (as P)	0.01	mg/L	0.15	0.02	0.01	0.06
Silicon (filtered)	0.5	mg/L	88	27	21	56
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	290	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	290	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	49	< 0.5	< 0.05	48
Arsenic (filtered)	0.001	mg/L	0.071	< 0.01	0.003	0.020
Barium (filtered)	0.02	mg/L	< 0.2	< 0.2	0.02	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	2.7	1.3	1.3	2.3
Cadmium (filtered)	0.0002	mg/L	0.049	0.0044	0.0003	0.033
Chromium (filtered)	0.001	mg/L	0.17	< 0.01	< 0.001	0.24
Cobalt (filtered)	0.001	mg/L	4.5	0.67	0.088	3.7
Copper (filtered)	0.001	mg/L	74	1.2	0.23	260
Iron (filtered)	0.05	mg/L	1200	130	< 0.05	440

Client Sample ID			PP_260324_KPFRT02	PP_260324_KPFRT03	PP_260324_KPFRT04	PP_260324_KPFRT06
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Ma0062908	M24-Ma0062909	M24-Ma0062910	M24-Ma0062911
Date Sampled			Mar 26, 2024	Mar 26, 2024	Mar 26, 2024	Mar 26, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	0.046	< 0.01	< 0.001	0.019
Lithium (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Manganese (filtered)	0.005	mg/L	2.0	0.33	0.15	2.2
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	7.3	1.1	0.14	6.3
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	0.013	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	4.8	2.5	2.0	4.6
Uranium (filtered)	0.005	mg/L	< 0.05	< 0.05	0.013	0.14
Vanadium (filtered)	0.005	mg/L	0.066	< 0.05	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	76	9.1	0.41	36
Alkali Metals						
Calcium	0.5	mg/L	400	180	120	460
Magnesium	0.5	mg/L	360	190	140	340
Potassium	0.5	mg/L	44	33	25	30
Sodium	0.5	mg/L	1700	1300	1300	1500

Client Sample ID			PP_260324_KPMON01	PP_260324_KPMON02	PP_260324_KPMON03	PP_260324_KPFRT03#2
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Ma0062912	M24-Ma0062913	M24-Ma0062914	M24-Ma0062915
Date Sampled			Mar 26, 2024	Mar 26, 2024	Mar 26, 2024	Mar 26, 2024
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.20	0.20	1.2	0.24
Bromide	1	mg/L	4.7	5.2	4.6	16
Chloride	1	mg/L	2000	2200	2700	2800
Conductivity (at 25 °C)	10	uS/cm	6900	7600	12000	9400
Fluoride	0.5	mg/L	1.7	1.2	2.5	0.8
Nitrate & Nitrite (as N)	0.05	mg/L	2.2	0.07	< 0.05	0.16
Nitrate (as N)	0.02	mg/L	2.2	0.07	< 0.02	0.11
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	0.05
Organic Nitrogen (as N)*	0.2	mg/L	0.5	< 0.2	< 0.2	0.66
pH (at 25 °C)	0.1	pH Units	7.4	7.1	3.9	4.1
Phosphorus reactive (as P)	0.01	mg/L	0.04	< 0.01	0.03	< 0.01
Salinity (expressed as TDS)*	10	mg/L	3700	4000	7700	5900
Sulphate (as SO4)	5	mg/L	520	650	4000	1300
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.7	0.2	1.2	0.9
Total Nitrogen (as N)*	0.2	mg/L	2.9	0.3	1.2	1.1
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	24	82	530	76
Phosphate total (as P)	0.01	mg/L	0.04	< 0.01	0.03	< 0.01
Silicon (filtered)	0.5	mg/L	22	8.3	37	27
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	340	300	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	340	300	< 20	< 20

Client Sample ID			PP_260324_KPMON01	PP_260324_KPMON02	PP_260324_KPMON03	PP_260324_KPFRT03#2
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M24-Ma0062912**	**M24-Ma0062913**	**M24-Ma0062914**	**M24-Ma0062915**
Date Sampled			**Mar 26, 2024**	**Mar 26, 2024**	**Mar 26, 2024**	**Mar 26, 2024**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.5	0.55
Arsenic (filtered)	0.001	mg/L	0.001	< 0.001	0.041	< 0.01
Barium (filtered)	0.02	mg/L	0.05	0.05	< 0.2	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	1.1	1.3	1.7	1.3
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.002	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Cobalt (filtered)	0.001	mg/L	0.014	0.033	2.3	0.70
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	0.18	0.58
Iron (filtered)	0.05	mg/L	< 0.05	1.9	820	140
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Lithium (filtered)	0.005	mg/L	0.022	0.021	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.087	0.54	1.5	0.33
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	0.006	< 0.005	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	0.016	0.011	3.7	1.1
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05	< 0.05
Strontium (filtered)	0.005	mg/L	2.1	1.9	3.2	2.5
Uranium (filtered)	0.005	mg/L	< 0.005	0.045	< 0.05	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05	< 0.05
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	46	9.4
Alkali Metals						
Calcium	0.5	mg/L	120	110	360	180
Magnesium	0.5	mg/L	120	120	330	180
Potassium	0.5	mg/L	28	31	32	33
Sodium	0.5	mg/L	1100	1200	1400	1300

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	Mar 27, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Mar 27, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Mar 26, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Mar 27, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Mar 27, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Mar 27, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Mar 27, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Mar 27, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Apr 03, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Mar 27, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Mar 27, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Mar 27, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Mar 27, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
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+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
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SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1081793
Phone: 08 7127 1110
Fax:

Received: Mar 26, 2024 3:54 PM
Due: Apr 4, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_260324_KPFRT02	Mar 26, 2024		Water	M24-Ma0062908	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
2	PP_260324_KPFRT03	Mar 26, 2024		Water	M24-Ma0062909	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
3	PP_260324_KPFRT04	Mar 26, 2024		Water	M24-Ma0062910	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
4	PP_260324_KPFRT06	Mar 26, 2024		Water	M24-Ma0062911	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
5	PP_260324_KPMON01	Mar 26, 2024		Water	M24-Ma0062912	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
6	PP_260324_KPMON02	Mar 26, 2024		Water	M24-Ma0062913	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
7	PP_260324_KPMON03	Mar 26, 2024		Water	M24-Ma0062914	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
8	PP_260324_KPFRT03#2	Mar 26, 2024		Water	M24-Ma0062915	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

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Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Method Blank							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Bromide	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	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	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Method Blank							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Fluoride	%	102			70-130	Pass	
Nitrate & Nitrite (as N)	%	111			70-130	Pass	
Nitrite (as N)	%	103			70-130	Pass	
Sulphate (as SO4)	%	111			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	98			70-130	Pass	
Total Alkalinity (as CaCO3)	%	101			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	98			80-120	Pass	
Arsenic (filtered)	%	95			80-120	Pass	
Boron (filtered)	%	101			80-120	Pass	
Cadmium (filtered)	%	93			80-120	Pass	
Chromium (filtered)	%	95			80-120	Pass	
Cobalt (filtered)	%	93			80-120	Pass	
Copper (filtered)	%	92			80-120	Pass	
Iron (filtered)	%	101			80-120	Pass	
Lead (filtered)	%	89			80-120	Pass	
Lithium (filtered)	%	96			80-120	Pass	
Manganese (filtered)	%	96			80-120	Pass	
Mercury (filtered)	%	89			80-120	Pass	
Molybdenum (filtered)	%	93			80-120	Pass	
Nickel (filtered)	%	94			80-120	Pass	
Selenium (filtered)	%	94			80-120	Pass	
Silver (filtered)	%	89			80-120	Pass	
Strontium (filtered)	%	97			80-120	Pass	
Uranium (filtered)	%	91			80-120	Pass	
Zinc (filtered)	%	95			80-120	Pass	
LCS - % Recovery							
Ammonia (as N)	%	107			70-130	Pass	
LCS - % Recovery							
Bromide	%	114			70-130	Pass	
Conductivity (at 25 °C)	%	99			70-130	Pass	
Nitrate & Nitrite (as N)	%	111			70-130	Pass	
Phosphorus reactive (as P)	%	113			70-130	Pass	
LCS - % Recovery							
Nitrate & Nitrite (as N)	%	111			70-130	Pass	
LCS - % Recovery							
Chloride	%	123			70-130	Pass	
Nitrate & Nitrite (as N)	%	111			70-130	Pass	
LCS - % Recovery							
Chloride	%	129			70-130	Pass	
Silicon (filtered)	%	97			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	87			80-120	Pass	
Magnesium	%	87			80-120	Pass	
Potassium	%	87			80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sodium	%	87			80-120	Pass	
LCS - % Recovery							
Conductivity (at 25 °C)	%	100			70-130	Pass	
LCS - % Recovery							
Chloride	%	124			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	102			70-130	Pass	
Phosphate total (as P)	%	97			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M24-Ma0065207	NCP	%	97			70-130	Pass	
Nitrite (as N)	M24-Ma0065207	NCP	%	97			70-130	Pass	
Sulphate (as SO4)	M24-Ma0061369	NCP	%	85			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B24-Ma0058007	NCP	%	94			70-130	Pass	
Phosphate total (as P)	M24-Ma0065184	NCP	%	100			70-130	Pass	
Silicon (filtered)	M24-Ma0062908	CP	%	92			75-125	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	M24-Ma0057036	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Ma0063809	NCP	%	103			75-125	Pass	
Arsenic (filtered)	M24-Ma0063809	NCP	%	100			75-125	Pass	
Beryllium (filtered)	M24-Ma0063809	NCP	%	100			75-125	Pass	
Boron (filtered)	M24-Ma0062160	NCP	%	93			75-125	Pass	
Cadmium (filtered)	M24-Ma0063809	NCP	%	95			75-125	Pass	
Chromium (filtered)	M24-Ma0063809	NCP	%	99			75-125	Pass	
Cobalt (filtered)	M24-Ma0063809	NCP	%	96			75-125	Pass	
Copper (filtered)	M24-Ma0063826	NCP	%	81			75-125	Pass	
Iron (filtered)	M24-Ma0064737	NCP	%	99			75-125	Pass	
Lead (filtered)	M24-Ma0063809	NCP	%	92			75-125	Pass	
Lithium (filtered)	M24-Ma0063809	NCP	%	100			75-125	Pass	
Manganese (filtered)	M24-Ma0063809	NCP	%	96			75-125	Pass	
Molybdenum (filtered)	M24-Ma0063809	NCP	%	88			75-125	Pass	
Nickel (filtered)	M24-Ma0063809	NCP	%	93			75-125	Pass	
Selenium (filtered)	M24-Ma0063809	NCP	%	93			75-125	Pass	
Uranium (filtered)	M24-Ma0063809	NCP	%	97			75-125	Pass	
Vanadium (filtered)	M24-Ma0063809	NCP	%	99			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Ma0062908	CP	%	89			75-125	Pass	
Magnesium	M24-Ma0062908	CP	%	89			75-125	Pass	
Potassium	M24-Ma0062908	CP	%	87			75-125	Pass	
Sodium	M24-Ma0062908	CP	%	97			75-125	Pass	
Spike - % Recovery									
				Result 1					
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ma0062911	CP	%	90			70-130	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)	M24-Ma0065903	NCP	mg/L	0.36	0.37	3.2	30%	Pass	
Conductivity (at 25 °C)	M24-Ma0055440	NCP	uS/cm	630	680	15	30%	Pass	
Nitrate & Nitrite (as N)	M24-Ma0065903	NCP	mg/L	2.7	2.8	4.4	30%	Pass	
Nitrite (as N)	M24-Ma0065903	NCP	mg/L	0.16	0.16	1.5	30%	Pass	
pH (at 25 °C)	M24-Ma0055440	NCP	pH Units	9.3	9.4	pass	30%	Pass	
Total Kjeldahl Nitrogen (as N)	B24-Ma0058006	NCP	mg/L	810	760	5.8	30%	Pass	
Silicon (filtered)	M24-Ma0062908	CP	mg/L	88	90	2.8	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Ma0057035	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Ma0057035	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Ma0057035	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Ma0057035	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Ma0063809	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-Ma0063809	NCP	mg/L	0.003	0.003	5.8	30%	Pass	
Barium (filtered)	M24-Ma0063809	NCP	mg/L	0.91	0.90	<1	30%	Pass	
Beryllium (filtered)	M24-Ma0063809	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Ma0063809	NCP	mg/L	1.2	1.2	<1	30%	Pass	
Cadmium (filtered)	M24-Ma0063809	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Ma0063809	NCP	mg/L	0.003	0.003	1.4	30%	Pass	
Cobalt (filtered)	M24-Ma0063809	NCP	mg/L	0.006	0.006	<1	30%	Pass	
Copper (filtered)	M24-Ma0063826	NCP	mg/L	0.12	0.12	2.4	30%	Pass	
Iron (filtered)	M24-Ma0064737	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-Ma0063809	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Ma0063809	NCP	mg/L	0.007	0.007	1.3	30%	Pass	
Manganese (filtered)	M24-Ma0063809	NCP	mg/L	0.045	0.044	<1	30%	Pass	
Mercury (filtered)	M24-Ma0063809	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Ma0063809	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Ma0063809	NCP	mg/L	0.011	0.011	<1	30%	Pass	
Selenium (filtered)	M24-Ma0063809	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-Ma0063809	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-Ma0063809	NCP	mg/L	0.97	0.97	<1	30%	Pass	
Uranium (filtered)	M24-Ma0063809	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Ma0063809	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Ma0063826	NCP	mg/L	0.70	0.68	2.1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Ma0062908	CP	mg/L	400	430	5.1	30%	Pass	
Magnesium	M24-Ma0062908	CP	mg/L	360	380	6.6	30%	Pass	
Potassium	M24-Ma0062908	CP	mg/L	44	46	5.7	30%	Pass	
Sodium	M24-Ma0062908	CP	mg/L	1700	1800	5.5	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ma0062910	CP	mg/L	56	46	19	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Ma0062915	CP	mg/L	16	17	11	30%	Pass	
Chloride	M24-Ma0062915	CP	mg/L	2800	2800	<1	30%	Pass	
Fluoride	M24-Ma0062915	CP	mg/L	0.8	0.8	<1	30%	Pass	
Sulphate (as SO4)	M24-Ma0062915	CP	mg/L	1300	1300	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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
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.

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Accreditation Number 1261
Site Number 1254

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Attention: **Leon Faulkner**

Report **1105037-W**
Project name KAPUNDA
Project ID 2
Received Date Jun 06, 2024

Client Sample ID			PP_050624_KPFRT02	PP_050624_KPFRT03	PP_050624_KPFRT04	PP_050624_KPFRT06
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Jn0012454	M24-Jn0012455	M24-Jn0012456	M24-Jn0012457
Date Sampled			Jun 05, 2024	Jun 05, 2024	Jun 05, 2024	Jun 05, 2024
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	1.7	0.22	< 0.01	0.33
Bromide	1	mg/L	6.2	< 1	< 1	2.2
Chloride	1	mg/L	3400	2900	2300	3000
Conductivity (at 25 °C)	10	uS/cm	15000	9800	8200	12000
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5	2.1
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.32	27	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02	0.32	27	< 0.02
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	1.2	3.37
pH (at 25 °C)	0.1	pH Units	3.2	4.6	7.8	3.9
Phosphorus reactive (as P)	0.01	mg/L	0.02	< 0.01	< 0.01	< 0.01
Salinity (expressed as TDS)*	10	mg/L	8600	5400	3800	7600
Sulphate (as SO4)	5	mg/L	4900	1300	910	4100
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.9	0.3	1.2	3.7
Total Nitrogen (as N)*	0.2	mg/L	1.9	0.6	28	3.7
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	27	80	32	70
Phosphate total (as P)	0.01	mg/L	0.10	< 0.01	< 0.01	0.05
Silicon (filtered)	0.5	mg/L	83	27	22	55
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	410	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	410	< 20
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	27	0.18	< 0.05	41
Arsenic (filtered)	0.001	mg/L	0.058	0.001	0.003	0.016
Barium (filtered)	0.02	mg/L	< 0.2	0.02	0.03	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01	< 0.001	< 0.001	< 0.01
Boron (filtered)	0.05	mg/L	< 5	1.1	1.2	< 5
Cadmium (filtered)	0.0002	mg/L	0.051	0.0035	< 0.0002	0.032
Chromium (filtered)	0.001	mg/L	0.41	< 0.001	< 0.001	0.19
Cobalt (filtered)	0.001	mg/L	4.3	0.61	0.050	3.7
Copper (filtered)	0.001	mg/L	41	0.37	0.10	220
Iron (filtered)	0.05	mg/L	900	120	0.06	380

Client Sample ID			PP_050624_KPFRT02	PP_050624_KPFRT03	PP_050624_KPFRT04	PP_050624_KPFRT06
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Jn0012454	M24-Jn0012455	M24-Jn0012456	M24-Jn0012457
Date Sampled			Jun 05, 2024	Jun 05, 2024	Jun 05, 2024	Jun 05, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Lead (filtered)	0.001	mg/L	0.031	< 0.001	< 0.001	0.020
Lithium (filtered)	0.005	mg/L	< 0.05	0.015	< 0.005	< 0.05
Manganese (filtered)	0.005	mg/L	1.9	0.31	0.11	2.2
Mercury (filtered)	0.0001	mg/L	< 0.001	< 0.0001	< 0.0001	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.005	< 0.05
Nickel (filtered)	0.001	mg/L	7.0	0.92	0.076	6.0
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.001	0.014	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05	< 0.005	< 0.005	< 0.05
Strontium (filtered)	0.005	mg/L	4.5	2.6	1.8	4.6
Uranium (filtered)	0.005	mg/L	0.12	< 0.005	0.014	0.11
Vanadium (filtered)	0.005	mg/L	0.055	< 0.005	< 0.005	< 0.05
Zinc (filtered)	0.005	mg/L	61	8.2	0.25	37
Alkali Metals						
Calcium	0.5	mg/L	430	190	120	490
Magnesium	0.5	mg/L	400	200	150	360
Potassium	0.5	mg/L	49	35	27	33
Sodium	0.5	mg/L	1900	1500	1400	1600

Client Sample ID			PP_050624_KPMON01	PP_050624_KPMON02	PP_050624_KPMON03	PP_050624_KPFRT02#2
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Jn0012458	M24-Jn0012459	M24-Jn0012460	M24-Jn0012461
Date Sampled			Jun 05, 2024	Jun 05, 2024	Jun 05, 2024	Jun 05, 2024
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.30	0.18	1.0	1.7
Bromide	1	mg/L	< 1	< 1	< 1	1.7
Chloride	1	mg/L	2200	2400	2900	3600
Conductivity (at 25 °C)	10	uS/cm	7100	7800	11000	15000
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.14	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	0.14	0.04	< 0.02	< 0.02
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	0.2	0.5
pH (at 25 °C)	0.1	pH Units	7.9	7.2	4.6	3.3
Phosphorus reactive (as P)	0.01	mg/L	0.11	< 0.01	< 0.01	0.06
Salinity (expressed as TDS)*	10	mg/L	2700	3500	8500	8500
Sulphate (as SO4)	5	mg/L	570	700	4000	4900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4	< 0.2	1.2	2.2
Total Nitrogen (as N)*	0.2	mg/L	0.5	< 0.2	1.2	2.2
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	8.0	110	130	30
Phosphate total (as P)	0.01	mg/L	0.13	< 0.01	0.02	0.09
Silicon (filtered)	0.5	mg/L	20	8.2	37	84
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	350	290	< 20	< 20
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	350	290	< 20	< 20

Client Sample ID			PP_050624_KPMON01	PP_050624_KPMON02	PP_050624_KPMON03	PP_050624_KPFRT02#2
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Jn0012458	M24-Jn0012459	M24-Jn0012460	M24-Jn0012461
Date Sampled			Jun 05, 2024	Jun 05, 2024	Jun 05, 2024	Jun 05, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.5	27
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	0.018	0.059
Barium (filtered)	0.02	mg/L	0.05	0.05	< 0.2	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Boron (filtered)	0.05	mg/L	1.0	1.3	< 5	< 5
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	0.052
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	0.41
Cobalt (filtered)	0.001	mg/L	0.002	0.008	2.2	4.4
Copper (filtered)	0.001	mg/L	0.018	0.002	< 0.01	42
Iron (filtered)	0.05	mg/L	< 0.05	0.80	710	910
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	0.031
Lithium (filtered)	0.005	mg/L	0.022	0.022	< 0.05	< 0.05
Manganese (filtered)	0.005	mg/L	0.055	0.45	1.4	1.9
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	< 0.001
Molybdenum (filtered)	0.005	mg/L	0.006	< 0.005	< 0.05	< 0.05
Nickel (filtered)	0.001	mg/L	0.003	0.002	3.5	7.1
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05	< 0.05
Strontium (filtered)	0.005	mg/L	2.1	1.8	2.9	4.6
Uranium (filtered)	0.005	mg/L	< 0.005	0.038	< 0.05	0.12
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.05	0.053
Zinc (filtered)	0.005	mg/L	0.023	< 0.005	44	61
Alkali Metals						
Calcium	0.5	mg/L	130	120	390	440
Magnesium	0.5	mg/L	130	130	350	400
Potassium	0.5	mg/L	29	34	34	50
Sodium	0.5	mg/L	1100	1300	1600	1900

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	Jun 11, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jun 11, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Jun 06, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Jun 11, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jun 11, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Jun 11, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Jun 11, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Jun 11, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Jun 11, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Jun 11, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Jun 11, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Jun 11, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1105037
Phone: 08 7127 1110
Fax:

Received: Jun 6, 2024 2:33 PM
Due: Jun 18, 2024
Priority: 7 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	PP_050624_KPFRT02	Jun 05, 2024		Water	M24-Jn0012454	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
2	PP_050624_KPFRT03	Jun 05, 2024		Water	M24-Jn0012455	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
3	PP_050624_KPFRT04	Jun 05, 2024		Water	M24-Jn0012456	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
4	PP_050624_KPFRT06	Jun 05, 2024		Water	M24-Jn0012457	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
5	PP_050624_KPMON01	Jun 05, 2024		Water	M24-Jn0012458	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
6	PP_050624_KPMON02	Jun 05, 2024		Water	M24-Jn0012459	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
7	PP_050624_KPMON03	Jun 05, 2024		Water	M24-Jn0012460	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
8	PP_050624_KPFRT02#2	Jun 05, 2024		Water	M24-Jn0012461	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
Test Counts						8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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							
Chloride	mg/L	< 1			1	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Salinity (expressed as TDS)*	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Bromide	mg/L	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Silicon (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Bromide	mg/L	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
LCS - % Recovery							
Nitrite (as N)	%	96			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	100			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	92			70-130	Pass	
Phosphate total (as P)	%	107			70-130	Pass	
Silicon (filtered)	%	100			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	99			80-120	Pass	
Arsenic (filtered)	%	103			80-120	Pass	
Boron (filtered)	%	99			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Cobalt (filtered)	%	94			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron (filtered)	%	97			80-120	Pass	
Lead (filtered)	%	93			80-120	Pass	
Lithium (filtered)	%	96			80-120	Pass	
Manganese (filtered)	%	96			80-120	Pass	
Mercury (filtered)	%	91			80-120	Pass	
Molybdenum (filtered)	%	95			80-120	Pass	
Nickel (filtered)	%	99			80-120	Pass	
Selenium (filtered)	%	114			80-120	Pass	
Silver (filtered)	%	96			80-120	Pass	
Strontium (filtered)	%	95			80-120	Pass	
Uranium (filtered)	%	93			80-120	Pass	
Zinc (filtered)	%	97			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	97			80-120	Pass	
Magnesium	%	96			80-120	Pass	
Potassium	%	99			80-120	Pass	
Sodium	%	99			80-120	Pass	
LCS - % Recovery							
Bromide	%	99			70-130	Pass	
Fluoride	%	81			70-130	Pass	
Phosphorus reactive (as P)	%	117			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	87			70-130	Pass	
Chloride	%	111			70-130	Pass	
LCS - % Recovery							
Sulphate (as SO4)	%	109			70-130	Pass	
LCS - % Recovery							
Bromide	%	111			70-130	Pass	
Fluoride	%	114			70-130	Pass	
Nitrate & Nitrite (as N)	%	99			70-130	Pass	
Phosphate total (as P)	%	107			70-130	Pass	
LCS - % Recovery							
Sulphate (as SO4)	%	116			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	81			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Alkalinity (as CaCO3)			%	85			70-130	Pass	
LCS - % Recovery									
Chloride			%	113			70-130	Pass	
Conductivity (at 25 °C)			%	88			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Chloride	M24-Jn0016087	NCP	%	95			70-130	Pass	
Nitrate & Nitrite (as N)	M24-Jn0022433	NCP	%	112			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Jn0016735	NCP	%	101			70-130	Pass	
Silicon (filtered)	M24-Jn0012454	CP	%	93			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-My0059593	NCP	%	93			75-125	Pass	
Arsenic (filtered)	M24-My0059593	NCP	%	92			75-125	Pass	
Barium (filtered)	M24-My0059593	NCP	%	90			75-125	Pass	
Beryllium (filtered)	M24-My0059593	NCP	%	92			75-125	Pass	
Cadmium (filtered)	M24-My0059593	NCP	%	91			75-125	Pass	
Chromium (filtered)	M24-My0059593	NCP	%	89			75-125	Pass	
Cobalt (filtered)	M24-My0059593	NCP	%	88			75-125	Pass	
Copper (filtered)	M24-My0059593	NCP	%	84			75-125	Pass	
Iron (filtered)	M24-My0059593	NCP	%	92			75-125	Pass	
Lead (filtered)	M24-My0059593	NCP	%	82			75-125	Pass	
Lithium (filtered)	M24-My0059593	NCP	%	91			75-125	Pass	
Manganese (filtered)	M24-My0059593	NCP	%	90			75-125	Pass	
Mercury (filtered)	M24-My0059593	NCP	%	93			75-125	Pass	
Molybdenum (filtered)	M24-Jn0016735	NCP	%	104			75-125	Pass	
Nickel (filtered)	M24-My0059593	NCP	%	87			75-125	Pass	
Selenium (filtered)	M24-My0059593	NCP	%	88			75-125	Pass	
Silver (filtered)	M24-My0059593	NCP	%	81			75-125	Pass	
Strontium (filtered)	M24-My0059593	NCP	%	90			75-125	Pass	
Uranium (filtered)	M24-My0059593	NCP	%	88			75-125	Pass	
Vanadium (filtered)	M24-My0059593	NCP	%	92			75-125	Pass	
Zinc (filtered)	M24-Jn0016735	NCP	%	114			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Jn0012454	CP	%	103			75-125	Pass	
Magnesium	M24-Jn0012454	CP	%	102			75-125	Pass	
Potassium	M24-Jn0012454	CP	%	95			75-125	Pass	
Sodium	M24-Jn0016725	NCP	%	113			75-125	Pass	
Spike - % Recovery									
				Result 1					
Fluoride	B24-Jn0024674	NCP	%	93			70-130	Pass	
Spike - % Recovery									
				Result 1					
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0012456	CP	%	91			70-130	Pass	
Spike - % Recovery									
				Result 1					
Bromide	M24-Jn0012458	CP	%	106			70-130	Pass	
Sulphate (as SO4)	M24-Jn0012458	CP	%	114			70-130	Pass	
Phosphate total (as P)	M24-Jn0012458	CP	%	116			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrite (as N)	M24-Jn0012459	CP	%	100			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M24-Jn0012454	CP	mg/L	3400	3400	<1	30%	Pass	
Sulphate (as SO4)	M24-Jn0012454	CP	mg/L	4900	5000	1.6	30%	Pass	
Silicon (filtered)	M24-Jn0012454	CP	mg/L	83	81	2.5	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Jn0012454	CP	mg/L	430	420	2.8	30%	Pass	
Magnesium	M24-Jn0012454	CP	mg/L	400	390	3.1	30%	Pass	
Potassium	M24-Jn0012454	CP	mg/L	49	48	1.1	30%	Pass	
Sodium	M24-Jn0012454	CP	mg/L	1900	1900	2.3	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25 °C)	M24-Jn0012456	CP	uS/cm	8200	8200	<1	30%	Pass	
pH (at 25 °C)	M24-Jn0012456	CP	pH Units	7.8	7.8	pass	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Jn0012456	CP	mg/L	410	370	10	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Jn0012456	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Jn0012456	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Jn0012456	CP	mg/L	410	370	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Jn0012457	CP	mg/L	2.2	2.6	18	30%	Pass	
Fluoride	M24-Jn0012457	CP	mg/L	2.1	2.3	12	30%	Pass	
Phosphate total (as P)	M24-Jn0012457	CP	mg/L	0.05	0.06	17	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M24-Jn0012458	CP	mg/L	0.30	0.40	30	30%	Pass	
Bromide	M24-Jn0012458	CP	mg/L	< 1	< 1	<1	30%	Pass	
Fluoride	M24-Jn0012458	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M24-Jn0012458	CP	mg/L	0.14	0.13	6.5	30%	Pass	
Nitrite (as N)	M24-Jn0012458	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M24-Jn0012459	CP	mg/L	2400	2400	<1	30%	Pass	
Sulphate (as SO4)	M24-Jn0012459	CP	mg/L	700	720	2.7	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	M24-Jn0012461	CP	mg/L	2.2	2.0	8.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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
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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33 Cormack Road
Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240
ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00223

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

Enviro Copper
Suite 4, Level 1,
155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref 00202477

BV Sample ID	**170129**
Customer Sample ID	**PP_050624_KPFRT02_BV**
Date Started	**14-Jun-2024**
Sample Type	**Water**
Date Sampled	**05-Jun-2024**
Collected By	**Client**

Method	Test/Units	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	3.5
	Measured Temp. ,°C	18.2
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	15000
	Resistivity at 25°C ,ohm m	0.65
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	9800
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	54
	Sodium as Na ,mg/L	2000
	Barium as Ba ,mg/L	<0.1
	Calcium as Ca ,mg/L	480
	Iron as Fe ,mg/L	1100
	Magnesium as Mg ,mg/L	420
	Strontium as Sr ,mg/L	5
	Aluminum as Al ,mg/L	32
Total Cations in House P3100-PW-012	Total Cations ,mg/L	4100
Total Cations APHA 1050A	* Potassium as K ,meq/L	1
	* Sodium as Na ,meq/L	89
	* Barium as Ba ,meq/L	<0.01
	* Calcium as Ca ,meq/L	24
	* Iron as Fe ,meq/L	58
	* Magnesium as Mg ,meq/L	35
	* Strontium as Sr ,meq/L	0.12
	* Aluminium as Al ,meq/L	1
	* Total Cations ,meq/L	210
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	2
	Silicon as Si ,mg/L	86
	Lithium as Li ,mg/L	<0.1
	Cadmium as Cd ,mg/L	<0.1
	Chromium as Cr ,mg/L	1
	Vanadium as V ,mg/L	<0.1
	Nickel as Ni ,mg/L	8
	Zinc as Zn ,mg/L	67
	Lead as Pb ,mg/L	48
	Copper as Cu ,mg/L	49
	Manganese as Mn ,mg/L	3
	Tin as Sn ,mg/L	<0.1
	Phosphorus as P ,mg/L	3

First Reported: 14 Jun 2024

Date Issued: 14 Jun 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
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Project Number :AUADE-24-00223

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Accreditation No 626

BV Sample ID	**170129**
Customer Sample ID	**PP_050624_KPFRT02_BV**
Date Started	**14-Jun-2024**
Sample Type	**Water**
Date Sampled	**05-Jun-2024**
Collected By	**Client**

Method	Test/Units	Results
Cations Dissolved P3100-PW-012	Molybdenum as Mo ,mg/L	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	88
	Chloride as Cl ,mg/L	3100
	Fluoride as F ,mg/L	5
	Nitrate as NO_3 ,mg/L	<0.1
	Sulphate as SO_4 ,mg/L	6500
Anions APHA 1050A	* Bromide as Br ,meq/L	1
	* Chloride as Cl ,meq/L	88
	* Fluoride as F ,meq/L	0.27
	* Nitrate as NO_3 ,meq/L	<0.01
	* Sulphate as SO_4 ,meq/L	140
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1
	Carbonate ,mg CaCO3/L	<1
	Bicarbonate ,mg CaCO3/L	<1
	Total Alkalinity ,mg CaCO3/L	<1
APHA 4110	Total Anions ,mg/L	9700
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01
	* Carbonate as CO3 ,meq/L	<0.01
	* Bicarbonate as HCO3 ,meq/L	<0.01
	* Total Anions ,meq/L	220
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	14000
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	2900
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	4
	Acceptance Criteria ,%	5
	Satisfactory ,-	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	1600
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.065
	* Beryllium ,mg/L	<0.01
	* Cobalt ,mg/L	4.9
	* Mercury ,mg/L	<0.001
	* Selenium ,mg/L	<0.01
	* Silver ,mg/L	<0.05
	* Uranium ,mg/L	0.16

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1106167-W

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00223

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Accreditation No 626

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

APPENDIX D CHARGE BALANCE

Well ID			KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03		KPMON03	
Date			23/11/2023		24/11/2023		24/11/2023		24/11/2023		25/11/2023		26/11/2023		27/11/2023		28/11/2023		29/11/2023		29/11/2023		1/12/2023		2/12/2023		3/12/2023		4/12/2023		15/12/2023		15/12/2023	
Sample ID			PP_231123_KPMON03#1		PP_241123_KPMON03 #1 BV		PP_241123_KPMON03#1		PP_241123_KPMON03#2		PP_251123_KPMON03#1		PP_261123_KPMON03#1		PP_271123_KPMON03#1		PP_281123_KPMON03#1		PP_291123_KPMON03 #1 BV		PP_291123_KPMON03#1		PP_011223_KPMON03#1		PP_021223_KPMON03#1		PP_031223_KPMON03#1		PP_041223_KPMON03#1		PP_151223_KPMON03#1		PP_151223_KPMON03_BV	
Report No.																																
Anions	**Formula Wts (g/mol)**	**Charge**	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L		meq/L		meq/L		meq/L		meq/L		meq/L		meq/L		meq/L		meq/L	
Chloride	**35.45**	**-1**	2700	*-76*	2800	*-79*	2600	*-73*	2600	*-73*	2600	*-73*	2500	*-71*	2800	*-79*	2600	*-73*	3200	*-90*	770	*-22*	2700	*-76*	2600	*-73*	2600	*-73*	2600	*-73*	2400	*-68*	2600	*-73*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	20	*0*	1	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*
Sulphate (as SO4)	**96.06**	**-2**	4000	*-83*	3500	*-73*	3900	*-81*	3900	*-81*	3900	*-81*	3900	*-81*	4000	*-83*	4000	*-83*	3800	*-79*	1200	*-25*	3900	*-81*	3900	*-81*	4000	*-83*	4000	*-83*	4200	*-87*	3900	*-81*
Sum				*-160*		*-152*		*-155*		*-155*		*-155*		*-152*		*-163*		*-157*		*-169*		*-47*		*-158*		*-155*		*-157*		*-157*		*-155*		*-155*
Cations																																		
Calcium	**40.08**	**2**	400	*20*	430	*21*	360	*18*	390	*19*	400	*20*	390	*19*	400	*20*	300	*15*	470	*23*	380	*19*	250	*12*	390	*19*	400	*20*	400	*20*	380	*19*	430	*21*
Magnesium	**24.31**	**2**	400	*33*	440	*36*	360	*30*	390	*32*	410	*34*	390	*32*	410	*34*	380	*31*	460	*38*	360	*30*	230	*19*	400	*33*	380	*31*	390	*32*	370	*30*	410	*34*
Potassium	**39.1**	**1**	40	*1*	48	*1*	36	*1*	39	*1*	40	*1*	38	*1*	39	*1*	37	*1*	47	*1*	35	*1*	23	*1*	38	*1*	38	*1*	38	*1*	35	*1*	39	*1*
Sodium	**22.99**	**1**	1600	*70*	1800	*78*	1400	*61*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1500	*65*	1900	*83*	1500	*65*	970	*42*	1600	*70*	1500	*65*	1600	*70*	1600	*70*	1800	*78*
Sum				*123*		*137*		*109*		*122*		*124*		*122*		*124*		*112*		*145*		*115*		*74*		*123*		*117*		*123*		*120*		*134*
Aluminium (filtered)	**26.98**	**3**	0.5	*0*	0.1	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.12	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.5	*0*	2.9	*0*	0.1	*0*
Copper (filtered)	**63.55**	**2**	2.6	*0*	3	*0*	2.6	*0*	2.5	*0*	2.5	*0*	2.2	*0*	2.4	*0*	2.1	*0*	2	*0*	1.6	*0*	1	*0*	1.4	*0*	1.5	*0*	1.5	*0*	0.1	*0*	0.2	*0*
Iron	**55.845**	**3**	630	*34*	570	*31*	500	*27*	490	*26*	500	*27*	490	*26*	600	*32*	530	*28*	760	*41*	580	*31*	330	*18*	570	*31*	630	*34*	640	*34*	790	*42*	830	*45*
Sum				*157*		*168*		*136*		*149*		*151*		*149*		*157*		*141*		*186*		*146*		*92*		*154*		*151*		*157*		*163*		*179*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
% electrical balance				*-0.73*		*5.01*		***-6.34***		*-2.07*		*-1.16*		*-1.16*		*-1.86*		***-5.35***		*4.68*		***51.27***		***-26.31***		*-0.39*		*-1.80*		*0.05*		*2.26*		***7.35***

Well ID			KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02		KPMON02	
Date			23/11/2023		24/11/2023		24/11/2023		24/11/2023		25/11/2023		26/11/2023		27/11/2023		28/11/2023		29/11/2023		29/11/2023		1/12/2023		2/12/2023		3/12/2023		4/12/2023		15/12/2023		15/12/2023	
Sample ID			PP_231123_KPMON02#1		PP_241123_KPMON02 #1 BV		PP_241123_KPMON02#1		PP_241123_KPMON02#2		PP_251123_KPMON02#1		PP_261123_KPMON02#1		PP_271123_KPMON02#1		PP_281123_KPMON02#1		PP_291123_KPMON02 #1 BV		PP_291123_KPMON02#1		PP_011223_KPMON02#1		PP_021223_KPMON02#1		PP_031223_KPMON02#1		PP_041223_KPMON02#1		PP_151223_KPMON02#1		PP_151223_KPMON02_BV	
Report No.																																
Anions	**Formula Wts (g/mol)**	**Charge**	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L
Chloride	**35.45**	**-1**	1900	*-54*	1700	*-48*	1900	*-54*	1900	*-54*	2100	*-59*	2100	*-59*	2100	*-59*	2100	*-59*	1900	*-54*	2100	*-59*	2100	*-59*	2100	*-59*	2100	*-59*	2100	*-59*	1800	*-51*	1900	*-54*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	200	*-3*	190	*-3*	230	*-4*	170	*-3*	260	*-4*	290	*-5*	210	*-3*	280	*-5*	240	*-4*	240	*-4*	260	*-4*	310	*-5*	340	*-6*	290	*-5*	240	*-4*	280	*-5*
Sulphate (as SO4)	**96.06**	**-2**	530	*-11*	570	*-12*	530	*-11*	550	*-11*	660	*-14*	630	*-13*	620	*-13*	640	*-13*	680	*-14*	680	*-14*	660	*-14*	660	*-14*	660	*-14*	670	*-14*	660	*-14*	680	*-14*
Sum				*-68*		*-63*		*-68*		*-68*		*-77*		*-77*		*-76*		*-77*		*-72*		*-77*		*-77*		*-78*		*-79*		*-78*		*-68*		*-72*
Cations																																		
Calcium	**40.08**	**2**	53	*3*	58	*3*	50	*2*	56	*3*	110	*5*	110	*5*	110	*5*	110	*5*	120	*6*	110	*5*	120	*6*	110	*5*	110	*5*	120	*6*	120	*6*	130	*6*
Magnesium	**24.31**	**2**	63	*5*	69	*6*	58	*5*	64	*5*	100	*8*	110	*9*	99	*8*	100	*8*	130	*11*	110	*9*	120	*10*	120	*10*	110	*9*	130	*11*	130	*11*	140	*12*
Potassium	**39.1**	**1**	53	*1*	58	*1*	50	*1*	51	*1*	36	*1*	37	*1*	35	*1*	36	*1*	38	*1*	33	*1*	34	*1*	36	*1*	37	*1*	35	*1*	35	*1*	39	*1*
Sodium	**22.99**	**1**	1300	*57*	1300	*57*	1200	*52*	1200	*52*	1300	*57*	1300	*57*	1300	*57*	1300	*57*	1400	*61*	1200	*52*	1300	*57*	1300	*57*	1300	*57*	1300	*57*	1300	*57*	1400	*61*
Sum				*66*		*67*		*61*		*62*		*71*		*72*		*71*		*71*		*79*		*68*		*73*		*73*		*72*		*74*		*74*		*80*
Aluminium (filtered)	**26.98**	**3**	0.05	*0*	0.1	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.16	*0*	0.1	*0*	0.09	*0*	0.05	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.05	*0*	0.1	*0*
Copper (filtered)	**63.55**	**2**	0.004	*0*	0.1	*0*	0.003	*0*	0.005	*0*	0.001	*0*	0.001	*0*	0.001	*0*	0.62	*0*	0.1	*0*	0.024	*0*	0.01	*0*	0.01	*0*	0.01	*0*	0.01	*0*	0.001	*0*	0.1	*0*
Iron	**55.845**	**3**	0.05	*0*	0.1	*0*	0.05	*0*	0.52	*0*	0.05	*0*	0.09	*0*	1.3	*0*	2.6	*0*	0.11	*0*	6.8	*0*	31	*2*	0.5	*0*	0.5	*0*	0.5	*0*	3.1	*0*	0.1	*0*
Sum				*66*		*67*		*61*		*62*		*71*		*72*		*71*		*71*		*79*		*68*		*75*		*73*		*72*		*74*		*74*		*80*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
% electrical balance				*-1.62*		*2.84*		*-5.92*		*-4.82*		*-4.08*		*-3.40*		*-3.02*		*-3.90*		*4.58*		*-6.45*		*-1.51*		*-3.41*		*-4.27*		*-2.45*		*4.10*		*4.97*

Well ID			KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01		KPMON01	
Date			23/11/2023		24/11/2023		24/11/2023		24/11/2023		25/11/2023		26/11/2023		27/11/2023		28/11/2023		29/11/2023		29/11/2023		1/12/2023		2/12/2023		3/12/2023		4/12/2023		15/12/2023		15/12/2023	
Sample ID			PP_231123_KPMON01#1		PP_241123_KPMON01 #1 BV		PP_241123_KPMON01#1		PP_241123_KPMON01#2		PP_251123_KPMON01#1		PP_261123_KPMON01#1		PP_271123_KPMON01#1		PP_281123_KPMON01#1		PP_291123_KPMON01 #1 BV		PP_291123_KPMON01#1		PP_011223_KPMON01#1		PP_021223_KPMON01#1		PP_031223_KPMON01#1		PP_041223_KPMON01#1		PP_151223_KPMON01#1		PP_151223_KPMON01_BV	
Report No.																																
Anions	Formula Wts (g/mol)	Charge	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L
Chloride	**35.45**	**-1**	2100	*-59*	1800	*-51*	2000	*-56*	2000	*-56*	2000	*-56*	1900	*-54*	1900	*-54*	2000	*-56*	1800	*-51*	2000	*-56*	1900	*-54*	1900	*-54*	1900	*-54*	1900	*-54*	1700	*-48*	1700	*-48*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	160	*-3*	220	*-4*	280	*-5*	270	*-4*	230	*-4*	260	*-4*	260	*-4*	320	*-5*	280	*-5*	310	*-5*	290	*-5*	2100	*-34*	280	*-5*	320	*-5*	270	*-4*	310	*-5*
Sulphate (as SO4)	**96.06**	**-2**	690	*-14*	640	*-13*	610	*-13*	610	*-13*	610	*-13*	580	*-12*	570	*-12*	580	*-12*	600	*-12*	570	*-12*	630	*-13*	570	*-12*	560	*-12*	570	*-12*	560	*-12*	600	*-12*
Sum				*-76*		*-68*		*-74*		*-74*		*-73*		*-70*		*-70*		*-74*		*-68*		*-73*		*-71*		*-100*		*-70*		*-71*		*-64*		*-66*
Cations																																
Calcium	**40.08**	**2**	130	*6*	130	*6*	120	*6*	130	*6*	130	*6*	130	*6*	120	*6*	130	*6*	130	*6*	120	*6*	130	*6*	130	*6*	120	*6*	130	*6*	120	*6*	140	*7*
Magnesium	**24.31**	**2**	130	*11*	140	*12*	120	*10*	130	*11*	130	*11*	120	*10*	110	*9*	120	*10*	130	*11*	120	*10*	120	*10*	120	*10*	110	*9*	130	*11*	130	*11*	140	*12*
Potassium	**39.1**	**1**	33	*1*	36	*1*	30	*1*	32	*1*	32	*1*	31	*1*	29	*1*	30	*1*	35	*1*	29	*1*	29	*1*	30	*1*	30	*1*	31	*1*	29	*1*	33	*1*
Sodium	**22.99**	**1**	1300	*57*	1300	*57*	1200	*52*	1200	*52*	1200	*52*	1200	*52*	1100	*48*	1100	*48*	1200	*52*	1100	*48*	1100	*48*	1100	*48*	1100	*48*	1200	*52*	1100	*48*	1200	*52*
Sum				*75*		*75*		*69*		*70*		*70*		*69*		*64*		*65*		*70*		*64*		*65*		*65*		*64*		*70*		*65*		*72*
Aluminium (filtered)	**26.98**	**3**	0.05	*0*	0.1	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.1	*0*	0.05	*0*	0.05	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.05	*0*	0.12	*0*
Copper (filtered)	**63.55**	**2**	0.049	*0*	0.1	*0*	0.001	*0*	0.36	*0*	0.001	*0*	0.001	*0*	0.001	*0*	0.032	*0*	0.1	*0*	0.012	*0*	0.12	*0*	0.068	*0*	0.01	*0*	0.01	*0*	0.033	*0*	0.1	*0*
Iron	**55.845**	**3**	0.37	*0*	0.1	*0*	0.08	*0*	0.16	*0*	0.6	*0*	0.05	*0*	0.05	*0*	0.15	*0*	0.1	*0*	0.2	*0*	0.38	*0*	0.5	*0*	0.24	*0*	0.5	*0*	0.05	*0*	0.1	*0*
Sum				*75*		*75*		*69*		*70*		*70*		*69*		*64*		*65*		*70*		*64*		*65*		*65*		*64*		*70*		*65*		*72*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
% electrical balance				*-1.08*		*5.44*		*-3.42*		*-2.31*		*-1.85*		*-0.41*		*-4.57*		*-6.31*		*1.76*		*-6.46*		*-4.76*		***-21.11***		*-4.58*		*-0.32*		*0.96*		*4.41*

Well ID			KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06		KPFRT06	
Date			23/11/2023		24/11/2023		24/11/2023		24/11/2023		25/11/2023		26/11/2023		27/11/2023		28/11/2023		29/11/2023		29/11/2023		1/12/2023		2/12/2023		3/12/2023		4/12/2023		15/12/2023		15/12/2023	
Sample ID			PP_231123_KPFRT06#2		PP_241123_KPFRT06 #1 BV		PP_241123_KPFRT06#1		PP_241123_KPFRT06#2		PP_251123_KPFRT06#1		PP_261123_KPFRT06#1		PP_271123_KPFRT06#1		PP_281223_KPFRT06#1		PP_291123_KPFRT06 #1 BV		PP_291123_KPFRT06#1		PP_011223_KPFRT06#1		PP_021223_KPFRT06#1		PP_031223_KPFRT06#1		PP_041223_KPFRT06#1		PP_151223_KPFRT06#1		PP_151223_KPFRT06_BV	
Report No.																																
Anions	**Formula Wts (g/mol)**	**Charge**	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L
Chloride	**35.45**	**-1**	2900	*-82*	2700	*-76*	2800	*-79*	2800	*-79*	2900	*-82*	2800	*-79*	2900	*-82*	2900	*-82*	2900	*-82*	3000	*-85*	3000	*-85*	2900	*-82*	2900	*-82*	2900	*-82*	2800	*-79*	2800	*-79*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	20	*0*	1	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*
Sulphate (as SO4)	**96.06**	**-2**	4600	*-96*	4600	*-96*	4500	*-94*	4300	*-90*	4500	*-94*	4500	*-94*	4800	*-100*	4700	*-98*	5000	*-104*	5400	*-112*	5000	*-104*	4700	*-98*	5000	*-104*	4800	*-100*	5800	*-121*	5200	*-108*
Sum				*-178*		*-172*		*-173*		*-169*		*-176*		*-173*		*-182*		*-180*		*-186*		*-197*		*-189*		*-180*		*-186*		*-182*		*-200*		*-187*
Cations																																		
Calcium	**40.08**	**2**	490	*24*	570	*28*	500	*25*	490	*24*	480	*24*	490	*24*	460	*23*	470	*23*	570	*28*	460	*23*	470	*23*	510	*25*	510	*25*	480	*24*	470	*23*	550	*27*
Magnesium	**24.31**	**2**	370	*30*	440	*36*	390	*32*	380	*31*	370	*30*	380	*31*	370	*30*	360	*30*	450	*37*	360	*30*	370	*30*	380	*31*	400	*33*	370	*30*	340	*28*	440	*36*
Potassium	**39.1**	**1**	33	*1*	41	*1*	34	*1*	33	*1*	33	*1*	33	*1*	32	*1*	33	*1*	45	*1*	34	*1*	34	*1*	36	*1*	38	*1*	35	*1*	32	*1*	43	*1*
Sodium	**22.99**	**1**	1600	*70*	1900	*83*	1700	*74*	1700	*74*	1700	*74*	1700	*74*	1700	*74*	1600	*70*	2100	*91*	1700	*74*	1700	*74*	1700	*74*	1800	*78*	1700	*74*	1700	*74*	2000	*87*
Sum				*125*		*148*		*132*		*131*		*129*		*131*		*128*		*124*		*158*		*127*		*129*		*132*		*138*		*129*		*126*		*152*
Aluminium (filtered)	**26.98**	**3**	61	*7*	69	*8*	62	*7*	69	*8*	67	*7*	71	*8*	81	*9*	70	*8*	92	*10*	76	*8*	76	*8*	69	*8*	77	*9*	75	*8*	95	*11*	92	*10*
Copper (filtered)	**63.55**	**2**	200	*6*	250	*8*	210	*7*	260	*8*	210	*7*	200	*6*	280	*9*	230	*7*	280	*9*	230	*7*	230	*7*	240	*8*	250	*8*	240	*8*	240	*8*	260	*8*
Iron	**55.845**	**3**	450	*24*	550	*30*	460	*25*	470	*25*	460	*25*	490	*26*	670	*36*	570	*31*	770	*41*	650	*35*	650	*35*	610	*33*	710	*38*	640	*34*	800	*43*	820	*44*
Sum				*163*		*193*		*170*		*172*		*168*		*171*		*182*		*169*		*218*		*178*		*179*		*180*		*192*		*180*		*187*		*214*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
% electrical balance				*-4.50*		*5.88*		*-0.86*		*0.81*		*-2.29*		*-0.58*		*-0.03*		*-3.10*		*8.02*		*-5.17*		*-2.64*		*-0.12*		*1.58*		*-0.71*		*-3.30*		*6.71*

Well ID			KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04		KPFRT04	
Date			23/11/2023		24/11/2023		24/11/2023		24/11/2023		25/11/2023		26/11/2023		27/11/2023		28/11/2023		29/11/2023		29/11/2023		1/12/2023		2/12/2023		3/12/2023		4/12/2023		15/12/2023		15/12/2023		3/12/2023	
Sample ID			PP_231123_KPFRT04#1		PP_241123_KPFRT04 #1 BV		PP_241123_KPFRT04#1		PP_241123_KPFRT04#2		PP_251123_KPFRT04#1		PP_261123_KPFRT04#1		PP_271123_KPFRT04#1		PP_281123_KPFRT04#1		PP_291123_KPFRT04 #1 BV		PP_291123_KPFRT04#1		PP_011223_KPFRT04#1		PP_021223_KPFRT04#1		PP_031223_KPFRT04#1		PP_041223_KPFRT04#1		PP_151223_KPFRT04#1		PP_151223_KPFRT04_BV		PP_031223_KPFRT04#1	
Report No.																																		
Anions	**Formula Wts (g/mol)**	**Charge**	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L
Chloride	**35.45**	**-1**	2500	*-71*	2200	*-62*	2500	*-71*	2600	*-73*	2500	*-71*	2400	*-68*	2400	*-68*	2600	*-73*	2300	*-65*	1100	*-31*	2400	*-68*	2500	*-71*	2900	*-82*	2500	*-71*	2400	*-68*	2400	*-68*	2900	*-82*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	300	*-5*	330	*-5*	420	*-7*	340	*-6*	330	*-5*	380	*-6*	290	*-5*	310	*-5*	310	*-5*	150	*-2*	300	*-5*	2300	*-38*	330	*-5*	170	*-3*	210	*-3*	260	*-4*	330	*-5*
Sulphate (as SO4)	**96.06**	**-2**	860	*-18*	780	*-16*	790	*-16*	780	*-16*	790	*-16*	810	*-17*	760	*-16*	780	*-16*	760	*-16*	330	*-7*	770	*-16*	790	*-16*	3100	*-65*	800	*-17*	900	*-19*	1000	*-21*	1023	*-21*
Sum				*-93*		*-84*		*-94*		*-95*		*-92*		*-91*		*-88*		*-95*		*-86*		*-40*		*-89*		*-125*		*-152*		*-90*		*-90*		*-93*		*-109*
Cations																																				
Calcium	**40.08**	**2**	150	*7*	160	*8*	150	*7*	150	*7*	150	*7*	150	*7*	140	*7*	160	*8*	170	*8*	85	*4*	150	*7*	160	*8*	160	*8*	160	*8*	170	*8*	190	*9*	160	*8*
Magnesium	**24.31**	**2**	180	*15*	190	*16*	170	*14*	180	*15*	180	*15*	180	*15*	170	*14*	190	*16*	200	*16*	100	*8*	180	*15*	180	*15*	180	*15*	180	*15*	200	*16*	220	*18*	180	*15*
Potassium	**39.1**	**1**	28	*1*	32	*1*	27	*1*	28	*1*	28	*1*	28	*1*	27	*1*	28	*1*	34	*1*	15	*0*	26	*1*	29	*1*	29	*1*	29	*1*	30	*1*	33	*1*	29	*1*
Sodium	**22.99**	**1**	1500	*65*	1600	*70*	1400	*61*	1400	*61*	1500	*65*	1500	*65*	1400	*61*	1500	*65*	1600	*70*	810	*35*	1400	*61*	1400	*61*	1400	*61*	1400	*61*	1400	*61*	1600	*70*	1400	*61*
Sum				*88*		*94*		*83*		*84*		*88*		*88*		*83*		*90*		*95*		*48*		*84*		*84*		*84*		*84*		*87*		*98*		*84*
Aluminium (filtered)	**26.98**	**3**	0.05	*0*	0.1	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.05	*0*	0.1	*0*	0.05	*0*	0.05	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.05	*0*	0.1	*0*	0.5	*0*
Copper (filtered)	**63.55**	**2**	0.3	*0*	0.1	*0*	0.54	*0*	1.5	*0*	0.37	*0*	0.17	*0*	0.33	*0*	0.44	*0*	0.1	*0*	0.3	*0*	0.5	*0*	0.12	*0*	0.75	*0*	0.51	*0*	1.1	*0*	0.1	*0*	0.75	*0*
Iron	**55.845**	**3**	0.05	*0*	0.1	*0*	0.05	*0*	0.05	*0*	0.49	*0*	0.33	*0*	0.05	*0*	0.35	*0*	0.1	*0*	0.28	*0*	0.67	*0*	0.5	*0*	0.5	*0*	0.5	*0*	0.05	*0*	0.15	*0*	0.5	*0*
Sum				*88*		*94*		*83*		*84*		*88*		*88*		*83*		*90*		*95*		*48*		*84*		*85*		*85*		*85*		*87*		*98*		*85*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
% electrical balance				*-2.79*		*5.82*		*-6.09*		*-6.25*		*-2.26*		*-1.40*		*-3.34*		*-2.74*		*5.32*		*8.77*		*-2.75*		*-19.19*		*-28.45*		*-3.11*		*-1.83*		*2.76*		*-12.42*

Well ID			KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03		KPFRT03	
Date			23/11/2023		24/11/2023		24/11/2023		24/11/2023		25/11/2023		26/11/2023		27/11/2023		28/11/2023		29/11/2023		29/11/2023		1/12/2023		2/12/2023		3/12/2023		4/12/2023		15/12/2023		15/12/2023	
Sample ID			PP_231123_KPFRT03#1		PP_241123_KPFRT03#1		PP_241123_KPFRT03#2		PP_241123_KPFRT03 #1 BV		PP_251123_KPFRT03#1		PP_261123_KPFRT03#1		PP_271123_KPFRT03#1		PP_281123_KPFRT03#1		PP_291123_KPFRT03#1		PP_291123_KPFRT03 #1 BV		PP_011223_KPFRT03#1		PP_021223_KPFRT03#1		PP_031223_KPFRT03#1		PP_041223_KPFRT03#1		PP_151223_KPFRT03#1		PP_151223_KPFRT03_BV	
Report No.																																
Anions	Formula Wts (g/mol)	Charge	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L	Result mg/L	meq/L
Chloride	**35.45**	**-1**	2900	*-82*	2700	*-76*	2700	*-76*	2800	*-79*	2800	*-79*	2500	*-71*	2900	*-82*	2800	*-79*	2800	*-79*	2900	*-82*	720	*-20*	2800	*-79*	2600	*-73*	2500	*-71*	2600	*-73*	2500	*-71*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*	1	*0*	1	*0*
Sulphate (as SO4)	**96.06**	**-2**	2000	*-42*	2700	*-56*	2100	*-44*	3000	*-62*	2800	*-58*	3200	*-67*	2800	*-58*	3000	*-62*	3000	*-62*	3000	*-62*	49	*-1*	2800	*-58*	2700	*-56*	2200	*-46*	3200	*-67*	3100	*-65*
Sum				*-124*		*-133*		*-120*		*-142*		*-138*		*-137*		*-140*		*-142*		*-142*		*-145*		*-22*		*-138*		*-130*		*-116*		*-140*		*-135*
Cations																																		
Calcium	**40.08**	**2**	230	*11*	270	*13*	230	*11*	280	*14*	280	*14*	280	*14*	260	*13*	280	*14*	290	*14*	270	*13*	300	*15*	280	*14*	250	*12*	250	*12*	320	*16*	290	*14*
Magnesium	**24.31**	**2**	230	*19*	260	*21*	220	*18*	270	*22*	270	*22*	270	*22*	260	*21*	270	*22*	270	*22*	260	*21*	270	*22*	260	*21*	250	*21*	270	*22*	310	*26*	280	*23*
Potassium	**39.1**	**1**	35	*1*	37	*1*	34	*1*	38	*1*	37	*1*	36	*1*	36	*1*	37	*1*	38	*1*	37	*1*	38	*1*	38	*1*	36	*1*	42	*1*	46	*1*	42	*1*
Sodium	**22.99**	**1**	1600	*70*	1600	*70*	1500	*65*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1600	*70*	1500	*65*	1700	*74*	1800	*78*	1700	*74*
Sum				*101*		*105*		*96*		*107*		*107*		*107*		*105*		*107*		*107*		*105*		*108*		*106*		*99*		*110*		*121*		*113*
Aluminium (filtered)	**26.98**	**3**	1.9	*0*	3.4	*0*	2.2	*0*	4.4	*0*	3.1	*0*	6	*1*	4.6	*1*	5.2	*1*	5.3	*1*	5.1	*1*	5.6	*1*	4.5	*1*	5.3	*1*	2	*0*	6	*1*	6	*1*
Copper (filtered)	**63.55**	**2**	4.1	*0*	4.7	*0*	4.2	*0*	5.5	*0*	5.5	*0*	8.3	*0*	7.1	*0*	7.4	*0*	7.2	*0*	7.5	*0*	7.6	*0*	6.6	*0*	5.7	*0*	4	*0*	8	*0*	6	*0*
Iron	**55.845**	**3**	260	*14*	450	*24*	340	*18*	500	*27*	460	*25*	620	*33*	470	*25*	500	*27*	550	*30*	500	*27*	560	*30*	450	*24*	440	*24*	320	*17*	590	*32*	460	*25*
Sum				*115*		*130*		*114*		*134*		*132*		*141*		*131*		*134*		*138*		*133*		*139*		*131*		*124*		*127*		*154*		*138*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
% electrical balance				*-3.59*		*-0.99*		*-2.51*		*-2.72*		*-2.10*		*1.24*		*-3.53*		*-2.67*		*-1.49*		*-4.15*		***72.99***		*-2.53*		*-2.47*		*4.48*		*4.62*		*1.10*

Appendix D

Well ID			KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02		KPFRT02	
Date			29/11/2016		26/11/2019		28/11/2019		26/11/2019		29/11/2019		26/11/2019		27/11/2019		28/11/2019		29/11/2019		29/11/2019		1/12/2019		2/12/2019		3/12/2019		4/12/2019		19/12/2019		26/12/2019		17/01/2020		8/02/2020		15/12/2019	
Sample ID			PP_151119_KPFRT0281		PP_261119_KPFRT02-81-RV		PP_281119_KPFRT0281		PP_261119_KPFRT0281		PP_291119_KPFRT0281		PP_261119_KPFRT0281		PP_271121_KPFRT0281		PP_281119_KPFRT0281		PP_291119_KPFRT02-82-RV		PP_291119_KPFRT0281		PP_011219_KPFRT0281		PP_021219_KPFRT0281		PP_031219_KPFRT0281		PP_041219_KPFRT0281		PP_191219_KPFRT0281		PP_260124_KPFRT02_RV		PP_170124_KPFRT02		PP_080224_KPFRT02		PP_151219_KPFRT02_RV	
Report No.																																						
Anions	**Formula Wts (g/mol)**	**Charge**	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	**35.45**	**-1**	4000	*-113*	4000	*-113*	4500	*-127*	4800	*-135*	4600	*-130*	4700	*-133*	4300	*-121*	5100	*-144*	3400	*-96*	2600	*-73*	4400	*-124*	4100	*-116*	4100	*-116*	3900	*-110*	3300	*-93*	5000	*-141*	3200	*-90*	3400	*-96*	5000	*-141*
Bicarbonate Alkalinity (as CaCO3)	**61.02**	**-1**	20	*0*	1	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	20	*0*	1	*0*	20	*0*	20	*0*	1	*0*
Sulphate (as SO4)	**96.06**	**-2**	5700	*-119*	5400	*-112*	5700	*-119*	5700	*-119*	5500	*-115*	5500	*-115*	5500	*-115*	5000	*-104*	5400	*-112*	2800	*-58*	4600	*-96*	4700	*-98*	4600	*-96*	4600	*-96*	4900	*-102*	18000	*-375*	5400	*-112*	5500	*-115*	5940	*-124*
Sum				*-232*		*-225*		*-246*		*-254*		*-245*		*-247*		*-236*		*-248*		*-208*		*-132*		*-220*		*-214*		*-212*		*-206*		*-195*		*-516*		*-203*		*-211*		*-265*
Cations																																								
Calcium	**40.08**	**2**	450	*22*	520	*26*	470	*23*	480	*24*	470	*23*	460	*23*	450	*22*	450	*22*	490	*24*	410	*20*	400	*20*	430	*21*	420	*21*	440	*22*	440	*22*	570	*28*	510	*25*	460	*23*	570	*28*
Magnesium	**24.31**	**2**	420	*35*	490	*40*	430	*35*	440	*36*	440	*36*	440	*36*	420	*35*	410	*34*	460	*38*	380	*31*	360	*30*	390	*32*	380	*31*	380	*31*	360	*30*	510	*42*	470	*39*	410	*34*	510	*42*
Potassium	**39.1**	**1**	37	*1*	31	*1*	29	*1*	22	*1*	22	*1*	21	*1*	20	*1*	20	*1*	27	*1*	21	*1*	22	*1*	25	*1*	25	*1*	27	*1*	41	*1*	61	*2*	67	*2*	51	*1*	61	*2*
Sodium	**22.99**	**1**	2300	*100*	2700	*117*	2500	*109*	2600	*113*	2600	*113*	2600	*113*	2400	*104*	2400	*104*	2600	*113*	2300	*100*	2100	*91*	2200	*96*	2100	*91*	2200	*96*	2100	*91*	2600	*113*	2300	*100*	2000	*87*	2600	*113*
Sum				*158*		*184*		*168*		*174*		*173*		*173*		*162*		*161*		*176*		*152*		*141*		*150*		*144*		*150*		*144*		*185*		*166*		*145*		*185*
Aluminium (filtered)	**26.98**	**3**	15	*2*	18	*2*	16	*2*	17	*2*	15	*2*	15	*2*	16	*2*	19	*2*	18	*2*	15	*2*	16	*2*	26	*3*	31	*3*	37	*4*	130	*14*	130	*14*	74	*8*	69	*8*	130	*14*
Copper (filtered)	**63.55**	**2**	50	*2*	61	*2*	51	*2*	66	*2*	50	*2*	51	*2*	64	*2*	58	*2*	59	*2*	50	*2*	51	*2*	68	*2*	79	*2*	77	*2*	130	*4*	140	*4*	54	*2*	69	*2*	140	*4*
Iron	**55.85**	**3**	1100	*59*	1000	*54*	950	*51*	1000	*54*	1000	*54*	910	*49*	940	*50*	810	*44*	950	*51*	840	*45*	790	*42*	890	*48*	950	*51*	910	*49*	1200	*64*	1200	*64*	910	*49*	990	*53*	1200	*64*
Lead	**207.2**	**2**																															130	*1.3*					130	*1.3*
Sum				*220*		*242*		*223*		*231*		*230*		*225*		*216*		*209*		*231*		*201*		*187*		*203*		*201*		*205*		*227*		*270*		*225*		*208*		*270*
Conductivity (at 25 °C)	**100**			*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
ε electrical balance				*-2.54*		*3.61*		*-4.95*		*-4.72*		*-3.02*		*-4.76*		*-4.41*		*-8.70*		*5.15*		***20.65***		*-8.08*		*-2.67*		*-2.56*		*-0.26*		*7.47*		***-31.34***		*5.06*		*-0.65*		*0.92*

APPENDIX E RELATIVE PERCENT DIFFERENCE

Well ID	KPFRT02	KPFRT02		KPFRT02		KPFRT02	KPFRT02		KPFRT02	KPFRT02	
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPFRT02#1	PP_241123_KPFRT02#2		PP_241123_KPFRT02 #1 BV		PP_291123_KPFRT02#1	PP_291123_KPFRT02 #1 BV		PP_151223_KPFRT02#1	PP_151223_KPFRT02_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra	RPD	Inter	RPD	Primary	Inter	RPD	Primary	Inter	RPD
Ammonia (as N)	1.4	1.3	7.4	0.78	57	0.61	1.1	57	0.01	0.01	0
Bromide	9.3	2100	198.2			1200			960		
Chloride	4500	4800	6.5	4000	12	2600	3400	27	3300	5000	41
Conductivity (at 25 °C)	18000	20000	10.5	19000	5	35000	20000	55	43000	96000	76
Fluoride	1.1	0.5	75.0			0.5			1		
Nitrate & Nitrite (as N)	0.05	0.05	0.0			0.05			0.05		
Nitrate (as N)	0.02	0.02	0.0	0.02	0	0.02	0.02	0	0.02	0.02	0
Nitrite (as N)	0.02	0.02	0.0	23	200	0.02	2	196	0.02	0.02	0
Organic Nitrogen (as N)*	0.7	1.6	78.3	2.22	104	1.69	1.9	12	1.5	2.1	33
pH (at 25 °C)	2.3	2.1	9.1	2.6	12	1.3	2.2	51	0.8	0.9	12
Phosphate total (as P)	0.07	0.07	0.0	0.08	13	0.1	0.08	22	1.2	1.2	0
Phosphorus reactive (as P)	0.04	0.02	66.7	6	197	0.04	1	185	0.32	0.2	46
Salinity (expressed as TDS)*	8200	16000	64.5	12000	38	25000	13000	63	25000	61000	84
Silicon (filtered)	57	58	1.7	62	8	51	58	13	100	110	10
Sulphate (as SO4)	5700	5700	0.0	5400	5	2800	5400	63	4900	18000	114
Total Kjeldahl Nitrogen (as N)	2.1	2.9	32.0	3	35	2.3	3	26	1.5	2.1	33
Total Nitrogen (as N)*	2.1	2.9	32.0	3	35	2.3	3	26	1.5	2.1	33
Total Suspended Solids Dried at 103 °C to 105 °C	86	150	54.2			78			330		
Alkali Metals											
Calcium	470	480	2.1	520	10	410	490	18	440	570	26
Magnesium	430	440	2.3	490	13	380	460	19	360	510	34
Potassium	29	22	27.5	31	7	21	27	25	41	61	39
Sodium	2500	2600	3.9	2700	8	2300	2600	12	2100	2600	21
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Carbonate Alkalinity (as CaCO3)	10	10	0.0	1	164	10	1	164	10	1	164
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Total Alkalinity (as CaCO3)	20	20	0.0	0	200	20	0	200	20	0	200
Aluminium (filtered)	16	17	6.1	18	12	15	18	18	130	130	0
Arsenic (filtered)	0.018	0.016	11.8	0.25	173	0.032	0.023	33	0.27	0.26	4
Barium (filtered)	0.2	0.2	0.0	0.1	67	0.2	0.1	67	2	0.1	181
Beryllium (filtered)	0.01	0.01	0.0	0.1	164	0.01	0.1	164	0.1	0.1	0
Boron (filtered)	2.6	2.4	8.0	3	14	2	3	40	3.9	0.1	190
Cadmium (filtered)	0.045	0.045	0.0	0.1	76	0.045	0.1	76	0.049	0.4	156
Chromium (filtered)	0.13	0.074	54.9	0.2	42	0.22	0.3	31	0.33	1	101
Cobalt (filtered)	4.9	5.3	7.8	4.9	0	4.6	4.7	2	5.6	5.8	4
Copper (filtered)	51	66	25.6	61	18	50	59	17	130	140	7
Iron (filtered)	950	1000	5.1	1000	5	840	950	12	1200	1200	0
Lead (filtered)	0.01	0.013	26.1	62	200	0.025	60	200	0.26	130	199
Lithium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.1	133
Manganese (filtered)	2.3	2.5	8.3	3	26	2.2	3	31	4.1	5	20
Mercury (filtered)	0.001	0.001	0.0	0.01	164	0.001	0.01	164	0.01	0.01	0
Molybdenum (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.3	50
Nickel (filtered)	7.7	8.1	5.1	9	16	7.6	8	5	9	9	0
Selenium (filtered)	0.01	0.01	0.0	0.1	164	0.016	0.1	145	0.1	0.1	0
Silver (filtered)	0.05	0.05	0.0	0.5	164	0.05	0.5	164	0.5	0.5	0
Strontium (filtered)	4.7	4.8	2.1	5	6	4.6	5	8	5.8	6	3
Uranium (filtered)	0.13	0.14	7.4	0.5	117	0.12	0.5	123	1	1.1	10
Vanadium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.2	120	0.5	0.3	50
Zinc (filtered)	73	74	1.4	76	4	68	71	7	77	89	14

Well ID	KPFRT03	KPFRT03		KPFRT03		KPFRT03	KPFRT03		KPFRT03	KPFRT03	
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPFRT03#1	PP_241123_KPFRT03#2		PP_241123_KPFRT03 #1 BV		PP_291123_KPFRT03#1	PP_291123_KPFRT03 #1 BV		PP_151223_KPFRT03#1	PP_151223_KPFRT03_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra	RPD	Inter	RPD	Primary	Inter	RPD	Primary	Inter	RPD
Ammonia (as N)	0.93	0.84	10.2	0.98	5	0.98	1.2	20	1	0.86	15
Bromide	230	210	9.1	150	42	120	170	34			
Chloride	2700	2800	3.6	2700	0	2900	2800	4	2600	2500	4
Conductivity (at 25 °C)	11000	12000	8.7	12000	9	12000	12000	0	12000	12000	0
Fluoride	5.5	1.4	118.8	0.8	149	0.5	0.5	0			
Nitrate & Nitrite (as N)	0.06	0.05	18.2	0.05	18	0.05	0.05	0			
Nitrate (as N)	0.05	0.05	0.0	0.03	50	0.03	0.02	40	0.02	0.06	100
Nitrite (as N)	0.02	0.02	0.0	0.02	0	0.02	0.02	0	7	0.02	199
Organic Nitrogen (as N)*	0.37	0.36	2.7	0.62	51	0.82	0.7	16	0.7	0.44	46
pH (at 25 °C)	3.7	3.5	5.6	3.7	0	3.9	3.3	17	3.6	3.7	3
Phosphate total (as P)	0.01	0.02	66.7	0.02	67	0.02	0.02	0	0.03	0.01	100
Phosphorus reactive (as P)	0.01	0.01	0.0	0.01	0	0.01	0.02	67	5	8	46
Salinity (expressed as TDS)*	6700	10000	39.5	9000	29	8700	7200	19	7900	7800	1
Silicon (filtered)	32	39	19.7	37	14	36	39	8	42	38	10
Sulphate (as SO4)	2100	3000	35.3	2700	25	3000	3000	0	3200	3100	3
Total Kjeldahl Nitrogen (as N)	1.3	1.2	8.0	1.6	21	1.8	1.9	5	1.7	1.3	27
Total Nitrogen (as N)*	1.4	1.3	7.4	1.6	13	1.8	1.9	5	1.7	1.4	19
Total Suspended Solids Dried at 103 °C to 105 °C	71	70	1.4	52	31	82	170	70			
Alkali Metals											
Calcium	230	280	19.6	270	16	270	290	7	320	290	10
Magnesium	220	270	20.4	260	17	260	270	4	310	280	10
Potassium	34	38	11.1	37	8	37	38	3	46	42	9
Sodium	1500	1600	6.5	1600	6	1600	1600	0	1800	1700	6
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	20	20	0.0	20	0	20	20	0	1	1	0
Carbonate Alkalinity (as CaCO3)	10	10	0.0	10	0	10	10	0	1	1	0
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	20	0	20	20	0	1	1	0
Total Alkalinity (as CaCO3)	20	20	0.0	20	0	20	20	0	0	0	0
Aluminium (filtered)	2.2	4.4	66.7	3.4	43	5.1	5.3	4	6	6	0
Arsenic (filtered)	0.01	0.01	0.0	0.01	0	0.015	0.011	31	0.1	0.1	0
Barium (filtered)	0.2	0.2	0.0	0.2	0	0.2	0.05	120	0.1	0.1	0
Beryllium (filtered)	0.01	0.01	0.0	0.01	0	0.01	0.01	0	0.1	0.1	0
Boron (filtered)	1.5	1.7	12.5	1.5	0	5	1.5	108	2	0.1	181
Cadmium (filtered)	0.0089	0.015	51.0	0.012	30	0.019	0.018	5	0.1	0.1	0
Chromium (filtered)	0.01	0.01	0.0	0.05	133	0.01	0.01	0	0.1	0.3	100
Cobalt (filtered)	1.6	2.4	40.0	2.1	27	2.4	2.4	0	2.5	2.2	13
Copper (filtered)	4.2	5.5	26.8	4.7	11	7.5	7.2	4	8	6	29
Iron (filtered)	340	500	38.1	450	28	500	550	10	590	460	25
Lead (filtered)	0.01	0.01	0.0	0.01	0	0.01	0.01	0	8	6	29
Lithium (filtered)	0.05	0.05	0.0	0.05	0	0.05	0.05	0	0.1	0.1	0
Manganese (filtered)	0.76	1.1	36.6	0.97	24	1	1.1	10	2	1	67
Mercury (filtered)	0.001	0.001	0.0	0.001	0	0.001	0.001	0	0.01	0.01	0
Molybdenum (filtered)	0.05	0.05	0.0	0.05	0	0.05	0.05	0	0.1	0.1	0
Nickel (filtered)	2.6	3.7	34.9	3.2	21	3.9	3.8	3	4	3	29
Selenium (filtered)	0.01	0.01	0.0	0.01	0	0.01	0.01	0	0.1	0.1	0
Silver (filtered)	0.05	0.05	0.0	0.05	0	0.05	0.005	164	0.5	0.5	0
Strontium (filtered)	3	3.3	9.5	3.1	3	3.4	3.5	3	4	3	29
Uranium (filtered)	0.05	0.05	0.0	0.05	0	0.05	0.05	0	0.5	0.5	0
Vanadium (filtered)	0.05	0.05	0.0	0.05	0	0.05	0.01	133	0.1	0.1	0
Zinc (filtered)	21	33	44.4	29	32	34	35	19	37	29	24

Well ID	KPFRT04	KPFRT04		KPFRT04		KPFRT04	KPFRT04		KPFRT04	KPFRT04	
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPFRT04#1	PP_241123_KPFRT04#2		PP_241123_KPFRT04 #1 BV		PP_291123_KPFRT04#1	PP_291123_KPFRT04 #1 BV		PP_151223_KPFRT04#1	PP_151223_KPFRT04_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra	RPD	Inter	RPD	Primary	Inter	RPD	Primary	Inter	RPD
Ammonia (as N)	0.11	0.17	42.9	0.04	93	0.1	0.01	164	0.35	1.4	120
Bromide	9.9	7.8	23.7			9.9		200	14		
Chloride	2500	2600	3.9	2200	13	1100	2300	71	2400	2400	0
Conductivity (at 25 °C)	9200	9400	2.2	9400	2	4300	9700	77	3600	10000	94
Fluoride	3.1	2.2	34.0			0.7			1		
Nitrate & Nitrite (as N)	14	10	33.3			3.2			1.4		
Nitrate (as N)	14	10	33.3	14	0	3.2	6.6	69	1.4	7.2	135
Nitrite (as N)	0.02	0.03	40.0	68	200	0.02	30	200	0.02	0.02	0
Organic Nitrogen (as N)*	1.09	0.63	53.5	1.86	52	1.1	1.6	37	0.2	0.6	100
pH (at 25 °C)	6.9	6.4	7.5	7.3	6	6.8	6.9	1	7.4	6.2	18
Phosphate total (as P)	0.01	0.01	0.0	0.01	0	0.01	0.01	0	0.01	0.01	0
Phosphorus reactive (as P)	0.01	0.01	0.0	0.2	181	0.01	0.2	181	0.01	0.2	181
Salinity (expressed as TDS)*	5200	5200	0.0	6000	14	3200	6200	64	6800	6400	6
Silicon (filtered)	19	18	5.4	20	5	9.8	19	64	18	18	0
Sulphate (as SO4)	790	780	1.3	780	1	330	760	79	900	1000	11
Total Kjeldahl Nitrogen (as N)	1.2	0.8	40.0	1.9	45	1.2	1.6	29	0.4	2	133
Total Nitrogen (as N)*	15	11	30.8	16	6	4.4	8.2	60	1.8	9.2	135
Total Suspended Solids Dried at 103 °C to 105 °C	100	59	51.6			21			80		
Alkali Metals											
Calcium	150	150	0.0	160	6	85	170	67	170	190	11
Magnesium	170	180	5.7	190	11	100	200	67	200	220	10
Potassium	27	28	3.6	32	17	15	34	78	30	33	10
Sodium	1400	1400	0.0	1600	13	810	1600	66	1400	1600	13
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	420	340	21.1	330	24	150	310	70	210	260	21
Carbonate Alkalinity (as CaCO3)	10	10	0.0	1	164	10	1	164	10	1	164
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Total Alkalinity (as CaCO3)	420	340	21.1	330	24	150	310	70	210	260	0
Aluminium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.05	0.1	67
Arsenic (filtered)	0.006	0.004	40.0	0.007	15	0.003	0.002	40	0.002	0.1	192
Barium (filtered)	0.03	0.03	0.0	0.1	108	0.02	0.1	133	0.03	0.1	108
Beryllium (filtered)	0.001	0.001	0.0	0.001	0	0.001	0.001	0	0.001	0.1	196
Boron (filtered)	1.1	1.1	0.0	0.9	20	2	1	67	1.1	1	10
Cadmium (filtered)	0.0006	0.001	50.0	0.1	198	0.0003	0.1	199	0.0005	0.1	198
Chromium (filtered)	0.001	0.001	0.0	0.1	196	0.001	0.1	196	0.001	0.1	196
Cobalt (filtered)	0.15	0.21	33.3	0.14	7	0.083	0.13	44	0.25	0.26	4
Copper (filtered)	0.54	1.5	94.1	0.1	138	0.3	0.1	100	1.1	0.1	167
Iron (filtered)	0.05	0.05	0.0	0.1	67	0.28	0.1	95	0.05	0.15	100
Lead (filtered)	0.001	0.001	0.0	0.1	196	0.001	0.1	196	0.001	0.1	196
Lithium (filtered)	0.005	0.005	0.0	0.1	181	0.005	0.1	181	0.005	0.1	181
Manganese (filtered)	0.15	0.15	0.0	0.1	40	0.079	0.1	23	0.33	0.3	10
Mercury (filtered)	0.0001	0.0001	0.0	0.0001	0	0.0001	0.0001	0	0.0001	0.01	196
Molybdenum (filtered)	0.005	0.005	0.0	0.1	181	0.005	0.1	181	0.005	0.1	181
Nickel (filtered)	0.25	0.35	33.3	0.2	22	0.14	0.2	35	0.36	0.4	11
Selenium (filtered)	0.014	0.011	24.0	0.013	7	0.006	0.007	15	0.006	0.1	177
Silver (filtered)	0.005	0.005	0.0	0.005	0	0.005	0.005	0	0.005	0.5	196
Strontium (filtered)	2.4	2.5	4.1	2	18	1.1	2	58	2.1	2	5
Uranium (filtered)	0.043	0.052	18.9	0.046	7	0.02	0.021	5	0.018	0.5	186
Vanadium (filtered)	0.005	0.005	0.0	0.1	181	0.005	0.1	181	0.005	0.1	181
Zinc (filtered)	0.72	1	32.6	0.3	82	0.33	0.2	40	1.1	0.7	44

Well ID	KPFRT06	KPFRT06		KPFRT06		KPFRT06	KPFRT06		KPFRT06	KPFRT06	
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPFRT06#1	PP_241123_KPFRT06#2		PP_241123_KPFRT06 #1 BV		PP_291123_KPFRT06#1	PP_291123_KPFRT06 #1 BV		PP_151223_KPFRT06#1	PP_151223_KPFRT06_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra	RPD	Inter	RPD	Primary	Inter	RPD	Primary	Inter	RPD
Ammonia (as N)	0.19	0.2	5.1	2.3	169	0.01	0.05	133	0.24	0.06	120
Bromide	7.7	8.4	8.7			8.9			10		
Chloride	2800	2800	0.0	2700	4	3000	2900	3	2800	2800	0
Conductivity (at 25 °C)	14000	13000	7.4	14000	0	14000	15000	7	8900	15000	51
Fluoride	1.8	6.6	114.3			0.7			1		
Nitrate & Nitrite (as N)	0.05	0.05	0.0			0.05			0.05		
Nitrate (as N)	0.02	0.02	0.0	0.02	0	0.02	0.02	0	0.02	0.02	0
Nitrite (as N)	0.02	0.02	0.0	20	200	0.02	18	200	0.02	0.02	0
Organic Nitrogen (as N)*	5.31	4.8	10.1	2.8	62	4	5.55	32	3.86	3.04	24
pH (at 25 °C)	3.6	3.7	2.7	3.4	6	3.3	3.5	6	3.9	3.8	3
Phosphate total (as P)	0.07	0.07	0.0	0.13	60	0.14	0.16	13	0.08	0.08	0
Phosphorus reactive (as P)	0.01	0.01	0.0	0.2	181	0.01	0.2	181	0.01	0.2	181
Salinity (expressed as TDS)*	6800	9000	27.8	8800	26	7900	9400	17	11000	9900	11
Silicon (filtered)	58	58	0.0	62	7	58	68	16	57	62	8
Sulphate (as SO4)	4500	4300	4.5	4600	2	5400	5000	8	5800	5200	11
Total Kjeldahl Nitrogen (as N)	5.5	5	9.5	5.1	8	4	5.6	33	4.1	3.1	28
Total Nitrogen (as N)*	5.5	5	9.5	5.1	8	4	5.6	33	4.1	3.1	28
Total Suspended Solids Dried at 103 °C to 105 °C	83	200	82.7			100			78		
Alkali Metals											
Calcium	500	490	2.0	570	13	460	570	21	470	550	16
Magnesium	390	380	2.6	440	12	360	450	22	340	440	26
Potassium	34	33	3.0	41	19	34	45	28	32	43	29
Sodium	1700	1700	0.0	1900	11	1700	2100	21	1700	2000	16
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Carbonate Alkalinity (as CaCO3)	10	10	0.0	1	164	10	1	164	10	1	164
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Total Alkalinity (as CaCO3)	20	20	0.0	0	200	20	0	200	20	0	0
Aluminium (filtered)	62	69	10.7	69	11	76	92	19	95	92	3
Arsenic (filtered)	0.022	0.028	24.0	0.01	75	0.053	0.1	61	0.1	0.051	65
Barium (filtered)	0.2	0.2	0.0	0.1	67	0.2	0.1	67	2	0.1	181
Beryllium (filtered)	0.01	0.01	0.0	0.1	164	0.01	0.1	164	0.1	0.1	0
Boron (filtered)	2.3	2.3	0.0	3	26	6	2	100	3.2	0.1	188
Cadmium (filtered)	0.034	0.034	0.0	0.1	99	0.044	0.1	78	0.046	0.2	125
Chromium (filtered)	0.11	0.064	52.9	0.1	10	0.055	0.1	58	0.1	0.5	133
Cobalt (filtered)	4	4	0.0	4.2	5	5	5.3	6	5.5	6	9
Copper (filtered)	210	260	21.3	250	17	230	280	20	240	260	8
Iron (filtered)	460	470	2.2	550	18	650	770	17	800	820	2
Lead (filtered)	0.017	0.022	25.6	250	200	0.031	270	200	0.1	250	200
Lithium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.1	133
Manganese (filtered)	2.2	2	9.5	3	31	2	3	40	2.3	3	26
Mercury (filtered)	0.001	0.001	0.0	0.01	164	0.001	0.01	164	0.01	0.001	164
Molybdenum (filtered)	0.05	0.5	163.6	0.1	67	0.05	0.1	67	0.5	0.1	133
Nickel (filtered)	6.5	6.6	1.5	8	21	8.1	9	11	9.1	9	1
Selenium (filtered)	0.01	0.01	0.0	0.01	0	0.018	0.1	139	0.1	0.01	164
Silver (filtered)	0.05	0.5	163.6	0.5	164	0.05	0.5	164	0.5	0.05	164
Strontium (filtered)	4.4	4.5	2.2	5	13	4.6	5	8	5.1	5	2
Uranium (filtered)	0.16	0.17	6.1	0.5	103	0.23	0.5	74	0.5	0.05	164
Vanadium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.1	133
Zinc (filtered)	37	38	2.7	46	22	47	54	16	54	55	2

Well ID	KPMON01	KPMON01	RPD	KPMON01	RPD	KPMON01	KPMON01	RPD	KPMON01	KPMON01	RPD
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPMON01#1	PP_241123_KPMON01#2		PP_241123_KPMON01 #1 BV		PP_291123_KPMON01#1	PP_291123_KPMON01 #1 BV		PP_151223_KPMON01#1	PP_151223_KPMON01_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra		Inter		Primary	Inter		Primary	Inter	
Ammonia (as N)	0.26	0.36	32.3	0.04	147	0.46	0.28	49	0.38	0.47	21
Bromide	56	35	46.2			10			7.3		
Chloride	2000	2000	0.0	1800	11	2000	1800	11	1700	1700	0
Conductivity (at 25 °C)	7500	7600	1.3	7700	3	7200	7400	3	5100	7600	39
Fluoride	2.1	11	135.9			3.7			3.8		
Nitrate & Nitrite (as N)	0.07	0.05	33.3			0.05			0.21		
Nitrate (as N)	0.07	0.02	111.1	0.02	111	0.02	0.02	0	0.21	0.05	123
Nitrite (as N)	0.02	0.02	0.0	0.1	133	0.02	0.1	133	0.02	0.02	0
Organic Nitrogen (as N)*	0.24	0.54	76.9	0.66	93	0.2	0.52	89	0.72	0.23	103
pH (at 25 °C)	7.5	7.3	2.7	7.8	4	7.2	7.6	5	8.1	7.3	10
Phosphate total (as P)	0.03	0.03	0.0	0.04	29	0.04	0.07	55	0.05	0.03	50
Phosphorus reactive (as P)	0.02	0.02	0.0	0.2	164	0.03	0.2	148	0.03	1	188
Salinity (expressed as TDS)*	3800	4500	16.9	5000	27	3700	4700	24	4100	4900	18
Silicon (filtered)	18	19	5.4	19	5	19	21	10	19	20	5
Sulphate (as SO4)	610	610	0.0	640	5	570	600	5	560	600	7
Total Kjeldahl Nitrogen (as N)	0.5	0.9	57.1	0.7	33	0.5	0.8	46	1.1	0.7	44
Total Nitrogen (as N)*	0.6	0.9	40.0	0.7	15	0.5	0.8	46	1.3	0.7	60
Total Suspended Solids Dried at 103 °C to 105 °C	44	54	20.4			54			53		
Alkali Metals											
Calcium	120	130	8.0	130	8	120	130	8	120	140	15
Magnesium	120	130	8.0	140	15	120	130	8	130	140	7
Potassium	30	32	6.5	36	18	29	35	19	29	33	13
Sodium	1200	1200	0.0	1300	8	1100	1200	9	1100	1200	9
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	280	270	3.6	220	24	310	280	10	270	310	14
Carbonate Alkalinity (as CaCO3)	10	10	0.0	1	164	10	1	164	10	1	164
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Total Alkalinity (as CaCO3)	280	270	3.6	220	24	310	280	10	270	310	0
Aluminium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.05	0.12	82
Arsenic (filtered)	0.001	0.001	0.0	0.002	67	0.002	0.004	67	0.003	0.01	108
Barium (filtered)	0.04	0.04	0.0	0.1	86	0.04	0.1	86	0.04	0.1	86
Beryllium (filtered)	0.001	0.001	0.0	0.001	0	0.001	0.001	0	0.001	0.01	164
Boron (filtered)	0.97	0.97	0.0	1	3	2	1	67	0.87	0.9	3
Cadmium (filtered)	0.0002	0.0004	66.7	0.1	199	0.0002	0.1	199	0.0002	0.1	199
Chromium (filtered)	0.001	0.001	0.0	0.1	196	0.001	0.1	196	0.001	0.1	196
Cobalt (filtered)	0.032	0.058	57.8	0.03	6	0.001	0.001	0	0.003	0.01	108
Copper (filtered)	0.001	0.36	198.9	0.1	196	0.012	0.1	157	0.033	0.1	101
Iron (filtered)	0.08	0.16	66.7	0.1	22	0.2	0.1	67	0.05	0.1	67
Lead (filtered)	0.001	0.001	0.0	0.1	196	0.001	0.1	196	0.001	0.1	196
Lithium (filtered)	0.03	0.03	0.0	0.1	108	0.024	0.1	123	0.021	0.1	131
Manganese (filtered)	0.099	0.11	10.5	0.1	1	0.011	0.1	160	0.036	0.1	94
Mercury (filtered)	0.0001	0.0001	0.0	0.0001	0	0.0001	0.0001	0	0.0001	0.001	164
Molybdenum (filtered)	0.007	0.007	0.0	0.1	174	0.006	0.1	177	0.005	0.1	181
Nickel (filtered)	0.067	0.11	48.6	0.1	40	0.004	0.1	185	0.005	0.1	181
Selenium (filtered)	0.001	0.001	0.0	0.001	0	0.006	0.006	0	0.005	0.01	67
Silver (filtered)	0.005	0.005	0.0	0.005	0	0.005	0.005	0	0.005	0.05	164
Strontium (filtered)	2.3	2.3	0.0	2	14	1.9	2	5	1.7	2	16
Uranium (filtered)	0.006	0.006	0.0	0.007	15	0.005	0.005	0	0.005	0.05	164
Vanadium (filtered)	0.005	0.005	0.0	0.1	181	0.005	0.1	181	0.005	0.1	181
Zinc (filtered)	0.075	0.48	145.9	0.1	29	0.014	0.1	0	0.019	0.1	136

Well ID	KPMON02	KPMON02	RPD	KPMON02	RPD	KPMON02	KPMON02	RPD	KPMON02	KPMON02	RPD
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPMON02#1	PP_241123_KPMON02#2		PP_241123_KPMON02 #1 BV		PP_291123_KPMON02#1	PP_291123_KPMON02 #1 BV		PP_151223_KPMON02#1	PP_151223_KPMON02_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra		Inter		Primary	Inter		Primary	Inter	
Ammonia (as N)	0.78	0.85	8.6	0.51	42	0.29	0.19	42	0.18	0.38	71
Bromide	27	10	91.9			6.4			4.7		
Chloride	1900	1900	0.0	1700	11	2100	1900	10	1800	1900	5
Conductivity (at 25 °C)	7200	7200	0.0	7300	1	7800	8000	3	4500	8400	60
Fluoride	3.7	0.5	152.4			2.1			2.2		
Nitrate & Nitrite (as N)	0.07	0.05	33.3			0.13			0.07		
Nitrate (as N)	0.06	0.02	100.0	0.02	100	0.13	0.02	147	0.07	0.06	15
Nitrite (as N)	0.02	0.02	0.0	0.1	133	0.02	0.1	133	0.02	0.02	0
Organic Nitrogen (as N)*	2.22	1.15	63.5	0.89	86	0.51	0.31	49	2.12	0.2	166
pH (at 25 °C)	7.4	7.3	1.4	7.6	3	7	6.8	3	7.2	6.5	10
Phosphate total (as P)	0.01	0.01	0.0	0.01	0	0.01	0.01	0	0.01	0.01	0
Phosphorus reactive (as P)	0.01	0.01	0.0	0.7	194	0.01	0.2	181	0.01	3	199
Salinity (expressed as TDS)*	3700	490	153.2	4700	24	4200	5100	19	4500	5400	18
Silicon (filtered)	5	5	0.0	5	0	7.7	8	4	8.7	8	8
Sulphate (as SO4)	530	550	3.7	570	7	680	680	0	660	680	3
Total Kjeldahl Nitrogen (as N)	3	2	40.0	1.4	73	0.8	0.5	46	2.3	0.5	129
Total Nitrogen (as N)*	3.1	2	43.1	1.4	76	0.9	0.5	57	2.4	0.6	120
Total Suspended Solids Dried at 103 °C to 105 °C	52	5	164.9			66			170		
Alkali Metals											
Calcium	50	56	11.3	58	15	110	120	9	120	130	8
Magnesium	58	64	9.8	69	17	110	130	17	130	140	7
Potassium	50	51	2.0	58	15	33	38	14	35	39	11
Sodium	1200	1200	0.0	1300	8	1200	1400	15	1300	1400	7
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	230	170	30.0	190	19	240	240	0	240	280	15
Carbonate Alkalinity (as CaCO3)	10	10	0.0	1	164	10	1	164	10	1	164
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Total Alkalinity (as CaCO3)	230	170	30.0	190	19	240	240	0	240	280	0
Aluminium (filtered)	0.05	0.05	0.0	0.1	67	0.09	0.1	11	0.05	0.1	67
Arsenic (filtered)	0.003	0.002	40.0	0.003	0	0.001	0.006	143	0.001	0.01	164
Barium (filtered)	0.07	0.07	0.0	0.1	35	0.06	0.1	50	0.04	0.1	86
Beryllium (filtered)	0.001	0.001	0.0	0.001	0	0.001	0.001	0	0.001	0.01	164
Boron (filtered)	0.82	0.82	0.0	0.6	31	2	1	67	1.1	1	10
Cadmium (filtered)	0.0002	0.0002	0.0	0.1	199	0.0002	0.1	199	0.0002	0.1	199
Chromium (filtered)	0.001	0.001	0.0	0.1	196	0.001	0.1	196	0.001	0.1	196
Cobalt (filtered)	0.004	0.007	54.5	0.012	100	0.14	0.16	13	0.15	0.19	24
Copper (filtered)	0.003	0.005	50.0	0.1	188	0.024	0.1	123	0.001	0.1	196
Iron (filtered)	0.05	0.52	164.9	0.1	67	6.8	0.11	194	3.1	0.1	188
Lead (filtered)	0.001	0.001	0.0	0.1	196	0.002	0.1	192	0.001	0.1	196
Lithium (filtered)	0.064	0.062	3.2	0.1	44	0.019	0.1	136	0.019	0.1	136
Manganese (filtered)	0.17	0.21	21.1	0.1	52	0.62	0.5	21	0.47	0.4	16
Mercury (filtered)	0.0001	0.0001	0.0	0.0001	0	0.0001	0.0001	0	0.0001	0.001	164
Molybdenum (filtered)	0.005	0.005	0.0	0.1	181	0.005	0.1	181	0.005	0.1	181
Nickel (filtered)	0.021	0.026	21.3	0.1	131	0.16	0.1	46	0.15	0.2	29
Selenium (filtered)	0.001	0.001	0.0	0.001	0	0.001	0.001	0	0.001	0.01	164
Silver (filtered)	0.005	0.005	0.0	0.005	0	0.005	0.005	0	0.005	0.05	164
Strontium (filtered)	1.6	1.6	0.0	1	46	1.6	2	22	1.5	2	29
Uranium (filtered)	0.016	0.018	11.8	0.017	6	0.034	0.057	51	0.049	0.05	2
Vanadium (filtered)	0.005	0.005	0.0	0.1	181	0.005	0.1	181	0.005	0.1	181
Zinc (filtered)	0.04	0.073	58.4	0.1	86	0.092	0.1	0	0.005	0.1	181

Well ID	KPMON03	KPMON03	RPD	KPMON03	RPD	KPMON03	KPMON03	RPD	KPMON03	KPMON03	RPD
Date	24/11/2023	24/11/2023		24/11/2023		29/11/2023	29/11/2023		15/12/2023	15/12/2023	
Sample ID	PP_241123_KPMON03#1	PP_241123_KPMON03#2		PP_241123_KPMON03 #1 BV		PP_291123_KPMON03#1	PP_291123_KPMON03 #1 BV		PP_151223_KPMON03#1	PP_151223_KPMON03_BV	
Report No.	1048099	1048099		1026020		1050046	1026020		1054689	1026139	
Type	Primary	Intra		Inter		Primary	Inter		Primary	Inter	
Ammonia (as N)	0.69	0.73	5.6	0.78	12	0.01	0.84	195	1.1	1.2	9
Bromide	9.3	5.8	46.4			5.5			7.2		
Chloride	2600	2600	0.0	2800	7	770	3200	122	2400	2600	8
Conductivity (at 25 °C)	12000	12000	0.0	13000	8	6400	13000	68	13000	13000	0
Fluoride	5.4	1.8	100.0			1.6			5.5		
Nitrate & Nitrite (as N)	0.05	0.05	0.0			0.05			4.6		
Nitrate (as N)	0.03	0.02	40.0	0.02	40	0.02	0.02	0	4.6	0.02	198
Nitrite (as N)	0.02	0.02	0.0	0.2	164	0.02	0.1	133	0.02	0.02	0
Organic Nitrogen (as N)*	1.01	0.97	4.0	1.12	10	2.4	0.96	86	0.2	0.2	0
pH (at 25 °C)	3.5	3.5	0.0	3.4	3	3.9	3.5	11	4.8	4.5	6
Phosphate total (as P)	0.02	0.03	40.0	-		0.02	0.03	40	0.02	0.01	67
Phosphorus reactive (as P)	0.01	0.02	66.7	0.2	181	0.02	0.2	164	0.02	3	197
Salinity (expressed as TDS)*	7200	10000	32.6	8200	13	3400	8200	83	9900	8500	15
Silicon (filtered)	26	28	7.4	30	14	28	36	25	36	36	0
Sulphate (as SO4)	3900	3900	0.0	3500	11	1200	3800	104	4200	3900	7
Total Kjeldahl Nitrogen (as N)	1.7	1.7	0.0	1.9	11	2.4	1.8	29	1.3	1.3	0
Total Nitrogen (as N)*	1.7	1.7	0.0	1.9	11	2.4	1.8	29	5.9	1.3	128
Total Suspended Solids Dried at 103 °C to 105 °C	13	100	154.0			56			180		
Alkali Metals											
Calcium	360	390	8.0	430	18	380	470	21	380	430	12
Magnesium	360	390	8.0	440	20	360	460	24	370	410	10
Potassium	36	39	8.0	48	29	35	47	29	35	39	11
Sodium	1400	1600	13.3	1800	25	1500	1900	24	1600	1800	12
Alkalinity (speciated)											
Bicarbonate Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Carbonate Alkalinity (as CaCO3)	10	10	0.0	1	164	10	1	164	10	1	164
Hydroxide Alkalinity (as CaCO3)	20	20	0.0	1	181	20	1	181	20	1	181
Total Alkalinity (as CaCO3)	20	20	0.0	0	200	20	0	200	20	0	0
Aluminium (filtered)	0.5	0.5	0.0	0.1	133	0.5	0.12	123	2.9	0.1	187
Arsenic (filtered)	0.01	0.01	0.0	0.1	164	0.016	0.01	46	0.1	0.18	57
Barium (filtered)	0.2	0.2	0.0	0.1	67	0.2	0.1	67	2	0.1	181
Beryllium (filtered)	0.01	0.01	0.0	0.1	164	0.01	0.1	164	0.1	0.01	164
Boron (filtered)	1.6	1.5	6.5	2	22	5	2	86	2.2	0.1	183
Cadmium (filtered)	0.002	0.0021	4.9	0.1	192	0.002	0.1	192	0.02	0.2	164
Chromium (filtered)	0.01	0.01	0.0	0.1	164	0.01	0.1	164	0.1	0.4	120
Cobalt (filtered)	2	1.9	5.1	1.9	5	2	2.2	10	2.3	2.4	4
Copper (filtered)	2.6	2.5	3.9	3	14	1.6	2	22	0.1	0.2	67
Iron (filtered)	500	490	2.0	570	13	580	760	27	790	830	5
Lead (filtered)	0.01	0.01	0.0	3	199	0.01	2	198	0.1	0.5	133
Lithium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.1	133
Manganese (filtered)	1.4	1.4	0.0	2	35	1.4	2	35	1.5	2	29
Mercury (filtered)	0.001	0.001	0.0	0.01	164	0.001	0.01	164	0.01	0.001	164
Molybdenum (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.1	133
Nickel (filtered)	3.3	3.1	6.2	4	19	3.3	4	19	3.8	4	5
Selenium (filtered)	0.01	0.01	0.0	0.1	164	0.01	0.1	164	0.1	0.01	164
Silver (filtered)	0.05	0.05	0.0	0.5	164	0.05	0.5	164	0.5	0.05	164
Strontium (filtered)	3.4	3.5	2.9	4	16	3.2	4	22	3.2	3	6
Uranium (filtered)	0.05	0.05	0.0	0.5	164	0.05	0.5	164	0.5	0.05	164
Vanadium (filtered)	0.05	0.05	0.0	0.1	67	0.05	0.1	67	0.5	0.1	133
Zinc (filtered)	35	36	2.8	39	11	38	46	16	47	48	2

APPENDIX F COMPLIANCE ASSESSMENT TABLES

APPENDIX G REHABILITATION ASSESSMENT

KPFRT02 Rehab Assessment July 2024

INORGANICS AND IONS

Baseline												5-Jun-24	Comment
					General Statistics on Uncensored Full Data								
					Date/Time of Computation	ProUCL 5.2 28/03/2023 6:07:18 PM							
					User Selected Options								
					From File	PRO UCL KPFRT02 NEW.xls							
					Full Precision	OFF							
From File: PRO UCL KPFRT02 NEW.xls													
					General Statistics for Uncensored Data Sets								
Variable	**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**	PP_050624_KPFRT02	
Ammonia (as N)	15	0	0.025	3.2	2.248	1.75	0.747	0.193	0.297	-1.877	0.332	1.7	
Bromide	10	5	0.25	2200	467.3	37.24	825.6	261.1	18.72	1.718	1.767	6.2	
Chloride	15	0	2300	4000	3373	3342	454.3	117.3	296.5	-0.755	0.135	3400	
Conductivity (at 25°C)	15	0	4100	21000	14647	13678	4547	1174	4448	-1.068	0.31	15000	
Fluoride (Total)	14	1	0.25	2.8	1.811	1.523	0.85	0.227	0.964	-0.578	0.469	< 0.5	
Nitrate & Nitrite (as N)	14	1	0.09	8.5	1.029	0.354	2.215	0.592	0.252	3.401	2.152	< 0.05	
Nitrate (as N)	15	0	0.01	5	0.612	0.139	1.264	0.326	0.326	3.398	2.066	< 0.02	
Nitrite (as N)	15	0	0.005	3.5	0.385	0.125	0.883	0.228	0.0445	3.596	2.293	< 0.02	
pH (at 25 °C)	15	0	3.3	7.8	3.913	3.819	1.096	0.283	0.297	3.627	0.28	3.2	Marginal
Phosphate total (as P)	15	0	0.005	0.25	0.0357	0.016	0.0616	0.0159	0.0222	3.403	1.727	0.1	
Phosphorus filterable reactive (as P)	15	0	0.005	0.7	0.092	0.0291	0.177	0.0457	0.0371	3.29	1.922	0.02	
Salinity (expressed as TDS)*	14	1	5	17000	10850	6347	4797	1282	3929	-0.848	0.442	8600	
Silicon (filtered)	15	0	2.5	86	53.83	43.31	23.21	5.993	20.76	-0.994	0.431	83	
Sulphate (as SO4)	15	0	680	6400	4665	4172	1579	407.6	1038	-1.688	0.338	4900	
Total Kjeldahl Nitrogen (as N)	15	0	1.1	3.9	2.527	2.421	0.706	0.182	0.741	-0.185	0.279	1.9	
Total Nitrogen (as N)	15	0	1.59	5	3.087	2.957	0.947	0.245	0.904	0.642	0.307	1.9	
Total Suspended Solids Dried at 103-105°C	14	1	4.1	160	51.15	33.7	46.85	12.52	26.69	1.351	0.916	27	
					Percentiles for Uncensored Data Sets								
Variable	**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**		
Ammonia (as N)	15	0	1.74	1.96	2.1	2.4	2.55	2.68	3	3.06	3.172	1.7	
Bromide	10	5	4.525	5	6.875	15.25	385	728	1840	2020	2164	6.2	
Chloride	15	0	2880	3160	3200	3400	3700	3820	3900	3930	3986	3400	
Conductivity (at 25°C)	15	0	8760	12800	13500	15000	18000	18200	19000	19600	20720	15000	
Fluoride (Total)	14	1	0.63	1.12	1.4	2.05	2.525	2.64	2.7	2.735	2.787	< 0.5	
Nitrate & Nitrite (as N)	14	1	0.106	0.126	0.133	0.28	0.528	0.798	1.76	4.275	7.655	< 0.05	
Nitrate (as N)	15	0	0.01	0.01	0.02	0.25	0.39	0.548	1.1	2.27	4.454	< 0.02	
Nitrite (as N)	15	0	0.048	0.09	0.09	0.11	0.16	0.178	0.592	1.624	3.125	< 0.02	
pH (at 25 °C)	15	0	3.4	3.4	3.5	3.6	3.8	3.82	4.02	5.21	7.282	3.2	
Phosphate total (as P)	15	0	0.005	0.005	0.005	0.02	0.04	0.04	0.046	0.11	0.222	0.1	
Phosphorus filterable reactive (as P)	15	0	0.005	0.005	0.0075	0.03	0.095	0.12	0.16	0.322	0.624	0.02	
Salinity (expressed as TDS)*	14	1	5220	8260	8825	11500	14000	14800	16000	16350	16870	8600	
Silicon (filtered)	15	0	23	38.8	41	59	70.5	72.2	73.6	77.6	84.32	83	
Sulphate (as SO4)	15	0	2520	4380	4650	4900	5700	5820	5960	6120	6344	4900	
Total Kjeldahl Nitrogen (as N)	15	0	1.74	2.1	2.15	2.5	3	3.02	3.16	3.41	3.802	1.9	
Total Nitrogen (as N)	15	0	2.282	2.392	2.45	2.64	3.46	3.696	4.418	4.601	4.92	1.9	
Total Suspended Solids Dried at 103-105°C	14	1	10.8	19.2	22.25	36.5	70.5	82.4	117.7	140.5	156.1	27	

Baseline												5-Jun-24	Comment
General Statistics on Uncensored Full Data													
Date/Time of Computation	ProUCL 5.2 28/03/2023 6:07:57 PM												
User Selected Options													
From File	PRO UCL KPFRT02 NEW.xls												
Full Precision	OFF												
From File: PRO UCL KPFRT02 NEW.xls													
General Statistics for Uncensored Data Sets													
Variable	**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**	PP_050624_KPFRT02	
Aluminium (filtered)	15	0	0.025	19	11.28	5.976	6.75	1.743	4.448	-0.823	0.598	27	
Arsenic (filtered)	15	0	0.003	0.054	0.017	0.0109	0.0166	0.00429	0.0119	1.408	0.977	0.058	Marginal
Barium (filtered)	14	1	0.01	0.1	0.0721	0.0544	0.0398	0.0106	0	-0.823	0.552	< 0.2	LOR Issue
Beryllium (filtered)	14	1	5.0000E-4	0.005	0.00307	0.00213	0.00207	5.5435E-4	0.00222	-0.216	0.675	< 0.01	LOR Issue
Boron (filtered)	14	1	0.05	3	2.215	1.749	0.8	0.214	0.445	-2.034	0.361	< 5	LOR Issue
Cadmium (filtered)	15	0	1.0000E-4	0.066	0.0441	0.0298	0.0189	0.00489	0.0178	-0.876	0.429	0.051	
Chromium (filtered)	15	0	5.0000E-4	0.015	0.00483	0.00339	0.00352	9.0851E-4	0	1.575	0.728	0.41	
Cobalt (filtered)	14	1	0.017	5.5	4.116	2.919	1.459	0.39	0.741	-1.895	0.354	4.3	
Copper (filtered)	15	0	0.053	76	29.94	15.91	20.06	5.18	13.34	0.33	0.67	41	
Iron (filtered)	15	0	0.025	1300	952	498.5	295.1	76.19	148.3	-2.586	0.31	900	
Lead (filtered)	15	0	5.0000E-4	0.08	0.0138	0.00479	0.0208	0.00536	0.00667	2.606	1.505	0.031	
Lithium (filtered)	13	2	0.008	0.05	0.0255	0.0238	0.00925	0.00257	0	1.184	0.363	< 0.05	
Manganese (filtered)	15	0	0.033	3	1.822	1.45	0.663	0.171	0.445	-1.177	0.364	1.9	
Mercury (filtered)	15	0	5.0000E-5	5.0000E-4	2.0000E-4	1.0772E-4	2.1958E-4	5.6695E-5	0	0.788	1.098	< 0.001	
Molybdenum (filtered)	14	1	0.0025	0.05	0.0141	0.0074	0.015	0.004	0.00185	1.1	1.06	< 0.05	
Nickel (filtered)	15	0	0.024	8.7	7.002	5.074	2.119	0.547	0.445	-2.96	0.303	7	
Selenium (filtered)	14	1	5.0000E-4	0.021	0.00761	0.00445	0.00663	0.00177	0.00482	0.985	0.872	< 0.01	
Silver (filtered)	12	3	0.0025	0.025	0.0175	0.0116	0.0111	0.0032	0	-0.812	0.633	< 0.05	LOR Issue
Strontium (filtered)	11	4	1.6	5.4	4.191	3.977	1.202	0.362	0.741	-1.245	0.287	4.5	
Uranium (filtered)	14	1	0.023	0.17	0.0959	0.0813	0.0459	0.0123	0.0371	-0.426	0.479	0.12	
Vanadium (filtered)	15	0	0.0025	0.05	0.0164	0.00948	0.0144	0.00373	0.0282	0.69	0.88	0.055	Marginal
Zinc (filtered)	14	1	64	90	71.36	70.99	7.811	2.088	3.706	1.568	0.109	61	

Percentiles for Uncensored Data Sets

Variable	**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**
Aluminium (filtered)	15	0	1.072	1.86	6.5	15	15.5	16.2	17.6	18.3	18.86
Arsenic (filtered)	15	0	0.0034	0.0048	0.005	0.012	0.021	0.0236	0.0426	0.0519	0.0536
Barium (filtered)	14	1	0.013	0.02	0.0275	0.1	0.1	0.1	0.1	0.1	0.1
Beryllium (filtered)	14	1	5.0000E-4	5.0000E-4	8.7500E-4	0.0035	0.005	0.005	0.005	0.005	0.005
Boron (filtered)	14	1	1.232	2.16	2.2	2.5	2.5	2.62	2.8	2.87	2.974
Cadmium (filtered)	15	0	0.026	0.0276	0.0295	0.051	0.0595	0.062	0.0626	0.0639	0.0656
Chromium (filtered)	15	0	5.0000E-4	0.0025	0.004	0.005	0.005	0.005	0.0068	0.0101	0.014
Cobalt (filtered)	14	1	2.83	3.26	3.6	4.7	5.05	5.1	5.24	5.37	5.474
Copper (filtered)	15	0	3.72	6.64	15.4	33	41.5	42.2	44.2	54.3	71.66
Iron (filtered)	15	0	798	908	930	1000	1100	1100	1160	1230	1286
Lead (filtered)	15	0	5.0000E-4	5.0000E-4	0.00125	0.005	0.02	0.0212	0.028	0.0464	0.0733
Lithium (filtered)	13	2	0.0194	0.0226	0.025	0.025	0.025	0.025	0.0314	0.0398	0.048
Manganese (filtered)	15	0	1.24	1.54	1.65	1.8	2.15	2.22	2.3	2.51	2.902
Mercury (filtered)	15	0	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4
Molybdenum (filtered)	14	1	0.0025	0.0025	0.0025	0.00375	0.025	0.025	0.025	0.0338	0.0468
Nickel (filtered)	15	0	5.62	7.16	7.35	7.6	7.85	7.92	8.12	8.35	8.63
Selenium (filtered)	14	1	5.0000E-4	0.0032	0.005	0.005	0.0108	0.0132	0.0178	0.0197	0.0207
Silver (filtered)	12	3	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.025	0.025
Strontium (filtered)	11	4	2.8	3	3.6	4.6	5	5.1	5.1	5.25	5.37
Uranium (filtered)	14	1	0.0265	0.0516	0.0678	0.11	0.128	0.13	0.137	0.151	0.166
Vanadium (filtered)	15	0	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.0325	0.0465
Zinc (filtered)	14	1	65.3	66	66.25	68.5	71	74.2	83.2	86.75	89.35

KPFRT03 Rehab Assessment July 2024

Metals

Baseline	5-Jun-24	Comment

General Statistics on Uncensored Full Data

Date/Time of Computation: ProUCL 5.2 28/03/2023 6:02:52 PM

User Selected Options

From File: PRO UCL KPFRT03.xls

Full Precision: OFF

From File: PRO UCL KPFRT03.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV	PP_050624_KPFRT03
Aluminium (filtered)	13	0	0.22	6.9	1.915	0.726	2.701	0.749	0.133	1.345	1.411	0.18
Arsenic (filtered)	13	0	0.001	0.02	0.00531	0.00426	0.00461	0.00128	0	3.059	0.868	0.001
Barium (filtered)	12	1	0.01	0.1	0.0642	0.043	0.0444	0.0128	0	-0.407	0.692	0.02
Beryllium (filtered)	13	0	5.0000E-4	0.005	0.00362	0.00284	0.00188	5.2243E-4	0	-0.765	0.521	< 0.001
Boron (filtered)	12	1	1	2.5	1.75	1.651	0.608	0.176	0.815	0.174	0.348	1.1
Cadmium (filtered)	13	0	0.0034	0.017	0.00838	0.00683	0.00559	0.00155	0.00222	0.672	0.667	0.0035
Chromium (filtered)	13	0	5.0000E-4	1.4	0.276	0.0121	0.52	0.144	0.00667	1.593	1.886	< 0.001
Cobalt (filtered)	13	0	0.77	3	1.425	1.296	0.684	0.19	0.46	1.126	0.48	0.61
Copper (filtered)	13	0	0.2	13	3.095	0.83	5.099	1.414	0.133	1.468	1.648	0.37
Iron (filtered)	13	0	140	540	280	254	130.7	36.25	118.6	0.753	0.467	120
Lead (filtered)	13	0	5.0000E-4	0.005	0.00331	0.00251	0.00196	5.4461E-4	0	-0.382	0.594	< 0.001
Lithium (filtered)	11	2	0.018	0.025	0.0232	0.023	0.00271	8.1818E-4	0	-1.115	0.117	0.015
Manganese (filtered)	13	0	0.36	1.5	0.764	0.658	0.453	0.126	0.163	0.838	0.592	0.31
Mercury (filtered)	13	0	5.0000E-5	5.0000E-4	2.9231E-4	1.7276E-4	2.3349E-4	6.4759E-5	0	-0.175	0.799	< 0.0001
Molybdenum (filtered)	12	1	0.0025	0.025	0.0138	0.00791	0.0118	0.00339	0.0167	7.120E-16	0.855	< 0.005
Nickel (filtered)	13	0	1.2	5.6	2.577	2.161	1.67	0.463	0.593	0.937	0.648	0.92
Selenium (filtered)	13	0	5.0000E-4	0.007	0.00346	0.00223	0.00242	6.7097E-4	0	-0.341	0.699	< 0.001
Silver (filtered)	11	2	0.0025	0.025	0.0168	0.0108	0.0114	0.00342	0	-0.661	0.675	< 0.005
Strontium (filtered)	9	4	2.2	2.7	2.522	2.518	0.148	0.0494	0.148	-1.375	0.0587	2.6
Uranium (filtered)	13	0	0.0025	0.053	0.0257	0.0173	0.0171	0.00473	0	0.189	0.663	< 0.005
Vanadium (filtered)	13	0	0.0025	0.025	0.0146	0.00864	0.0117	0.00324	0	-0.175	0.799	< 0.005
Zinc (filtered)	13	0	10	40	21.38	18.92	11.24	3.118	7.413	0.721	0.526	8.2

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile	PP_050624_KPFRT03
Aluminium (filtered)	13	0	0.25	0.25	0.25	0.31	2	4.52	6.52	6.72	6.864	0.18
Arsenic (filtered)	13	0	0.0022	0.0034	0.004	0.005	0.005	0.005	0.005	0.011	0.0182	0.001
Barium (filtered)	12	1	0.01	0.012	0.0175	0.1	0.1	0.1	0.1	0.1	0.1	0.02
Beryllium (filtered)	13	0	8.0000E-4	0.002	0.002	0.005	0.005	0.005	0.005	0.005	0.005	< 0.001
Boron (filtered)	12	1	1.1	1.12	1.175	1.65	2.425	2.48	2.5	2.5	2.5	1.1
Cadmium (filtered)	13	0	0.00346	0.00374	0.0038	0.0049	0.015	0.0156	0.016	0.0164	0.0169	0.0035
Chromium (filtered)	13	0	5.0000E-4	0.0023	0.005	0.005	0.042	0.563	1.142	1.28	1.376	< 0.001
Cobalt (filtered)	13	0	0.798	0.882	0.96	1.1	2	2.06	2.1	2.46	2.892	0.61
Copper (filtered)	13	0	0.252	0.304	0.31	0.39	1.2	7.08	11.8	12.4	12.88	0.37
Iron (filtered)	13	0	144	172	190	220	380	404	444	486	529.2	120
Lead (filtered)	13	0	6.0000E-4	0.0014	0.002	0.005	0.005	0.005	0.005	0.005	0.005	< 0.001
Lithium (filtered)	11	2	0.019	0.021	0.0215	0.025	0.025	0.025	0.025	0.025	0.025	0.015
Manganese (filtered)	13	0	0.392	0.404	0.41	0.5	1.3	1.36	1.4	1.44	1.488	0.31
Mercury (filtered)	13	0	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	< 0.0001
Molybdenum (filtered)	12	1	0.0025	0.0025	0.0025	0.0138	0.025	0.025	0.025	0.025	0.025	< 0.005
Nickel (filtered)	13	0	1.2	1.28	1.4	1.6	4.2	4.5	5.02	5.3	5.54	0.92
Selenium (filtered)	13	0	5.0000E-4	5.0000E-4	5.0000E-4	0.005	0.005	0.005	0.005	0.0058	0.00676	< 0.001
Silver (filtered)	11	2	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.025	0.025	< 0.005
Strontium (filtered)	9	4	2.36	2.46	2.5	2.6	2.6	2.6	2.62	2.66	2.692	2.6
Uranium (filtered)	13	0	0.0025	0.0115	0.025	0.025	0.025	0.0394	0.0498	0.0512	0.0526	< 0.005
Vanadium (filtered)	13	0	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.025	0.025	< 0.005
Zinc (filtered)	13	0	11.2	12.4	13	16	34	34.6	37.4	38.8	39.76	8.2

KPFRT03 Rehab Assessment July 2024

INORGANICS AND IONS

Baseline												5-Jun-24	Comment
General Statistics on Uncensored Full Data													
Date/Time of Computation	ProUCL 5.2 28/03/2023 6:02:28 PM												
User Selected Options													
From File	PRO UCL KPFRT03.xls												
Full Precision	OFF												
From File: PRO UCL KPFRT03.xls													
General Statistics for Uncensored Data Sets													
Variable	**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**	PP_050624_KPFRT03	
Ammonia (as N)	13	0	0.53	1.4	0.84	0.79	0.311	0.0863	0.356	0.612	0.371	0.22	
Bromide	10	3	12.5	320	161.7	125.4	92.56	29.27	94.14	0.246	0.573	< 1	
Chloride	13	0	2300	3800	3000	2957	538.5	149.4	296.5	0.537	0.18	2900	
Conductivity (at 25°C)	13	0	3200	14000	9877	9193	3127	867.3	1927	-1.275	0.317	9800	
Fluoride (Total)	13	0	0.5	1.5	0.985	0.929	0.329	0.0912	0.445	-0.155	0.334	< 0.5	
Nitrate & Nitrite (as N)	13	0	0.025	6.1	0.583	0.0881	1.665	0.462	0	3.551	2.858	0.32	
Nitrate (as N)	13	0	0.01	5.7	0.521	0.0486	1.562	0.433	0.0222	3.556	2.998	0.32	
Nitrite (as N)	13	0	0.01	0.37	0.0592	0.0266	0.1	0.0279	0.0222	2.889	1.696	< 0.02	
pH (at 25 °C)	13	0	3.1	4.8	3.977	3.948	0.49	0.136	0.445	-0.372	0.123	4.6	
Phosphate total (as P)	13	0	0.005	0.25	0.0315	0.0124	0.0668	0.0185	0.00741	3.395	2.119	< 0.01	
Phosphorus filterable reactive (as P)	13	0	0.005	0.07	0.0254	0.0162	0.0235	0.00652	0.0222	0.9	0.925	< 0.01	
Salinity (expressed as TDS)*	13	0	5	11000	6693	4070	2496	692.4	1186	-1.325	0.373	5400	
Silicon (filtered)	13	0	27	48	35.54	34.86	7.355	2.04	8.895	0.466	0.207	27	
Sulphate (as SO4)	13	0	1200	4900	2292	2080	1114	308.9	741.3	1.158	0.486	1300	
Total Kjeldahl Nitrogen (as N)	13	0	0.3	4.6	1.491	1.184	1.133	0.314	0.89	1.867	0.76	0.3	
Total Nitrogen (as N)	13	0	0.3	7.3	2.06	1.456	1.947	0.54	1.038	1.937	0.945	0.6	
Total Suspended Solids Dried at 103-105°C	13	0	2.5	47	21.11	16.85	12.52	3.471	14.83	0.459	0.593	**80**	
Percentiles for Uncensored Data Sets													
Variable	**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**		
Ammonia (as N)	13	0	0.54	0.544	0.55	0.78	1.2	1.2	1.2	1.28	1.376		
Bromide	10	3	74.15	82.6	97.25	160	200	224	284	302	316.4		
Chloride	13	0	2440	2600	2600	2800	3600	3660	3780	3800	3800		
Conductivity (at 25°C)	13	0	4960	9280	9400	11000	11000	11600	12800	13400	13880		
Fluoride (Total)	13	0	0.6	0.64	0.7	1.2	1.2	1.2	1.28	1.38	1.476		
Nitrate & Nitrite (as N)	13	0	0.025	0.025	0.025	0.025	0.2	0.224	0.504	2.782	5.436		
Nitrate (as N)	13	0	0.01	0.01	0.01	0.025	0.16	0.172	0.444	2.586	5.077		
Nitrite (as N)	13	0	0.01	0.01	0.01	0.025	0.05	0.062	0.126	0.232	0.342		
pH (at 25 °C)	13	0	3.28	3.64	3.7	4	4.3	4.36	4.4	4.56	4.752		
Phosphate total (as P)	13	0	0.005	0.005	0.005	0.01	0.02	0.02	0.044	0.13	0.226		
Phosphorus filterable reactive (as P)	13	0	0.005	0.005	0.005	0.02	0.05	0.05	0.058	0.064	0.0688		
Salinity (expressed as TDS)*	13	0	5400	5960	6200	7000	7700	7940	8660	9680	10736		
Silicon (filtered)	13	0	27.2	28	28	34	41	42.2	46.2	47.4	47.88		
Sulphate (as SO4)	13	0	1400	1400	1400	1700	3000	3120	3440	4060	4732		
Total Kjeldahl Nitrogen (as N)	13	0	0.62	0.732	0.78	1.2	1.9	1.96	2.4	3.34	4.348		
Total Nitrogen (as N)	13	0	0.62	0.78	0.9	1.3	2.47	2.488	4.18	5.68	6.976		
Total Suspended Solids Dried at 103-105°C	13	0	7.88	9.64	10	23	27	30.6	33.8	39.2	45.44		

KPFRT04 Rehab Assessment July 2024

Metals

Baseline											5-Jun-24	Comment
General Statistics on Uncensored Full Data												
Date/Time of Computation	ProUCL 5.2 28/03/2023 5:59:27 PM											
User Selected Options												
From File	PRO UCL KPFRT04.xls											
Full Precision	OFF											
From File: PRO UCL KPFRT04.xls												
General Statistics for Uncensored Data Sets												
Variable	**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**	**PP_050624_KPFRT04**
Aluminium (filtered)	12	1	0.025	0.05	0.0271	0.0265	0.00722	0.00208	0	3.464	0.266	< 0.05
Arsenic (filtered)	13	0	5.0000E-4	0.022	0.00712	0.00285	0.00831	0.00231	0.00519	1.035	1.168	0.003
Barium (filtered)	11	2	0.01	0.05	0.0264	0.0245	0.0103	0.0031	0.0148	0.907	0.39	0.03
Beryllium (filtered)	12	1	5.0000E-4	0.005	0.00163	8.8914E-4	0.00204	5.8751E-4	0	1.327	1.252	< 0.001
Boron (filtered)	10	3	0.78	1.4	1.168	1.154	0.181	0.0574	0.148	-1.031	0.155	1.2
Cadmium (filtered)	12	1	3.0000E-4	0.0016	8.6667E-4	7.8386E-4	3.7739E-4	1.0894E-4	2.9652E-4	0.311	0.435	< 0.0002
Chromium (filtered)	13	0	5.0000E-4	0.005	0.00131	7.9274E-4	0.00169	4.6869E-4	0	1.954	1.292	< 0.001
Cobalt (filtered)	12	1	0.19	0.39	0.277	0.269	0.0676	0.0195	0.0741	0.431	0.244	0.05
Copper (filtered)	13	0	0.031	0.87	0.35	0.232	0.268	0.0744	0.341	0.543	0.767	0.1
Iron (filtered)	11	2	0.025	0.6	0.205	0.101	0.217	0.0654	0.0667	0.852	1.061	0.06
Lead (filtered)	13	0	5.0000E-4	0.005	9.6154E-4	6.6406E-4	0.00128	3.5564E-4	0	3.078	1.334	< 0.001
Lithium (filtered)	10	3	0.0025	0.025	0.0054	0.00358	0.00718	0.00227	0	2.766	1.33	< 0.005
Manganese (filtered)	13	0	0.28	2.2	0.922	0.734	0.702	0.195	0.267	1.231	0.761	0.11
Mercury (filtered)	12	1	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	1.416E-20	4.086E-21	0	-1.149	N/A	< 0.0001
Molybdenum (filtered)	11	2	0.0025	0.025	0.00455	0.00308	0.00678	0.00205	0	3.317	1.492	< 0.005
Nickel (filtered)	13	0	0.2	0.55	0.374	0.36	0.105	0.0292	0.119	0.287	0.281	0.076
Selenium (filtered)	12	1	0.001	0.01	0.00475	0.00414	0.00242	6.9767E-4	0.00148	0.768	0.509	**0.014**
Silver (filtered)	9	4	0.0025	0.0025	0.0025	0.0025	0	0	0	N/A	N/A	**< 0.005**
Strontium (filtered)	10	3	1.9	2.5	2.19	2.18	0.223	0.0706	0.222	0.305	0.102	1.8
Uranium (filtered)	12	1	0.0025	0.066	0.025	0.0188	0.0182	0.00525	0.0156	1.046	0.726	0.014
Vanadium (filtered)	12	1	0.0025	0.025	0.00438	0.00303	0.0065	0.00188	0	3.464	1.485	< 0.005
Zinc (filtered)	12	1	0.013	1.8	1.158	0.82	0.504	0.146	0.222	-1.29	0.436	0.25
Percentiles for Uncensored Data Sets												
Variable	**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**	
Aluminium (filtered)	12	1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.0363	0.0473	< 0.05
Arsenic (filtered)	13	0	5.0000E-4	5.0000E-4	5.0000E-4	0.004	0.014	0.0152	0.0208	0.022	0.022	0.003
Barium (filtered)	11	2	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.048	0.03
Beryllium (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.00163	0.0041	0.005	0.005	0.005	< 0.001
Boron (filtered)	10	3	0.978	1.08	1.1	1.2	1.3	1.3	1.31	1.355	1.391	1.2
Cadmium (filtered)	12	1	4.1000E-4	5.4000E-4	6.5000E-4	9.0000E-4	0.00103	0.00108	0.00128	0.00144	0.00157	< 0.0002
Chromium (filtered)	13	0	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.0014	0.0044	0.005	0.005	< 0.001
Cobalt (filtered)	12	1	0.211	0.22	0.22	0.27	0.32	0.342	0.368	0.379	0.388	0.05
Copper (filtered)	13	0	0.0498	0.106	0.12	0.4	0.5	0.518	0.69	0.786	0.853	0.1
Iron (filtered)	11	2	0.025	0.025	0.025	0.07	0.335	0.42	0.51	0.555	0.591	0.06
Lead (filtered)	13	0	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.0017	0.0032	0.00464	< 0.001
Lithium (filtered)	10	3	0.0025	0.0025	0.0025	0.0025	0.0025	0.0038	0.0106	0.0178	0.0236	< 0.005
Manganese (filtered)	13	0	0.402	0.442	0.49	0.59	1.1	1.58	2.14	2.2	2.2	0.11
Mercury (filtered)	12	1	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	< 0.0001
Molybdenum (filtered)	11	2	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0138	0.0228	< 0.005
Nickel (filtered)	13	0	0.268	0.3	0.3	0.38	0.44	0.458	0.526	0.544	0.549	0.076
Selenium (filtered)	12	1	0.003	0.003	0.003	0.004	0.00625	0.0068	0.007	0.00835	0.00967	0.014
Silver (filtered)	9	4	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	< 0.005
Strontium (filtered)	10	3	1.99	2	2	2.15	2.375	2.42	2.5	2.5	2.5	1.8
Uranium (filtered)	12	1	0.01	0.0104	0.0115	0.0205	0.0365	0.0398	0.0428	0.0534	0.0635	0.014
Vanadium (filtered)	12	1	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0126	0.0225	< 0.005
Zinc (filtered)	12	1	0.518	0.784	1.07	1.4	1.4	1.4	1.49	1.635	1.767	0.25

Marginal by 0.004 mg/L
LOR Issue

KPFRT04 Rehab Assessment July 2024

INORGANICS AND IONS

	Baseline	5-Jun-24	Comment
	General Statistics on Uncensored Full Data		
Date/Time of Computation	ProUCL 5.2 28/03/2023 5:59:01 PM		
User Selected Options			
From File	PRO UCL KPFRT04.xls		
Full Precision	OFF		

From File: PRO UCL KPFRT04.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV	5-Jun-24
ammonia	12	1	0.005	0.17	0.0729	0.0533	0.0509	0.0147	0.0445	0.755	0.698	< 0.01
Bromide	8	5	9.4	24	17.36	16.54	5.529	1.955	7.784	-0.0588	0.318	< 1
Chloride	13	0	1800	3200	2569	2546	344.9	95.67	296.5	-0.657	0.134	2300
Conductivity (at 25°C)	13	0	3400	10000	8346	8092	1792	497.1	1334	-1.885	0.215	8200
Fluoride (Total)	12	1	0.8	1.9	1.358	1.309	0.36	0.104	0.371	-0.446	0.265	< 0.5
Nitrate & Nitrite (as N)	11	2	1	7	3.091	2.736	1.597	0.481	0.89	1.32	0.517	27
Nitrate (as N)	12	1	1	7	3.025	2.691	1.54	0.445	0.89	1.427	0.509	27
Nitrite (as N)	13	0	0.01	0.2	0.0485	0.0259	0.0596	0.0165	0.0148	1.688	1.229	< 0.02
pH (at 25 °C)	13	0	6.9	8.1	7.3	7.294	0.319	0.0884	0.148	1.312	0.0437	7.8
Phosphate total (as P)	12	1	0.005	0.03	0.0104	0.00821	0.00838	0.00242	0	1.511	0.805	< 0.01
Phosphorus filterable reactive (as P)	12	1	0.005	0.05	0.0192	0.0137	0.0153	0.00443	0.0148	0.844	0.801	< 0.01
Salinity (expressed as TDS)*	12	1	5	6800	4817	2896	1760	508.2	667.2	-2.124	0.365	3800
Silicon (filtered)	13	0	4	22	17.46	16.42	4.521	1.254	2.965	-2.391	0.259	22
Sulphate (as SO4)	13	0	680	1300	966.9	946.8	210.3	58.32	118.6	0.601	0.217	910
Total Kjeldahl Nitrogen (as N)	12	1	0.1	1.6	0.517	0.341	0.447	0.129	0.445	1.218	0.865	1.2
Total Nitrogen (as N)	12	1	1	12.4	4.3	3.518	3.099	0.895	1.853	1.851	0.721	**28**
Total Suspended Solids Dried at 103-105°C	12	1	2.5	66	19.5	13.92	17.2	4.966	11.27	1.958	0.882	32

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile	
ammonia	12	1	0.021	0.034	0.045	0.06	0.0975	0.114	0.147	0.159	0.168	< 0.01
Bromide	8	5	11.57	12.7	12.88	17	23	23	23.3	23.65	23.93	< 1
Chloride	13	0	2160	2440	2500	2600	2800	2800	2800	2960	3152	2300
Conductivity (at 25°C)	13	0	7200	7360	7600	9100	9500	9500	9900	10000	10000	8200
Fluoride (Total)	12	1	0.81	0.98	1.2	1.4	1.625	1.68	1.7	1.79	1.878	< 0.5
Nitrate & Nitrite (as N)	11	2	1.3	2	2.25	3.3	3.45	3.5	3.9	5.45	6.69	27
Nitrate (as N)	12	1	1.28	2.06	2.225	3	3.35	3.46	3.86	5.295	6.659	27
Nitrite (as N)	13	0	0.01	0.01	0.01	0.02	0.08	0.092	0.116	0.152	0.19	< 0.02
pH (at 25 °C)	13	0	6.94	7.1	7.1	7.3	7.3	7.36	7.64	7.86	8.052	7.8
Phosphate total (as P)	12	1	0.005	0.005	0.005	0.005	0.0125	0.018	0.02	0.0245	0.0289	< 0.01
Phosphorus filterable reactive (as P)	12	1	0.005	0.005	0.005	0.015	0.03	0.03	0.039	0.0445	0.0489	< 0.01
Salinity (expressed as TDS)*	12	1	3180	4840	4950	5150	5625	5680	5970	6360	6712	3800
Silicon (filtered)	13	0	16	16	16	18	20	20.6	21	21.4	21.88	22
Sulphate (as SO4)	13	0	762	822	840	890	1200	1200	1280	1300	1300	910
Total Kjeldahl Nitrogen (as N)	12	1	0.1	0.1	0.1	0.55	0.7	0.7	0.79	1.16	1.512	1.2
Total Nitrogen (as N)	12	1	2.01	2.16	2.325	3.5	4.525	5.24	7.48	9.815	11.88	28
Total Suspended Solids Dried at 103-105°C	12	1	4.21	9.24	10.45	14	25.5	28.8	30	46.2	62.04	32

KPFRT06 Rehab Assessment July 2024

Metals

Baseline

General Statistics on Uncensored Full Data

Date/Time of Computation ProUCL 5.2 28/03/2023 5:48:27 PM

User Selected Options

From File PRO UCL KPFRT06.xls

Full Precision OFF

From File: PRO UCL KPFRT06.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
Aluminium (filtered)	16	0	30	83	46.88	44.53	16.26	4.066	15.57	0.992	0.347
Arsenic (filtered)	16	0	0.01	0.046	0.0238	0.0215	0.011	0.00275	0.0111	0.705	0.462
Barium (filtered)	15	1	0.01	0.1	0.0813	0.0692	0.0331	0.00856	0	-1.412	0.407
Beryllium (filtered)	15	1	0.002	0.005	0.00453	0.00439	9.9043E-4	2.5573E-4	0	-1.887	0.218
Boron (filtered)	14	2	1.9	2.9	2.379	2.367	0.246	0.0656	0.148	-0.112	0.103
Cadmium (filtered)	15	1	0.02	0.05	0.034	0.0327	0.0093	0.0024	0.0089	-0.285	0.274
Chromium (filtered)	15	1	0.003	0.16	0.0332	0.018	0.04	0.0103	0.0282	2.476	1.204
Cobalt (filtered)	16	0	2.3	4.8	3.781	3.667	0.893	0.223	0.593	-0.757	0.236
Copper (filtered)	16	0	130	270	184.4	180.8	38.12	9.529	44.48	0.489	0.207
Iron (filtered)	14	2	410	580	490.7	488.5	48.11	12.86	44.48	0.0455	0.098
Lead (filtered)	14	2	0.007	0.032	0.0179	0.0156	0.00924	0.00247	0.0119	0.205	0.515
Lithium (filtered)	14	2	0.025	0.05	0.0306	0.0294	0.00965	0.00258	0	1.419	0.316
Manganese (filtered)	16	0	1.3	5	2.913	2.735	1.017	0.254	0.815	0.296	0.349
Mercury (filtered)	16	0	5.0000E-5	5.0000E-4	3.3125E-4	2.1085E-4	2.2500E-4	5.6250E-5	0	-0.571	0.679
Molybdenum (filtered)	13	3	0.0025	0.025	0.0181	0.0123	0.0108	0.003	0	-0.946	0.598
Nickel (filtered)	15	1	5.8	7.9	6.707	6.674	0.688	0.178	0.741	0.376	0.103
Selenium (filtered)	15	1	5.0000E-4	0.016	0.0077	0.00576	0.00524	0.00135	0	0.571	0.68
Silver (filtered)	14	2	0.0025	0.025	0.0218	0.018	0.00817	0.00218	0	-2.295	0.375
Strontium (filtered)	14	2	2.8	6	4.393	4.277	1.011	0.27	0.593	-0.154	0.23
Uranium (filtered)	15	1	0.093	0.26	0.15	0.143	0.0518	0.0134	0.0593	0.781	0.344
Vanadium (filtered)	16	0	0.0025	0.05	0.0211	0.0133	0.0154	0.00384	0	0.351	0.728
Zinc (filtered)	16	0	27	52	40.25	39.74	6.434	1.609	7.413	-0.309	0.16

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Aluminium (filtered)	16	0	31	34	34	44.5	52.75	64	69.5	73.25	81.05
Arsenic (filtered)	16	0	0.0125	0.014	0.0148	0.02	0.031	0.031	0.0375	0.0438	0.0456
Barium (filtered)	15	1	0.028	0.048	0.075	0.1	0.1	0.1	0.1	0.1	0.1
Beryllium (filtered)	15	1	0.003	0.0046	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron (filtered)	14	2	2.06	2.26	2.3	2.45	2.5	2.5	2.5	2.64	2.848
Cadmium (filtered)	15	1	0.021	0.0218	0.027	0.035	0.0405	0.0412	0.0426	0.0451	0.049
Chromium (filtered)	15	1	0.005	0.005	0.005	0.024	0.048	0.0492	0.05	0.083	0.145
Cobalt (filtered)	16	0	2.4	2.5	3.25	4.05	4.3	4.3	4.8	4.8	4.8
Copper (filtered)	16	0	140	150	157.5	190	205	220	220	232.5	262.5
Iron (filtered)	14	2	433	446	455	500	517.5	524	544	560.5	576.1
Lead (filtered)	14	2	0.0083	0.0096	0.01	0.016	0.025	0.0266	0.029	0.0301	0.0316
Lithium (filtered)	14	2	0.025	0.025	0.025	0.025	0.0348	0.0388	0.047	0.05	0.05
Manganese (filtered)	16	0	1.75	2.3	2.3	2.65	3.55	4	4.05	4.325	4.865
Mercury (filtered)	16	0	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4
Molybdenum (filtered)	13	3	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.025	0.025
Nickel (filtered)	15	1	5.9	5.98	6.1	6.7	7	7.12	7.72	7.83	7.886
Selenium (filtered)	15	1	0.0032	0.005	0.005	0.005	0.014	0.014	0.0146	0.0153	0.0159
Silver (filtered)	14	2	0.00925	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Strontium (filtered)	14	2	2.93	3.42	3.8	4.65	4.85	4.9	5.67	6	6
Uranium (filtered)	15	1	0.0968	0.0996	0.105	0.14	0.175	0.188	0.22	0.232	0.254
Vanadium (filtered)	16	0	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.0375	0.05	0.05
Zinc (filtered)	16	0	32	37	37.75	39.5	45.25	46	46.5	48.25	51.25

5-Jun-24	Comment
PP_050624_KPFRT06	
41	
0.016	
< 0.2	LOR Issue
< 0.01	LOR Issue
< 5	LOR Issue
0.032	
0.19	
3.7	
220	
380	
0.02	
< 0.05	
2.2	
< 0.001	
< 0.05	LOR Issue
6	
< 0.01	
< 0.05	LOR Issue
4.6	
0.11	
< 0.05	
37	
41	
0.016	
< 0.2	
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0.032	
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220	
380	
0.02	
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< 0.001	
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< 0.01	
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4.6	
0.11	
< 0.05	
37	

KPFRT06 Rehab Assessment July 2024

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Baseline	5-Jun-24	Comment
General Statistics on Uncensored Full Data		
Date/Time of Computation: ProUCL 5.2 28/03/2023 5:48:02 PM		
User Selected Options		
From File: PRO UCL KPFRT06.xls		
Full Precision: OFF		
From File: PRO UCL KPFRT06.xls		
General Statistics for Uncensored Data Sets		

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV	PP_050624_KPFRT06
Ammonia (as N)	16	0	1.6	4.1	3.219	3.127	0.7	0.175	0.371	-1.375	0.217	0.33
Bromide	11	5	2.8	230	87.3	39.04	90.78	27.37	24.02	0.567	1.04	2.2
Chloride	16	0	2300	3300	2838	2824	287.2	71.81	296.5	-0.161	0.101	3000
Conductivity (at 25°C)	16	0	3400	15000	11900	11454	2514	628.5	1483	-2.736	0.211	12000
Fluoride (Total)	14	2	0.25	2.5	1.546	1.205	0.803	0.215	0.667	-0.729	0.519	2.1
Nitrate & Nitrite (as N)	14	2	0.75	7.1	2.104	1.718	1.695	0.453	0.445	2.308	0.806	< 0.05
Nitrate (as N)	15	1	0.58	4	1.446	1.244	0.936	0.242	0.504	1.918	0.647	< 0.02
Nitrite (as N)	15	1	0.01	0.21	0.0893	0.0581	0.0666	0.0172	0.0741	0.232	0.745	3.37
pH (at 25 °C)	16	0	3.4	4.4	3.831	3.822	0.282	0.0705	0.222	0.449	0.0737	3.9
Phosphate total (as P)	15	1	0.005	0.1	0.043	0.0341	0.0263	0.00679	0.0297	0.64	0.612	0.05
Phosphorus filterable reactive (as P)	15	1	0.005	0.33	0.0583	0.0232	0.0868	0.0224	0.0371	2.507	1.487	< 0.01
Salinity (expressed as TDS)*	14	2	5	12000	8786	5449	2959	790.7	2224	-2.139	0.337	7600
Silicon (filtered)	16	0	19	75	56.69	54.74	12.54	3.134	8.895	-1.712	0.221	55
Sulphate (as SO4)	16	0	3100	5700	4319	4279	610.2	152.5	593	0.397	0.141	4100
Total Kjeldahl Nitrogen (as N)	16	0	1.5	5.3	4.296	4.158	0.911	0.228	0.638	-2.039	0.212	3.7
Total Nitrogen (as N)	16	0	4.45	11.2	6.334	6.137	1.777	0.444	1.483	1.557	0.28	3.7
Total Suspended Solids Dried at 103-105°C	14	2	5.4	84	39.46	29.94	26.21	7.006	28.17	0.493	0.664	70

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Ammonia (as N)	16	0	2.15	3	3.075	3.45	3.625	3.7	3.75	3.875	4.055
Bromide	11	5	12	12.5	14.75	19	170	180	210	220	228
Chloride	16	0	2500	2600	2675	2800	3025	3100	3200	3225	3285
Conductivity (at 25°C)	16	0	11000	11000	11750	12000	13000	13000	13500	14250	14850
Fluoride (Total)	14	2	0.25	0.88	1.3	1.75	2.1	2.14	2.34	2.435	2.487
Nitrate & Nitrite (as N)	14	2	1.1	1.1	1.125	1.4	2.175	2.66	3.76	5.085	6.697
Nitrate (as N)	15	1	0.624	0.846	0.93	1.3	1.5	1.62	2.54	3.37	3.874
Nitrite (as N)	15	1	0.01	0.018	0.03	0.09	0.14	0.142	0.162	0.182	0.204
pH (at 25 °C)	16	0	3.5	3.6	3.675	3.8	3.95	4.1	4.2	4.25	4.37
Phosphate total (as P)	15	1	0.014	0.02	0.025	0.04	0.055	0.062	0.076	0.086	0.0972
Phosphorus filterable reactive (as P)	15	1	0.005	0.005	0.005	0.03	0.075	0.084	0.13	0.204	0.305
Salinity (expressed as TDS)*	14	2	7010	7740	7900	9500	10750	11000	11000	11350	11870
Silicon (filtered)	16	0	49	52	52.75	57.5	64.5	66	68	69.75	73.95
Sulphate (as SO4)	16	0	3850	3900	3900	4300	4575	4800	5000	5250	5610
Total Kjeldahl Nitrogen (as N)	16	0	3.65	3.7	3.955	4.5	4.9	4.9	5	5.075	5.255
Total Nitrogen (as N)	16	0	4.75	4.8	4.95	5.95	6.7	7	8.45	9.4	10.84
Total Suspended Solids Dried at 103-105°C	14	2	9.5	14.2	17.5	34.5	52.25	59.4	79.5	84	84

KPMON01 Rehab Assessment July 2024

Metals

Baseline												5-Jun-24	Comment
General Statistics on Uncensored Full Data													
Date/Time of Computation	ProUCL 5.2 28/03/2023 5:44:05 PM												
User Selected Options													
From File	PRO UCL KPMON01.xls												
Full Precision	OFF												
From File: PRO UCL KPMON01.xls													
General Statistics for Uncensored Data Sets													
Variable	**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**	**PP_050624_KPMON01**	
Aluminium (filtered)	12	1	0.025	0.25	0.0525	0.0347	0.0691	0.02	0	2.628	1.317	< 0.05	
Arsenic (filtered)	12	1	0.002	0.015	0.00675	0.00568	0.00384	0.00111	0.00371	0.633	0.569	< 0.001	
Barium (filtered)	11	2	0.05	0.15	0.0782	0.0747	0.0275	0.00829	0.0148	1.994	0.352	0.05	
Beryllium (filtered)	12	1	5.0000E-4	0.005	8.7500E-4	6.0576E-4	0.0013	3.7500E-4	0	3.464	1.485	< 0.001	
Boron (filtered)	11	2	0.51	2.5	0.974	0.891	0.532	0.16	0.267	2.753	0.547	1	
Cadmium (filtered)	12	1	1.0000E-4	0.001	1.7500E-4	1.2115E-4	2.5981E-4	7.5000E-5	0	3.464	1.485	< 0.0002	
Chromium (filtered)	12	1	5.0000E-4	0.012	0.00204	9.9464E-4	0.00339	9.7983E-4	0	2.749	1.662	< 0.001	
Cobalt (filtered)	12	1	5.0000E-4	0.008	0.00233	0.00143	0.00244	7.0532E-4	7.4129E-4	1.409	1.047	0.002	
Copper (filtered)	12	1	5.0000E-4	0.052	0.0161	0.00708	0.0177	0.00511	0.0122	1.211	1.101	0.018	
Iron (filtered)	12	1	0.025	0.25	0.0763	0.05	0.0777	0.0224	0	1.397	1.019	< 0.05	
Lead (filtered)	12	1	5.0000E-4	0.013	0.00192	7.9473E-4	0.00372	0.00107	0	2.882	1.942	< 0.001	
Lithium (filtered)	10	3	0.017	0.11	0.0597	0.0548	0.0233	0.00738	0.0111	0.49	0.391	0.022	
Manganese (filtered)	12	1	0.0025	0.046	0.0256	0.0216	0.0115	0.00331	0.0104	-0.297	0.448	0.055	
Mercury (filtered)	12	1	5.0000E-5	5.0000E-4	8.7500E-5	6.0576E-5	1.2990E-4	3.7500E-5	0	3.464	1.485	< 0.0001	
Molybdenum (filtered)	11	2	0.0025	0.025	0.00895	0.00779	0.00573	0.00173	0.00148	2.475	0.64	0.006	
Nickel (filtered)	12	1	5.0000E-4	0.016	0.00638	0.00445	0.00528	0.00152	0.00297	1.087	0.828	0.003	
Selenium (filtered)	12	1	5.0000E-4	0.007	0.00292	0.0015	0.00298	8.5907E-4	3.7064E-4	0.541	1.02	< 0.001	
Silver (filtered)	10	3	0.0025	0.025	0.00475	0.00315	0.00712	0.00225	0	3.162	1.498	< 0.005	
Strontium (filtered)	10	3	1.4	2.5	1.77	1.746	0.32	0.101	0.222	1.257	0.181	2.1	
Uranium (filtered)	12	1	0.0025	0.045	0.0192	0.0146	0.0142	0.0041	0.00519	0.937	0.74	< 0.005	
Vanadium (filtered)	12	1	0.0025	0.025	0.00496	0.0035	0.00647	0.00187	0	3.195	1.305	< 0.005	
Zinc (filtered)	12	1	0.0025	1.1	0.11	0.0219	0.312	0.0901	0.0104	3.453	2.847	0.023	
Percentiles for Uncensored Data Sets													
Variable	**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**		
Aluminium (filtered)	12	1	0.025	0.025	0.025	0.025	0.025	0.025	0.12	0.184	0.237	< 0.05	
Arsenic (filtered)	12	1	0.0021	0.0032	0.00375	0.007	0.009	0.009	0.0099	0.0123	0.0145	< 0.001	
Barium (filtered)	11	2	0.06	0.06	0.06	0.07	0.08	0.08	0.1	0.125	0.145	0.05	
Beryllium (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.00253	0.00451	< 0.001	
Boron (filtered)	11	2	0.72	0.74	0.74	0.76	0.975	1	1.1	1.8	2.36	1	
Cadmium (filtered)	12	1	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	5.0500E-4	9.0100E-4	< 0.0002	
Chromium (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.00125	0.0018	0.0047	0.00815	0.0112	< 0.001	
Cobalt (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	0.001	0.0035	0.0046	0.005	0.00635	0.00767	0.002	
Copper (filtered)	12	1	6.5000E-4	0.0022	0.00275	0.0095	0.0225	0.028	0.0444	0.0487	0.0513	0.018	
Iron (filtered)	12	1	0.025	0.025	0.025	0.025	0.1	0.144	0.178	0.212	0.242	< 0.05	
Lead (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.00455	0.0086	0.0121	< 0.001	
Lithium (filtered)	10	3	0.0395	0.0508	0.0535	0.06	0.0668	0.0682	0.0731	0.0916	0.106	0.022	
Manganese (filtered)	12	1	0.0135	0.0186	0.0203	0.0265	0.0315	0.0348	0.036	0.0405	0.0449	0.055	
Mercury (filtered)	12	1	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	2.5250E-4	4.5050E-4	< 0.0001	
Molybdenum (filtered)	11	2	0.006	0.006	0.0065	0.008	0.0085	0.009	0.011	0.018	0.0236	0.006	
Nickel (filtered)	12	1	0.0021	0.003	0.003	0.0045	0.00875	0.0104	0.0155	0.016	0.016	0.003	
Selenium (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	7.5000E-4	0.0055	0.0066	0.007	0.007	0.007	< 0.001	
Silver (filtered)	10	3	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.00475	0.0149	0.023	< 0.005	
Strontium (filtered)	10	3	1.4	1.56	1.625	1.7	1.875	1.92	2.05	2.275	2.455	2.1	
Uranium (filtered)	12	1	0.0082	0.0102	0.0108	0.0125	0.028	0.0346	0.0406	0.0428	0.0446	< 0.005	
Vanadium (filtered)	12	1	0.0025	0.0025	0.0025	0.0025	0.00313	0.0045	0.0068	0.0151	0.023	< 0.005	
Zinc (filtered)	12	1	0.0081	0.0098	0.012	0.0195	0.0255	0.0266	0.0504	0.524	0.985	0.023	

KPMON01 Rehab Assessment July 2024

INORGANICS AND IONS

Baseline

General Statistics on Uncensored Full Data

Date/Time of Computation: ProUCL 5.2 28/03/2023 5:43:38 PM

User Selected Options

From File: PRO UCL KPMON01.xls

Full Precision: OFF

From File: PRO UCL KPMON01.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
Ammonia	12	1	0.005	0.96	0.402	0.222	0.286	0.0824	0.2	0.128	0.71
Bromide	10	3	5	12.5	7.68	7.276	2.674	0.845	3.262	0.492	0.348
Chloride	12	1	1500	2200	1883	1874	189.9	54.82	74.13	-0.575	0.101
Conductivity (at 25°C)	12	1	3100	7400	6300	6160	1202	347.1	889.5	-1.9	0.191
Fluoride (Total)	12	1	0.8	1.5	1.1	1.082	0.209	0.0603	0.222	0.503	0.19
Nitrate & Nitrite (as N)	12	1	0.025	19	1.787	0.123	5.43	1.567	0.0259	3.443	3.039
Nitrate (as N)	12	1	0.01	19	1.714	0.0835	5.449	1.573	0.0593	3.453	3.179
Nitrite (as N)	12	1	0.01	0.96	0.108	0.026	0.27	0.0781	0	3.366	2.496
pH (at 25 °C)	12	1	7.2	8.1	7.692	7.687	0.281	0.0811	0.297	-0.134	0.0365
Phosphate total (as P)	12	1	0.005	0.25	0.0629	0.0394	0.0669	0.0193	0.0371	2.239	1.063
Phosphorus filterable reactive (as P)	12	1	0.005	0.27	0.045	0.0193	0.0751	0.0217	0.0222	2.873	1.668
Salinity (expressed as TDS)*	12	1	5	5400	3225	1919	1458	421	296.5	-1.146	0.452
Silicon (filtered)	12	1	10	17	14.58	14.41	2.234	0.645	2.965	-0.719	0.153
Sulphate (as SO4)	12	1	450	640	543.3	540.6	56.78	16.39	66.72	-0.0197	0.105
Total Kjeldahl Nitrogen (as N)	12	1	0.1	42	4.205	0.912	11.91	3.438	0.4	3.458	2.832
Total Nitrogen (as N)	12	1	0.4	42.84	5.981	1.497	12.86	3.712	0.415	2.645	2.15
Total Suspended Solids Dried at 103-105°C	12	1	1.4	19	8.633	6.11	6.544	1.889	6.523	0.414	0.758

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Ammonia	12	1	0.041	0.074	0.14	0.445	0.56	0.56	0.596	0.762	0.92
Bromide	10	3	5	5.24	5.375	7.25	9.55	9.66	10.16	11.33	12.27
Chloride	12	1	1620	1820	1875	1900	1925	1980	2090	2145	2189
Conductivity (at 25°C)	12	1	5270	5920	5975	6700	7050	7160	7380	7400	7400
Fluoride (Total)	12	1	0.9	0.9	0.9	1.1	1.2	1.2	1.38	1.445	1.489
Nitrate & Nitrite (as N)	12	1	0.025	0.025	0.025	0.0425	0.465	0.74	0.876	9.034	17.01
Nitrate (as N)	12	1	0.01	0.014	0.025	0.05	0.205	0.304	0.772	9.001	17
Nitrite (as N)	12	1	0.01	0.01	0.01	0.01	0.0625	0.09	0.1	0.487	0.865
pH (at 25 °C)	12	1	7.41	7.5	7.5	7.7	7.925	7.98	8	8.045	8.089
Phosphate total (as P)	12	1	0.011	0.02	0.02	0.045	0.075	0.086	0.108	0.173	0.235
Phosphorus filterable reactive (as P)	12	1	0.005	0.005	0.005	0.02	0.035	0.046	0.086	0.171	0.25
Salinity (expressed as TDS)*	12	1	1200	2380	3150	3700	3900	3900	3990	4630	5246
Silicon (filtered)	12	1	12.1	13	13	15	16.25	16.8	17	17	17
Sulphate (as SO4)	12	1	473	502	507.5	540	590	590	599	618	635.6
Total Kjeldahl Nitrogen (as N)	12	1	0.416	0.568	0.59	0.75	1.1	1.1	1.55	19.78	37.56
Total Nitrogen (as N)	12	1	0.564	0.64	0.75	0.92	1.27	1.512	18.25	30.33	40.34
Total Suspended Solids Dried at 103-105°C	12	1	1.96	2.5	2.5	6.05	14.5	15.6	16.9	17.9	18.78

5-Jun-24	Comment
0.3	
< 1	
2200	
7100	
< 0.5	
0.14	
0.14	
< 0.02	
7.9	
0.13	
0.11	
2700	
20	
570	
0.4	
0.5	
8	

KPMON02 Rehab Assessment July 2024

Metals

Baseline	5-Jun-24	Comment

General Statistics on Uncensored Full Data

Date/Time of Computation ProUCL 5.2 28/03/2023 5:40:11 PM

User Selected Options

From File PRO UCL KPMON02.xls

Full Precision OFF

From File: PRO UCL KPMON02.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV	PP_050624_KPMON02
Aluminium (filtered)	11	2	0.025	0.09	0.035	0.0308	0.0227	0.00684	0	2.094	0.648	< 0.05
Arsenic (filtered)	12	1	5.0000E-4	0.005	0.00271	0.00222	0.00154	4.4576E-4	0.00222	0.196	0.57	< 0.001
Barium (filtered)	11	2	0.06	0.1	0.0736	0.0725	0.0143	0.00432	0.0148	1.206	0.195	0.05
Beryllium (filtered)	11	2	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	1.137E-19	3.429E-20	0	-1.165	N/A	< 0.001
Boron (filtered)	10	3	0.54	1.1	0.848	0.832	0.167	0.0527	0.156	-0.444	0.197	1.3
Cadmium (filtered)	11	2	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	2.843E-20	8.571E-21	0	-1.165	N/A	< 0.0002
Chromium (filtered)	12	1	5.0000E-4	0.005	0.00142	9.0762E-4	0.00156	4.5157E-4	0	1.638	1.104	< 0.001
Cobalt (filtered)	12	1	5.0000E-4	0.012	0.00442	0.00271	0.00391	0.00113	0.00334	0.737	0.886	0.008
Copper (filtered)	12	1	5.0000E-4	0.028	0.0102	0.00711	0.00803	0.00232	0.00371	1.115	0.787	0.002
Iron (filtered)	11	2	0.025	0.57	0.133	0.0575	0.199	0.0599	0	1.807	1.493	0.8
Lead (filtered)	11	2	5.0000E-4	0.002	6.3636E-4	5.6716E-4	4.5227E-4	1.3636E-4	0	3.317	0.711	< 0.001
Lithium (filtered)	9	4	0.051	0.079	0.0659	0.0652	0.00977	0.00326	0.0133	-0.185	0.148	0.022
Manganese (filtered)	12	1	0.0025	0.25	0.156	0.102	0.0841	0.0243	0.0445	-1.031	0.539	0.45
Mercury (filtered)	12	1	5.0000E-5	5.0000E-4	8.7500E-5	6.0576E-5	1.2990E-4	3.7500E-5	0	3.464	1.485	< 0.0001
Molybdenum (filtered)	10	3	0.0025	0.009	0.00365	0.00326	0.00215	6.7926E-4	0	2.066	0.588	< 0.005
Nickel (filtered)	12	1	5.0000E-4	0.019	0.00671	0.00425	0.00606	0.00175	0.00371	1.057	0.904	0.002
Selenium (filtered)	12	1	5.0000E-4	0.008	0.002	9.9464E-4	0.0027	7.7850E-4	0	1.552	1.348	< 0.001
Silver (filtered)	9	4	0.0025	0.0025	0.0025	0.0025	0	0	0	N/A	N/A	< 0.005
Strontium (filtered)	10	3	1.2	1.9	1.47	1.456	0.221	0.07	0.148	1.088	0.151	1.8
Uranium (filtered)	11	2	0.016	0.09	0.0391	0.0345	0.0224	0.00675	0.0104	1.436	0.573	0.038
Vanadium (filtered)	11	2	0.0025	0.006	0.00282	0.00271	0.00106	3.1818E-4	0	3.317	0.374	< 0.005
Zinc (filtered)	11	2	0.007	0.063	0.0323	0.0274	0.017	0.00514	0.0193	0.234	0.528	< 0.005

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Aluminium (filtered)	11	2	0.025	0.025	0.025	0.025	0.025	0.025	0.07	0.08	0.088
Arsenic (filtered)	12	1	0.001	0.0012	0.00175	0.0025	0.004	0.004	0.0049	0.005	0.005
Barium (filtered)	11	2	0.06	0.06	0.065	0.07	0.075	0.08	0.1	0.1	0.1
Beryllium (filtered)	11	2	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4
Boron (filtered)	10	3	0.639	0.754	0.788	0.855	0.968	0.992	1.01	1.055	1.091
Cadmium (filtered)	11	2	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Chromium (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.002	0.002	0.0038	0.00445	0.00489
Cobalt (filtered)	12	1	5.5000E-4	0.001	0.001	0.003	0.008	0.008	0.0089	0.0104	0.0117
Copper (filtered)	12	1	0.0041	0.0052	0.00575	0.006	0.0158	0.0174	0.0189	0.0231	0.027
Iron (filtered)	11	2	0.025	0.025	0.025	0.025	0.12	0.15	0.48	0.525	0.561
Lead (filtered)	11	2	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.00125	0.00185
Lithium (filtered)	9	4	0.0542	0.0568	0.058	0.067	0.073	0.0746	0.0774	0.0782	0.0788
Manganese (filtered)	12	1	0.026	0.0652	0.124	0.19	0.203	0.208	0.228	0.239	0.248
Mercury (filtered)	12	1	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	2.5250E-4	4.5050E-4
Molybdenum (filtered)	10	3	0.0025	0.0025	0.0025	0.0025	0.00438	0.005	0.0054	0.0072	0.00864
Nickel (filtered)	12	1	0.0011	0.0022	0.00275	0.0045	0.00875	0.0126	0.0149	0.0168	0.0186
Selenium (filtered)	12	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.002	0.0042	0.0059	0.0069	0.00778
Silver (filtered)	9	4	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Strontium (filtered)	10	3	1.29	1.3	1.325	1.4	1.5	1.56	1.81	1.855	1.891
Uranium (filtered)	11	2	0.024	0.024	0.0245	0.031	0.0465	0.056	0.066	0.078	0.0876
Vanadium (filtered)	11	2	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.00425	0.00565
Zinc (filtered)	11	2	0.014	0.015	0.0185	0.035	0.0405	0.041	0.052	0.0575	0.0619

KPMON02 Rehab Assessment July 2024

INORGANICS AND IONS

Baseline

General Statistics on Uncensored Full Data

Date/Time of Computation: ProUCL 5.2 28/03/2023 5:39:49 PM

User Selected Options

From File: PRO UCL KPMON02.xls

Full Precision: OFF

From File: PRO UCL KPMON02.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
Ammonia (as N)	11	2	0.47	1.1	0.77	0.754	0.165	0.0497	0.119	0.375	0.214
Bromide	11	2	5	12.5	7.336	6.898	2.803	0.845	0.89	0.805	0.382
Chloride	12	1	1700	2700	2033	2014	302.5	87.33	222.4	1.272	0.149
Conductivity (at 25°C)	12	1	3900	8800	6742	6607	1307	377.3	889.5	-0.863	0.194
Fluoride (Total)	12	1	0.9	1.8	1.392	1.368	0.261	0.0753	0.222	-0.149	0.188
Nitrate & Nitrite (as N)	11	2	0.025	6	1.16	0.246	1.935	0.583	0.215	2.015	1.669
Nitrate (as N)	12	1	0.01	3.6	0.572	0.133	1.058	0.305	0.126	2.527	1.85
Nitrite (as N)	11	2	0.01	3.4	0.325	0.0223	1.02	0.308	0	3.315	3.143
pH (at 25 °C)	12	1	7.5	8.3	7.875	7.871	0.256	0.074	0.222	-0.017	0.0325
Phosphate total (as P)	11	2	0.005	0.05	0.0168	0.0136	0.0131	0.00395	0	1.925	0.778
Phosphorus filterable reactive (as P)	11	2	0.005	0.11	0.0255	0.0149	0.0313	0.00943	0.0222	2.324	1.228
Salinity (expressed as TDS)*	12	1	5	4900	3284	1974	1409	406.6	518.9	-1.458	0.429
Silicon (filtered)	11	2	2.5	13	6.673	5.834	3.541	1.068	2.52	0.703	0.531
Sulphate (as SO4)	12	1	460	660	561.7	559.5	51.32	14.81	44.48	-0.0718	0.0914
Total Kjeldahl Nitrogen (as N)	11	2	0.67	2.7	1.561	1.416	0.697	0.21	0.741	0.316	0.447
Total Nitrogen (as N)	12	1	0.76	8.3	3.329	2.482	2.567	0.741	1.875	0.861	0.771
Total Suspended Solids Dried at 103-105°C	12	1	2.5	31	14.68	12.04	8.933	2.579	6.449	0.63	0.608

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Ammonia (as N)	11	2	0.67	0.67	0.69	0.75	0.835	0.9	0.94	1.02	1.084
Bromide	11	2	5	5	5	5.6	9.55	9.6	11	11.75	12.35
Chloride	12	1	1800	1800	1800	1950	2125	2180	2470	2590	2678
Conductivity (at 25°C)	12	1	5050	6440	6550	6700	7575	7740	7800	8250	8690
Fluoride (Total)	12	1	1.11	1.22	1.275	1.4	1.55	1.66	1.7	1.745	1.789
Nitrate & Nitrite (as N)	11	2	0.025	0.025	0.0575	0.17	1.25	1.4	3.6	4.8	5.76
Nitrate (as N)	12	1	0.012	0.034	0.045	0.125	0.41	0.916	1.37	2.39	3.358
Nitrite (as N)	11	2	0.01	0.01	0.01	0.01	0.025	0.04	0.05	1.725	3.065
pH (at 25 °C)	12	1	7.51	7.64	7.75	7.9	8.025	8.08	8.19	8.245	8.289
Phosphate total (as P)	11	2	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.048
Phosphorus filterable reactive (as P)	11	2	0.005	0.005	0.005	0.02	0.025	0.03	0.05	0.08	0.104
Salinity (expressed as TDS)*	12	1	1390	2480	3250	3700	4025	4080	4370	4625	4845
Silicon (filtered)	11	2	2.5	3.9	4.5	5.6	8.45	9.6	12	12.5	12.9
Sulphate (as SO4)	12	1	512	532	537.5	560	592.5	598	609	632.5	654.5
Total Kjeldahl Nitrogen (as N)	11	2	0.8	0.9	1	1.3	2.2	2.3	2.3	2.5	2.66
Total Nitrogen (as N)	12	1	0.847	1.276	1.293	2.3	5.25	6.02	6.597	7.382	8.116
Total Suspended Solids Dried at 103-105°C	12	1	6.87	7.92	9.075	11.5	22	24.2	25.9	28.25	30.45

5-Jun-24
PP_050624_KPMON02
0.18
< 1
2400
7800
< 0.5
< 0.05
0.04
< 0.02
7.2
< 0.01
< 0.01
3500
8.2
700
< 0.2
< 0.2
110
0.18
< 1
2400
7800
< 0.5
< 0.05
0.04
< 0.02
7.2
< 0.01
< 0.01
3500
8.2
700
< 0.2
< 0.2
110

Comment

KPMON03 Rehab Assessment July 2024

Metals

Baseline											5-Jun-24	Comment
General Statistics on Uncensored Full Data												
Date/Time of Computation	ProUCL 5.2 28/03/2023 5:37:13 PM											
User Selected Options												
From File	PRO UCL KPMON03.xls											
Full Precision	OFF											
From File: PRO UCL KPMON03.xls												
General Statistics for Uncensored Data Sets												
Variable	**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**	PP_050624_KPMON03	
Aluminium (filtered)	12	2	0.05	0.68	0.222	0.183	0.161	0.0465	0.089	2.271	0.727	< 0.5	
Arsenic (filtered)	12	2	0.004	0.06	0.0182	0.0123	0.0173	0.00499	0.0104	1.504	0.952	0.018	
Barium (filtered)	13	1	0.04	0.1	0.0723	0.0677	0.0268	0.00744	0.0148	0.138	0.371	< 0.2	LOR Issue
Beryllium (filtered)	13	1	5.0000E-4	0.005	0.00258	0.00145	0.00233	6.4759E-4	0	0.175	0.906	< 0.01	LOR Issue
Boron (filtered)	12	2	1.3	2.5	1.925	1.885	0.414	0.119	0.297	0.434	0.215	< 5	LOR Issue
Cadmium (filtered)	12	2	1.0000E-4	0.003	0.00163	0.00125	8.7939E-4	2.5386E-4	8.1542E-4	-0.353	0.538	< 0.0002	
Chromium (filtered)	13	1	5.0000E-4	0.005	0.00227	0.00128	0.00225	6.2433E-4	0	0.527	0.992	< 0.01	LOR Issue
Cobalt (filtered)	12	2	1.2	2.6	1.492	1.453	0.401	0.116	0.297	2.184	0.269	2.2	
Copper (filtered)	13	1	0.011	10	4.045	1.862	3.221	0.893	2.669	0.536	0.796	< 0.01	
Iron (filtered)	11	3	300	630	404.5	393.6	105.5	31.81	88.95	1.307	0.261	710	
Lead (filtered)	13	1	5.0000E-4	0.012	0.00346	0.00185	0.00341	9.4642E-4	0.00667	1.211	0.986	< 0.01	
Lithium (filtered)	12	2	0.007	0.025	0.0169	0.0148	0.00847	0.00244	0.0111	-0.0219	0.501	< 0.05	
Manganese (filtered)	12	2	0.05	1.3	0.987	0.825	0.322	0.093	0.178	-2.485	0.327	1.4	
Mercury (filtered)	13	1	5.0000E-5	5.0000E-4	2.5769E-4	1.4471E-4	2.3349E-4	6.4759E-5	0	0.175	0.906	< 0.001	
Molybdenum (filtered)	11	3	0.0025	0.025	0.0127	0.00712	0.0118	0.00354	0	0.213	0.923	< 0.05	LOR Issue
Nickel (filtered)	12	2	5.0000E-4	2.8	2.042	1.094	0.733	0.212	0.445	-2.08	0.359	3.5	
Selenium (filtered)	13	1	5.0000E-4	0.005	0.00292	0.00195	0.00212	5.8793E-4	0.00297	-0.114	0.725	< 0.01	LOR Issue
Silver (filtered)	13	1	0.0025	0.025	0.0113	0.00639	0.0113	0.00312	0	0.527	0.992	< 0.05	LOR Issue
Strontium (filtered)	11	3	3.4	5.3	4.127	4.097	0.529	0.16	0.445	0.728	0.128	2.9	
Uranium (filtered)	13	1	0.0025	0.032	0.0152	0.0088	0.0123	0.00342	0.0104	-0.0865	0.814	< 0.05	LOR Issue
Vanadium (filtered)	13	1	0.0025	0.05	0.0165	0.00911	0.0151	0.00418	0.0334	0.703	0.912	< 0.05	
Zinc (filtered)	11	3	20	35	25.27	24.88	4.86	1.465	4.448	0.89	0.192	44	
Percentiles for Uncensored Data Sets													
Variable	**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**		
Aluminium (filtered)	12	2	0.111	0.12	0.12	0.225	0.25	0.25	0.25	0.444	0.633	< 0.5	
Arsenic (filtered)	12	2	0.005	0.005	0.005	0.012	0.027	0.0292	0.0372	0.0479	0.0576	0.018	
Barium (filtered)	13	1	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1	< 0.2	
Beryllium (filtered)	13	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.005	0.005	0.005	0.005	0.005	< 0.01	
Boron (filtered)	12	2	1.6	1.62	1.675	1.8	2.35	2.46	2.5	2.5	2.5	< 5	
Cadmium (filtered)	12	2	4.6000E-4	0.001	0.001	0.00185	0.00233	0.00238	0.0024	0.00267	0.00293	< 0.0002	
Chromium (filtered)	13	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.005	0.005	0.005	0.005	0.005	< 0.01	
Cobalt (filtered)	12	2	1.2	1.2	1.2	1.4	1.55	1.66	1.79	2.16	2.512	2.2	
Copper (filtered)	13	1	0.234	1.11	1.8	3.6	5.4	6.06	8.66	9.52	9.904	< 0.01	
Iron (filtered)	11	3	320	320	325	380	430	460	560	595	623	710	
Lead (filtered)	13	1	5.0000E-4	5.0000E-4	5.0000E-4	0.005	0.005	0.005	0.005	0.0078	0.0112	< 0.01	
Lithium (filtered)	12	2	0.009	0.009	0.009	0.0175	0.025	0.025	0.025	0.025	0.025	< 0.05	
Manganese (filtered)	12	2	0.87	0.962	0.968	1	1.2	1.2	1.2	1.245	1.289	1.4	
Mercury (filtered)	13	1	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-5	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	< 0.001	
Molybdenum (filtered)	11	3	0.0025	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.025	< 0.05	
Nickel (filtered)	12	2	1.8	1.82	1.875	2.15	2.425	2.48	2.77	2.8	2.8	3.5	
Selenium (filtered)	13	1	5.0000E-4	5.0000E-4	5.0000E-4	0.003	0.005	0.005	0.005	0.005	0.005	< 0.01	
Silver (filtered)	13	1	0.0025	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.025	< 0.05	
Strontium (filtered)	11	3	3.5	3.6	3.8	4.1	4.35	4.4	4.4	4.85	5.21	2.9	
Uranium (filtered)	13	1	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.0278	0.0312	< 0.05	
Vanadium (filtered)	13	1	0.0025	0.0025	0.0025	0.025	0.025	0.025	0.025	0.035	0.047	< 0.05	
Zinc (filtered)	11	3	20	21	21.5	24	27	28	32	33.5	34.7	44	

KPMON03 Rehab Assessment July 2024

INORGANICS AND IONS

Baseline	5-Jun-24	Comment

General Statistics on Uncensored Full Data

Date/Time of Computation ProUCL 5.2 28/03/2023 5:36:01 PM

User Selected Options

From File PRO UCL KPMON03.xls

Full Precision OFF

From File: PRO UCL KPMON03.xls

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV	5-Jun-24	Comment
Ammonia (as N)	13	1	0.19	0.99	0.608	0.538	0.254	0.0705	0.133	-0.709	0.418	1	marginal
Bromide	13	1	5	14	7.562	6.994	3.365	0.933	1.483	1.173	0.445	< 1	
Chloride	13	1	2100	3200	2638	2614	366.4	101.6	148.3	-0.448	0.139	2900	
Conductivity (at 25°C)	13	1	3800	15000	10838	10351	2860	793.2	1927	-1.206	0.264	11000	
Fluoride (Total)	12	2	0.8	2.4	1.617	1.553	0.461	0.133	0.371	0.0926	0.285	< 0.5	
Nitrate & Nitrite (as N)	12	2	0.025	3.3	0.965	0.372	0.995	0.287	1.064	1.208	1.031	< 0.05	
Nitrate (as N)	13	1	0.01	3	0.825	0.199	0.92	0.255	0.741	1.16	1.115	< 0.02	
Nitrite (as N)	12	2	0.01	0.09	0.0442	0.0302	0.0329	0.00949	0.0519	0.109	0.744	< 0.02	
pH (at 25 °C)	12	2	3.4	4.3	3.8	3.79	0.292	0.0844	0.297	0.367	0.0769	4.6	
Phosphate total (as P)	12	2	0.005	0.04	0.0154	0.0101	0.0148	0.00428	0	0.929	0.963	0.02	
Phosphorus filterable reactive (as P)	12	2	0.005	0.09	0.0233	0.0132	0.0261	0.00755	0.00371	1.656	1.12	< 0.01	
Salinity (expressed as TDS)*	12	2	5	11000	7884	4542	2945	850	1853	-1.922	0.374	8500	
Silicon (filtered)	11	3	23	34	29.36	29.14	3.695	1.114	4.448	-0.425	0.126	37	
Sulphate (as SO4)	13	1	670	4100	3467	3237	879.1	243.8	296.5	-3.071	0.254	4000	
Total Kjeldahl Nitrogen (as N)	12	2	0.1	2.1	0.822	0.553	0.607	0.175	0.519	0.711	0.739	1.2	
Total Nitrogen (as N)	12	2	0.59	3.97	1.738	1.53	0.92	0.266	0.741	1.205	0.529	1.2	
Total Suspended Solids Dried at 103-105°C	12	2	7.4	57	28.45	24.92	14.05	4.054	13.34	0.422	0.494	130	

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile	5-Jun-24
Ammonia (as N)	13	1	0.204	0.364	0.58	0.67	0.74	0.764	0.836	0.906	0.973	1
Bromide	13	1	5	5	5	6	8.3	10.82	12.9	13.4	13.88	< 1
Chloride	13	1	2120	2200	2200	2800	2900	2900	2900	3020	3164	2900
Conductivity (at 25°C)	13	1	7860	9820	10000	11000	13000	13000	13000	13800	14760	11000
Fluoride (Total)	12	2	1.3	1.3	1.3	1.55	1.925	1.98	2.18	2.29	2.378	< 0.5
Nitrate & Nitrite (as N)	12	2	0.025	0.04	0.0813	0.78	1.425	1.7	1.89	2.53	3.146	< 0.05
Nitrate (as N)	13	1	0.01	0.01	0.01	0.51	1.2	1.5	1.78	2.28	2.856	< 0.02
Nitrite (as N)	12	2	0.01	0.01	0.01	0.05	0.08	0.08	0.08	0.0845	0.0889	< 0.02
pH (at 25 °C)	12	2	3.42	3.62	3.675	3.7	4.025	4.08	4.19	4.245	4.289	4.6
Phosphate total (as P)	12	2	0.005	0.005	0.005	0.005	0.03	0.03	0.039	0.04	0.04	0.02
Phosphorus filterable reactive (as P)	12	2	0.005	0.005	0.005	0.0075	0.04	0.04	0.04	0.0625	0.0845	< 0.01
Salinity (expressed as TDS)*	12	2	5390	7180	7400	8650	9625	9900	10000	10450	10890	8500
Silicon (filtered)	11	3	24	27	27.5	30	32	33	34	34	34	37
Sulphate (as SO4)	13	1	3300	3380	3500	3700	3900	3960	4000	4040	4088	4000
Total Kjeldahl Nitrogen (as N)	12	2	0.1	0.198	0.468	0.75	1.1	1.1	1.55	1.825	2.045	1.2
Total Nitrogen (as N)	12	2	0.73	1.02	1.075	1.7	1.95	2.06	2.586	3.239	3.824	1.2
Total Suspended Solids Dried at 103-105°C	12	2	13.4	17.4	18.5	28.5	37	37	39.7	47.65	55.13	130

Groundwater Monitoring & Management Plan (Interim Criteria)

Kapunda Site B: In-Situ Copper Recovery

EnviroCopper

April 2025

Document Status

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Client Project Manager	Charlie Johnston
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Definition of Acronyms

AF	Assessment Factor
AHD	Australian Height Datum
ALS	Australia Laboratory Services
ANZG	Australian New Zealand Guidelines
ANZECC	Australian New Zealand Environment Conservation Council
ARMCAZ	Agriculture and Resource Management Council of Australian and New Zealand
ASC	Assessment of Site Contamination
BGL	Below Ground Level
BOM	Bureau of Meteorology
BV	Bureau Veritas
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CPEC	Chemicals of Primary Environmental Concern
CRC-P	Cooperative Research Centres – Projects
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CT	Circulatory Trials
DEM	Department of Energy & Mining
DES	Department of Environment and Science
DEW	Department for Environment and Water
DHG	Down Hydraulic Gradient
DO	Dissolved Oxygen
DQO	Data Quality Objective
DR	Draft Report
EC	Electrical Conductivity
EnviroCopper	Environmental Copper Recovery
EPA	Environment Protection Authority
E-PEPR	Exploration Program for Environment Protection and Rehabilitation
EV	Environmental Value
FR	Final Report
GC-MS	Gas Chromatography - Mass Spectroscopy
GDE	Groundwater Dependent Ecosystem
GMMP	Groundwater Monitoring & Management Plan
GSS	Geochemists Spreadsheet (an application within GWB)
GWB	Geochemists Work Bench
HMTV	Hardness Modified Target Value
ISR	In-Situ Recovery
ITRC	Interstate Technology and Regulatory Council
KECP	Key excursion control parameters
LOR	Limits of Reporting
LWC	Land and Water Consulting
LNAPL	Light Non-Aqueous Phase Liquid
LPCT	Large Particle Column Leach Test
mg/L	milligrams per litre
µg/L	micrograms per litre
MSA	Methanesulfonic Acid
mV	milli volts
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	National Resource Management Ministerial Council
NYNRMB	Northern and Yorke Natural Resources Management Board
ppm	parts per million
PSS	Primary sampling sequence
QA/QC	Quality Assurance/ Quality Control

REE	Rare Earth Element
RPD	Relative Percentage Difference
SA EPA	South Australian Environmental Protection Authority
SELT	Site Environmental Lixiviant Trial
STP	Standard Temperature and Pressure
SWL	Standing Water Level
TDS	Total Dissolved Solids
TRH	Total Recoverable Hydrocarbons
TV	Target Value
U.S. EPA	United States Environment Protection Agency
U.S. NRC	United States Nuclear Regulatory Authority
WAP	Water Allocation Plan
WHSMP	Workplace Health and Safety Plan
WQEPP	Environment Protection (Water Quality) Policy
WQO	Water Quality Objective
XRD	X-Ray Diffraction

CONTENTS

1 INTRODUCTION 5
1.1 Context 5
1.2 Purpose 6
1.3 Guidance 6
1.4 Interim Status 6
2 GROUNDWATER COMPLIANCE PROTOCOL 7
2.1 Objective 7
2.2 Compliance approach 7
2.3 Monitoring well network 9
2.4 Limit A and B Development 9
2.4.1 Number of data points 9
2.4.2 Electrical balance for Limit A and B development 10
2.4.3 Relative percent difference for Limit A and B development 11
2.4.4 Laboratory quality assurance and control 11
2.4.5 Limits A and B 13
2.5 Identification of exceedance, excursion and non-compliance 13
2.6 Action following non-compliance 17
3 CORRECTIVE ACTION 18
3.1 Immediate control 18
3.2 Contingency 18
4 REHABILITATION 19
4.1 Definition of rehabilitation 19
4.2 Rehabilitation parameters 19
4.3 Rehabilitation method 19
4.4 Reporting 19
5 SCHEDULE 21
6 REFERENCES 22
FIGURES 24

APPENDICES

Appendix A CHARGE BALANCE
Appendix B RELATIVE PERCENT DIFFERENCE
Appendix C LABORATORY REPORTS
Appendix D PERCENTILES (LIMITS A/B)
Appendix E GROUNDWATER MONITORING AND SAMPLING METHODOLOGY

LIST OF FIGURES (REAR)

Figure 1 – Site Locality Plan
Figure 2 – Site Layout Plan and Monitoring Plan – Groundwater Monitoring Well Locations

LIST OF FIGURES

Figure 2-1 Summary of identification of non-compliance and actions required 16

LIST OF TABLES

Table 2-1 Description of Limits 8
Table 2-2 Monitoring well network 9
Table 2-3 E-balance summary for dataset 11
Table 2-4 Summary of primary laboratory reports 12
Table 2-5 Limit A and B for KECP 13

1 INTRODUCTION

1.1 Context

Land & Water Consulting (LWC) was previously engaged by Environmental Copper Recovery (Enviro-Copper) to prepare a Groundwater Monitoring & Management Plan (GMMP) for Site A of the Copper In-Situ Recovery (ISR) project located on privately owned land to the south (and down hydraulic gradient) of the Kapunda Historic Mine, within the township of Kapunda and approximately 80 km north-east of Adelaide, South Australia ('the Site' or 'the exploration site').

Enviro-Copper aims to utilise ISR to extract copper from underground mineral deposits. The ISR process involves injecting a specifically selected lixiviant through a well into the desired ore body to leach the copper into a soluble form. This solution is then pumped to the surface, where the concentrated copper can be recovered for processing (U.S. NRC, 2021) – refer to Section 2.6 for further information.

Baseline metals analysis undertaken by Enviro-Copper in Site A has shown a significant local variability between wells in both pH and metal ion concentration in solution. This variability is more than likely attributable to the variable pH and the proximity of metal/ sulfide rich veins and fractures to some of the wells, noting that the Site is located down hydraulic gradient of the historic Kapunda copper mine.

This variability means that the statistical treatment suggested to be applied in the Enviro-Copper (2021) Exploration Program for Environment Protection and Rehabilitation (E-PEPR) results in some metal (Al, As, Cd, Cr, Co, Cu, Fe, Pb, Li, Mo, Ni, Se, U, Zn) concentrations already exceeding rehabilitation criteria before lixiviant is added (i.e. the values for the metals are already higher than the calculated rehabilitation criteria).

On the basis of the variability of groundwater parameters and chemical substances in groundwater across the project area, a 'blanket' trigger value per chemical substance for the project area is impractical – based on the elevated concentrations of key metals in the central project area where the CT will occur, trigger values would be impractically high and would not detect excursion from the ISR operation.

Consequently, an intra well trigger value derivation approach was previously agreed with the Department for Energy and Mining (DEM) in 2022. This approach identifies the 80th percentile for each chemical substance in groundwater at each of the eight groundwater monitoring wells. The percentile is calculated from 10 – 16 data points, depending on the data available for each well.

This GMMP has been prepared for the next phase of ISR testing, comprising circulation testing (CT), at Site B, which is located around 100 m north of Site A.

A site locality plan is provided as Figure 1 (at rear). The Light River is located approximately 700 m south-east of Site B.

Site B comprises a five spot ISR pattern comprising four injection wells (KPSELTI01 – 04) and one extraction well (KPSELTX01). There are also two monitoring wells (KPSELTM01 and 02).

A groundwater monitoring and sample analysis methodology and schedule is set out here to be applied to detect any excursion of mining fluids or alteration to the natural hydrogeochemistry as a function of ISR testing activities (i.e. a non-compliance).

1.2 Purpose

The purpose of the Site B GMMP is to:

1. Prescribe the monitoring and sample analysis methodology and schedule required to formulate a robust baseline assessment of current pre-activity groundwater conditions.
2. Formulate groundwater chemical substance trigger values for the CT, that if exceeded, may indicate excursion of mining fluids or alteration to the natural hydrogeochemistry as a function of CT activities (i.e. a non-compliance).
3. Define a non-compliance.
4. Define how a non-compliance is identified.
5. Prescribe actions required on identification of a non-compliance.
6. Define rehabilitation criteria and return to baseline conditions required to complete rehabilitation post testing.

1.3 Guidance

The GMMP was prepared in accordance with relevant South Australian legislation and policies, including the following:

- *Environment Protection Act 1993; and*
- *Environment Protection (Water Quality) Policy 2015* (WQEPP).
- *Mining Act (1971)*
- *Landscapes SA Act (2019)*

The GMMP also considers technical guideline information provided in:

- DES (2021) *Using Monitoring Data to Assess Groundwater Quality and Potential Environmental Impacts*;
- SA EPA (2016a) *Regulatory Monitoring and Testing - Monitoring Plans Requirements*;
- SA EPA (2019b) *Guidelines for Regulatory Monitoring and Testing – Groundwater Sampling*.
- SA EPA (2024) Guideline 3 – Establishing baseline groundwater quality - Guidelines for groundwater quality monitoring of regulated activities series

1.4 Interim Status

SA EPA (2024) requires an extensive baseline groundwater quality data set (and subsequent assessment criteria) but allows an interim baseline groundwater quality data set comprising at least eight data points for each sampling location until a more robust baseline can be established following the commencement of the regulated activity. Where baseline groundwater quality data set is established using data collected within a timeframe shorter than two years, SA EPA (2024) requires that is should be clearly reported as interim, and a process outlined for the continued collection of additional data be provided. When baseline monitoring data spanning at least two years becomes available, the interim baseline groundwater quality data set should be updated as a matter of priority. This this dataset and baseline is interim and this document sets out processes for collection of further data.

2 GROUNDWATER COMPLIANCE PROTOCOL

2.1 Objective

Monitor groundwater associated with the proposed activity to be able to detect/ identify changes in chemical composition of the groundwater that may indicate/ represent excursion of rich (or barren) lixiviant from the CT activity area (Site B) – an excursion is a 'non-compliance'.

2.2 Compliance approach

The characteristics of the existing (pre-activity) groundwater composition beneath the Site, and in the surrounding area, are important in assessing the current groundwater quality and potential risks to the quality of the groundwater into the future.

In order to demonstrate that groundwater quality has not been affected by an activity, there is a need to compare data collected before, during and after the activity commenced. This requires detailed baseline assessments to be undertaken to obtain an accurate picture of water quality within the aquifer prior to activities commencing. The baseline assessments should also establish natural groundwater quality and variability in order to confidently attribute any potential contamination to a specific activity (DES, 2021).

For the purpose of applying control charts to groundwater quality assessment, control limits can be developed from either inter-bore or intra-bore data. Inter-bore control limits are derived from hydraulically up-gradient reference bore data, and potentially, data from other background bores.

Intra-bore control limits are derived from historical measurements collected from the same compliance bore. These can also be considered as pre-disturbance baseline data. The type of comparison that is most appropriate often depends on the local hydrogeological conditions (ITRC, 2013). Given the natural variability in groundwater composition reported at the Site, and the historically modified disturbed nature of the groundwater (due to historical mining), intra-well control limits are considered to be relevant.

The compliance approaches recommended in DES (2021) for groundwater quality assessment are based on comparing a number of consecutive sample tests at each compliance well to a limit based on percentile calculations.

This approach is aimed at reducing the probability of a false positive, or what is referred to as a false non-compliance in regard to regulation, while ensuring sufficient sensitivity to detect potential impacts. The approach is based on combining ANZECC/ARMCANZ (2000) methodology, adapted control charting approaches and statistics around applying one or two limit types (or triggers).

DES (2021) presents a two tiered trigger non-parametric approach that compares a rolling median of an individual chemical substance in water from individual monitoring wells ("intra-well comparison") against triggers that are calculated based on the long-term 80th percentile (Limit A/ Tier 1 trigger) and 95th percentile (Limit B/ Tier 2 trigger) – refer to Table 2-1 for a description of each Limit provided by DES (2021). The triggers are static and not calculated on a rolling basis. Each limit is a set value for the period of the compliance and would only be changed if the initial site-specific data used to derive the values were inadequate.

Table 2-1 Description of DES (2021) Limits

Limit	Description
A	Limit A is the 80th percentile of site-specific BASELINE groundwater data except pH values, which use 20th percentile and 10th percentile, as in this case we are concerned around lowering of pH due to the acidification required as part of ISR. Limit A must be applied to at least five consecutive data points (i.e. there must be at least five consecutive data points during and after the CT has been completed).
B	Limit B is the 95th percentile of site-specific BASELINE groundwater data. Limit B must be applied to at least three consecutive data points (i.e. there must be at least three consecutive data points during and after the CT has been completed).

The DES (2021) approach is modified to use 95% percentiles only, and so although Limit A percentiles have been calculated, Limit A is seen as a method for detecting gradual change over the medium term (i.e. one to two years). Five consecutive exceedances of Limit A will trigger a review of operations as a precursor to avoiding a B1 and B2 non-compliance.

The excursion control limits/ non-compliance ('the movement of lixiviant outside the trial area') is determined on the following basis:

1. **Low Level (Warning) Trigger: Two consecutive results above Limit B criterion (B1)**
2. **High Level Trigger (determination of excursion): Three consecutive results above Limit B criterion (three consecutive Limit B exceedances (B2).**

Limit B, which is tested over two and three consecutive samples, will potentially provide detection of change over a shorter term, particularly if the change is significant. The period of time required to detect change for each limit will depend on sampling frequency.

Based on the approach outlined above, the period of time to detect change could range from three months through to a year. In some circumstances (for example, where there are high ecological values), the sampling frequency and the number of consecutive samples applied in this approach may be varied depending on site-specific conditions.

For analytes where baseline concentrations are below LOR consistently, the 80th percentile is either incalculable or very low and therefore it is likely that the LOR is used as both Limit A and Limit B (B1 and B2). Limit B is the more capable of detecting significant change in the short term

For any analyte where baseline concentration has been consistently below LOR to the extent that both Limit A and B are LOR, then three consecutive exceedances of LOR (in lieu of Limit B) is sufficient to determine that an excursion has occurred and a non-compliance is evident.

The maximum estimated natural groundwater flow velocity is up to 15 m per year. This means that impacts to groundwater quality may take more than 12 months to be detected at the monitoring wells. Consequently, taking into account the potential lag affect around Limit A prescribed by DES (2021), an abridged version of the DES (2021) approach will be implemented, which is designed to rapidly identify any potential excursion over a 28 day assessment period.

2.3 Monitoring well network

The monitoring wells listed in Table 2-2 are to be sampled in accordance with the methodology provided in Section 2.6 of the GMMP and at the frequency prescribed in Section 2.5 of the GMMP. The locations of such wells are shown in Figure 2, at rear.

Table 2-2 Monitoring well network

Groundwater monitoring well	Purpose	Requires Limit A and B Approach	Requires Rehabilitation Protocol
KPSELTI01	Injection	X	☑
KPSELTI02	Injection	X	☑
KPSELTI03	Injection	X	☑
KPSELTI04	Injection	X	☑
KPSELTX01	Extraction	X	☑
KPSELTM01	Monitoring	☑	☑
KPSELTM03	Monitoring	☑	☑

2.4 Limit A and B Development

DES (2021) provides four recommended steps for the analysis and interpretation of groundwater quality monitoring data and trigger development:

- Step 1 – Determine summary statistics for each monitoring bore for all indicators using all available data.
- Step 2 – Assess the electrical balance of each water sample to determine the quality of the analysis and identify if any analyte is missing (i.e. causing an imbalance) (See Section 2.4.2).
- Step 3 – Graph and interpret the data for each bore to assist in identifying outliers.
- Step 4 – Adjust the dataset and recalculate percentiles (if required) after having assessed if any outliers are present.

2.4.1 Number of data points

As specified in DES (2021), the preference is to estimate 20th and 80th percentiles based on a minimum of 18 samples obtained over a period of at least 12, and preferably 24, months. However, percentile estimates based on eight or more samples can be used to derive guidelines (DES, 2021) with varying degrees of accuracy/ robustness.

Approximately 10 - 14 data points are available per location, spanning from February 2024 to June 2024.

As reported in SA EPA (2024), 3–6 samples per year provides a cost-effective monitoring frequency (with little sampling redundancy), and that sampling frequencies greater than monthly have the potential to result in considerable loss of information through serial correlation (Serial correlation can occur when samples are

collected too frequently, resulting in data points which are not independent and provide no new information about groundwater quality).

The Interstate Technology and Regulatory Council (ITRC 2013) indicates that most guidelines on sample size for groundwater statistical tests recommend at least 8–10 samples when constructing (statistical) limits for a target population.

However, ANZG (2018) points out that the precision with which percentiles for a data set are estimated depends heavily on the sample size. This means that for a relatively small sample size of 8–10 samples, only a limited range of percentiles around the 50th percentile (median) are likely to be able to be estimated with relatively good precision.

In order to estimate more extreme percentiles with the same precision for each target population, a larger sample size is required. ANZG (2018) provides some guidance for sample sizes required to estimate percentiles with relative precision for non-parametric data sets. It suggests that to estimate the 20th or 80th percentile of a data set with an associated 95% confidence interval, a minimum sample size of 17 is required; and that to estimate the 10th or 90th percentile of a data set with the same precision, a minimum of 36 samples is required.

Additional data is being collected which will bring the number of baseline samples up to (or close to) 17, being a suggested minimum for 80th percentile derivation.

Collection of samples on a broader timescale to eliminate serial correlation is not possible however given that there is no activity the only reasonable mechanism for potential serial correlation would be seasonal water table variability and associated recharge. Accounting for quarterly sampling in an attempt to eliminate serial correlation and noting a minimum number of 17 samples per SA EPA (2024), it would take over four years to establish a baseline. This is clearly illogical when a shorter period will suffice (e.g. 6 – 9 months.

SA EPA (2024) acknowledges this – and recognises that there may be exceptional circumstances where a baseline groundwater quality data set (and subsequent assessment criteria) is required to be established within a timeframe shorter than two years to facilitate the commencement of an activity. Where this is the case, and there is sufficient information to support the requirement, the use of an interim baseline groundwater quality data set may be appropriate. A suitable interim data set may be achieved by undertaking baseline groundwater quality monitoring more regularly than quarterly to ensure at least eight data points are available for each sampling location within the timeframe required. The interim baseline groundwater quality data set can then be used to develop interim groundwater quality assessment criteria for compliance monitoring, until a more robust baseline can be established following the commencement of the regulated activity. SA EPA (2024) requires that where an interim baseline groundwater quality data set is established using data collected within a timeframe shorter than two years, it should be clearly reported as interim, and a process outlined for the continued collection of additional data. When baseline monitoring data spanning at least two years becomes available, the interim baseline groundwater quality data set should be updated as a matter of priority.

Percentiles have been defined using non-detect treated data in ProUCL version 5.2. Protocols set out in SA EPA (2024) have been followed for processing of baseline data to derive percentiles.

2.4.2 Electrical balance for Limit A and B development

Every sample analysed from the Site B network has been analysed for major ions, therefore the ion (electrical) balance has been calculated per sample, per location. As water is electroneutral, there should be no positive (cationic charge) or negative (anionic charge) and major cation and anion balance should be 0%.

A satisfactory analysis is deemed to be an error less than +/- 5%. Only ~16% of samples reported an EB outside of the range, and several of these were very marginal exceedances and reported under 6% .

There was one exception (KPSELTI01, 14 February 2024) that reported an abnormally high balance of 36.59 due to a low bicarbonate result (possible laboratory error).

Ion (electrical) balance data is presented in Appendix A and summarised below in Table 2-3.

Table 2-3 E-balance summary for dataset

DATE	KPSELTX01	KPSELTI01	KPSELTI02	KPSELTI03	KPSELTI04	KPSELTM01	KPSELTM03
14/02/2024	2.65	36.59					
21/02/2024						-1.66	4.65
1/03/2024	2.24	5.75				5.13	2.32
13/03/2024	-2.50	-0.21				-2.28	3.40
27/03/2024	-2.44	-5.29				-4.87	2.05
26/04/2024	-0.81	-2.30	0.75	2.86	1.60	-1.11	1.58
1/05/2024	2.60	1.83	7.35	1.01	10.49	5.28	6.41
7/05/2024	-3.79	-0.26	0.91	-0.30	-3.94	-2.40	-1.81
15/05/2024	3.77	0.61	5.09	2.24	4.21	0.08	2.63
21/05/2024	-2.54	-2.42	1.69	1.22	-0.38	0.22	-0.81
29/05/2024	-2.37	-0.21	0.60	-1.02	-0.74		-2.43
5/06/2024	-2.62	0.79	1.66	-1.63	-2.95	1.36	-3.42
12/06/2024	-1.93	-0.17	2.44	-0.66	-0.74	2.50	-1.02
24/06/2024	-2.60	1.42	2.10	-0.20	-0.31	3.60	1.97
22/07/2024	5.52	0.47	3.00	5.05	4.08	5.41	2.73
# of > +/- 5%	**0**	**3**	**2**	**0**	**1**	**2**	**1**
	TOTAL	9	Samples	71	%	12.68	
# of > +/- 10%	**0**	**1**	**0**	**0**	**1**	**0**	**0**
	TOTAL	2	Samples	71	%	2.82	

2.4.3 Relative percent difference for Limit A and B development

Intra and inter duplicate were collected at satisfactory ratios (1 per 10 primary sample) per location. Relative percent differences (RPD) between the three results for each duplicated chemical/ parameter were calculated – these results are presented as Appendix B. The RPD are satisfactory noting exceedances are associated with differences in limit of reporting between primary/ intra and the inter.

The data is deemed to be suitable for use in Limit derivation.

2.4.4 Laboratory quality assurance and control

LWC undertook a review of the provided laboratory certification. Primary samples were analysed by Bureau Veritas (BV) and the inter duplicate was analysed by Eurofins.

Batch specific quality assurance detail was not readily apparent with respect to the analysis conducted by BV. A list of primary analytical batch reports and quality assurance commentary is provided in Table 2-4.

The laboratory reports are listed in Appendix C.

Table 2-4 Summary of primary laboratory reports

Bureau Veritas Laboratory Report	Date
1027366	14 Feb 24
1027459	21 Feb 24
1027625	1 Mar 24
1028004	13 Mar 24
1028190	26 Apr 24
1028571	1 May 2024
139195-139202	7 May 2024
142040--142047	15 May 2024
144123-144130	21 May 2024
147205-147212	29 May 2024
170121-170128	5 June 2024
172430-172437	12 June 2024
175654-175661	24 June 2024

Note that should any results appear potentially anomalous or any aspect of laboratory quality assurance and control is questionable, written follow up/ discussion should occur with the laboratory within an appropriate period from receipt of data (sooner the better, the longer it takes to raise a query the less likely it is to achieve an accurate resolution).

2.4.5 Limits A and B

Statistical data summaries and the percentiles (Limit A and B) for each parameter for each well are presented as Appendix D.

Key excursion control parameters (KECP, and as set in the e-PEPR) for comparison to Limit A and B are as follows:

- pH
- Electrical conductivity (EC)
- copper
- sulfate

However, trigger values are defined for all analytes on an intra-well basis in the baseline sampling to date such that all analytes analysed are given a percentiles determination so as to be applied for rehabilitation criteria (Section 4).

The Limit A and B for KECP are listed in Table 2-5.

Table 2-5 Limit A and B for KECP

	KECP	pH	EC (µS/cm)	copper (mg/L)	Sulfate (mg/L)
Well ID	Exceedance occurs when…	Values are **below** Limit A five consecutive results or below Limit B three consecutive results	Values are above Limit A for five consecutive results or above Limit B for three consecutive results	Values are above Limit A for five consecutive results or above Limit B for three consecutive results	Values are above Limit A for five consecutive results or above Limit B for three consecutive results
KPSELTM01	Limit A	6.78	15,000	0.1	2,560
	Limit B	6.7	15,000	0.1	2,600
KPSELTM03	Limit A	7.6	4,100	0.1	448
	Limit B	7.53	5,790	0.1	474

2.5 Identification of exceedance, excursion and non-compliance

A sodium bromide tracer should be added to the injectant so as to monitor potential excursion of mining fluid noting inherent variability in local groundwater.

The determination of a non-compliance (i.e. an excursion of mining fluid has occurred) during and after the CT is determined as follows at the monitoring array (in order to not incur long lead times on non-compliance identification):

1. Obtain groundwater samples every 7 days during the CT and then 3, 7, 14, 21 and 28 days after the CT (**this is referred to as the primary sampling sequence – PSS**).
    a. Laboratory turnaround times for the first month post CT must be no longer than 4 business days from sampling.

b. Laboratory turnaround times for the months after the first month must be no longer than 7 business days from sampling.

2. The maximum estimated natural groundwater flow velocity is up to 15 m per year. This means that impacts to groundwater quality may take more than 12 months to be detected at the monitoring wells. As such, three additional groundwater sampling events must be undertaken at 18, 24 and 30 months 'post CT'.

3. For all events, review the quality of the **current sampling and analysis data** (CSAD) in terms of precision and accuracy:

    a. sampling techniques;

    b. preservation and storage of samples upon collection and during transport to the laboratory;

    c. sample holding times;

    d. analytical procedures;

    e. laboratory LOR;

    f. field QC sample results and relative percent difference (RPD) between duplicates:

        i. The typical RPD which can be expected from acceptable field duplicates is <30-50% of the mean concentration of the analyte, where the results are greater than ten times the LOR.

        ii. When using the results from duplicate sample pairs, the higher result is adopted as a conservative approach.

        iii. When the RPD for detected constituents is ≥30% the representativeness of the sample results must be considered;

    g. charge balance assessment:

        i. Review the charge balance of the CSAD with objective of charge balance error being +/- 5% (see Section 2.4.2).

        ii. Where not in this range, investigate the possible causes. Metals analysis (dissolved) must be included in the charge balance calculation to ensure an accurate outcome.

    h. outlier assessment (statistical – unexpectedly low/high?)

    i. laboratory QA procedures and QC sample results – check laboratory control spike results – is it unusually high or low for the analyte in question? and

    j. the occurrence of apparently unusual or anomalous results.

4. Check CSAD against data collected to date to determine if a non-compliance has occurred:

    a. If analyte in CSAD has always had results below LOR and the result for that analyte is a result above the LOR, and the LOR is the same or less than the LOR reported to date, this is a potential exceedance, and the next two results must be compared to Limit B (exceedance of Limit B is the prevailing non-compliance rule).

    b. If analyte in CSAD has always had results below LOR and the result for that analyte is less than the LOR, and the current LOR is the same or less than the LOR reported to date, this is NOT a potential exceedance.

c. If analyte in CSAD has had results above and below the LOR to date, or always above the LOR, then compare the current result to Limit B. If the current result comprises the CSAD above the 80th percentile then there is a potential exceedance (though this in itself is not a non-compliance).

5. Note that if a potential exceedance is identified from one data point, even if it is the last planned monitoring event covering at least five events since the end of the CT, then at any point during/ post CT, the following protocol must be applied:

    a. re-start the primary sampling sequence (PSS) set out as #1 in this list, i.e.:

        i. Re-sample all wells no more than 7 days after receipt of the data batch incorporating the potential exceedance of baseline criteria (Test 2) – the initial exceedance forms Test 1.

        ii. Re-sample all wells no more than 14 days after receipt of the data batch incorporating the potential exceedance of baseline criteria (Test 3).

        iii. Re-sample all wells no more than 21 days after receipt of the data batch incorporating the potential exceedance of baseline criteria (Test 4).

        iv. Re-sample all wells no more than 28 days after receipt of the data batch incorporating the potential exceedance of baseline criteria (Test 5).

    b. Compare data to quality assurance requirements set out in #3 above and then to the rules set out in #4 ('Check CSAD') above.

Tests (samples) on the exceeding well(s) should be collected in triplicate (primary, intra laboratory and inter laboratory duplicates) to assess accuracy and precision of the analyses and any potential analytical errors that may have contributed to the exceedance and guard against false positives.

6. Where a non-compliance is identified, the company (Enviro-Copper) will notify DEM of the exceedance and stating the corrective action that will be applied, within 7 business days of exceedance identification occurring.

7. Corrective action must be applied within 7 business days of notification.

The groundwater monitoring and sampling methodology and analytical program is presented as Appendix E.

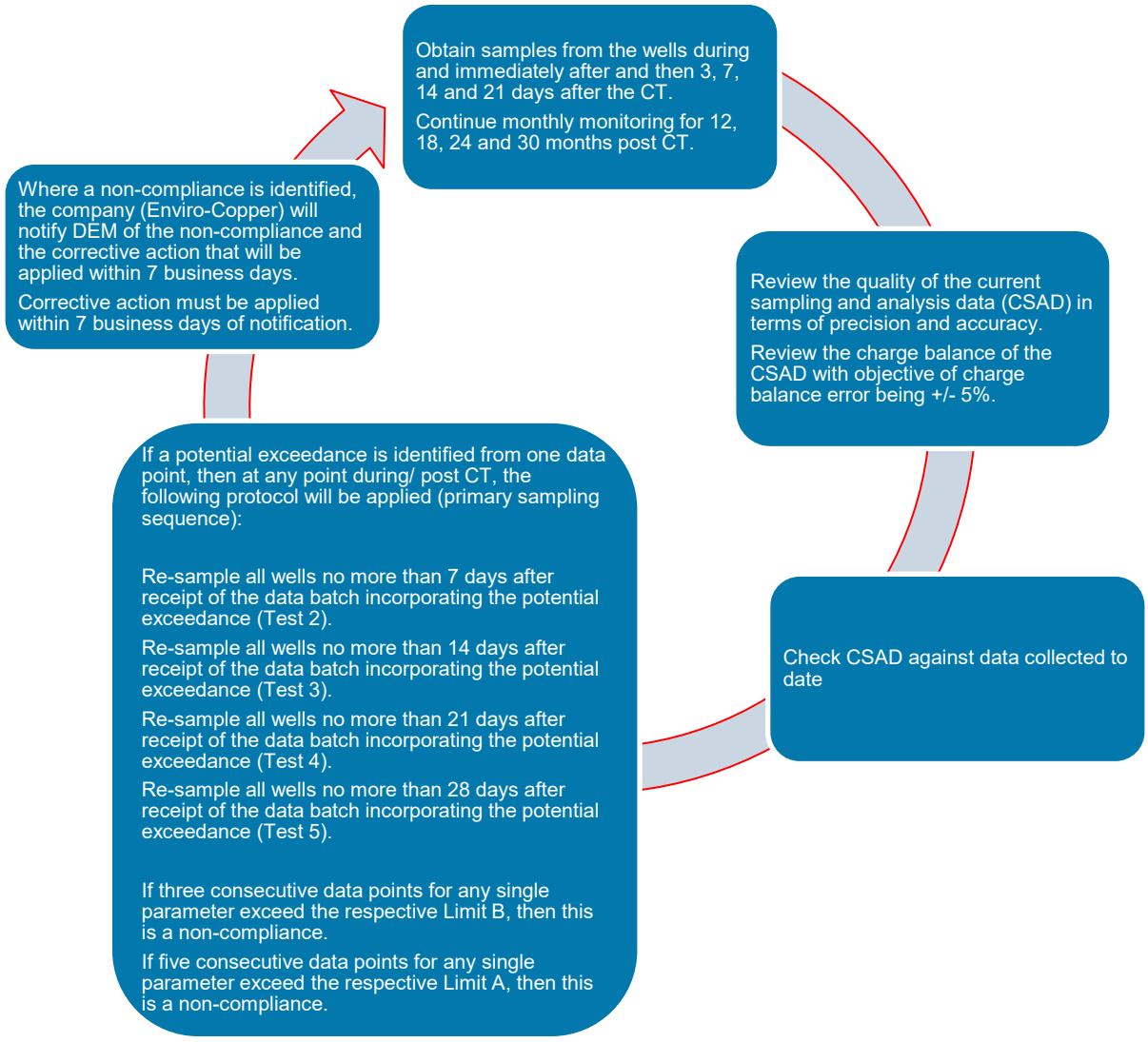

Figure 2-1 Summary of identification of non-compliance and actions required

2.6 Action following non-compliance

The identification of non-compliance during and after the CT shall be as follows, in order to not incur long lead times on excursion identification:

1. Where non-compliance is identified, the company (Enviro-Copper) will notify DEM of the exceedance and the corrective action that will be applied within 7 business days of determining the non-compliance.
2. Corrective action to mitigate the non-compliance must be applied within 7 business days of identification of the non-compliance (see **Section 3**).
3. Tests must be completed after implementation of corrective action (refer Section 3) of the non-compliance on the well(s) reporting the non-compliance: implement the PSS set out in Section 2.5
4. Continue the monitoring program.

3 CORRECTIVE ACTION

3.1 Immediate control

If trigger values / conditions are exceeded at any Monitoring Well, the following actions will be taken:

1. Injection of lixiviant ceases.
2. Extraction commences from the extraction well and continues until the chemistry at the affected Monitoring Well returns to below trigger value controls.
3. No further injection is undertaken, and the trial is completed and rehabilitated.

3.2 Contingency

If excursion management does not result in correction of the excursion, and trigger value controls concentration limits continue to be exceeded in one of the Monitoring Wells, even after the extraction has continued to the point that lixiviant is removed from the extraction and injection wells to meet the rehabilitation criteria, then the extraction pump will be moved to the impacted monitoring well and groundwater will be pumped until the groundwater chemistry at the Monitoring Well returns to below trigger value controls, as a minimum following the PSS set out in Section 2.5.

All pumped groundwater will be disposed of by a licensed wastewater contractor, to a suitably licenced facility.

4 REHABILITATION

4.1 Definition of rehabilitation

Rehabilitation is considered to have occurred when concentrations of chemical substances in groundwater match (i.e. are lower than) the maximum reported concentration of the baseline criteria (refer Appendix D which provides summary statistics for chemical substances / parameters).

4.2 Rehabilitation parameters

Rehabilitation parameters are those parameters and chemical substances that have been identified from column leach tests and geochemical modelling as modified or potentially mobilised by leaching:

- pH
- EC
- Metals: Fe, Co, Zn, Cu, Ni, Ag, Li, Mo, Cr, V.

4.3 Rehabilitation method

Active rehabilitation will be undertaken post CT.

Active rehabilitation comprises extraction of lixiviant from the extraction well (1 – 2 pore volumes) until rehabilitation criteria are met at the injection, extraction and monitoring wells. Active rehabilitation may occur post-test.

If rehabilitation is not progressing at an acceptable pace, then emergency actions are:

1. If not remediated in 10 days: Pumping from monitoring wells in addition to injection/ extraction well(s) to achieve high flow rates and larger area of extraction until full rehabilitation parameters return to baseline at all wells.
2. If not remediated in 30 days: Injection of clean (mains) water into observation and/ or monitoring wells while pumping from the extraction well to flush formation until rehabilitation parameters return to baseline at all wells.
3. Complete in accordance with monitoring at timescale set out in Section 2.2.

4.4 Reporting

A CT close out report must be prepared within 21 business days of finalisation of the circulation test.

The CT report must compare the KECP from EACH CSAD to repsective Limit A and B and categorically state that corrective action is or is not required or that corrective action has been undertaken and has been succesful in correcting the non-compliance and that rehabilitation has been achieved.

Such close out report is to include the following:

- details of groundwater monitoring program methodology and scope of works;
- construction details and logs of any new or replaced groundwater monitoring wells;
- results of groundwater gauging, field parameter measurement and laboratory sample analysis, including field gauging/ sampling sheets, NATA certified laboratory reports and COC records;

- discussion of laboratory and field QA/QC and analytical data validation;
- data summary tables – field and laboratory results;
- interpretation of the data, including the quality of the groundwater with respect to relevant EVs and groundwater quality objectives, quality control and assurance and outlier, LOR and charge balance reviews and interpretation of groundwater elevation contours;
- graphical and tabulated outputs of all monitoring data during and post test in relation to the trigger values;
- Overall comaprison of each CSAD within and post CT to the Limit A and B values and statements with respect to corrective action that has or has not been required and/ or where corrective action has been undertaken that it has been succesful in correcting the non-compliance and that rehabilitation has been achieved.
- Recommendations (if / where required).

5 SCHEDULE

Guideline 3 – Establishing baseline groundwater quality expects that the reported baseline groundwater quality will be reviewed and potentially updated periodically (or as required) as new data becomes available.

As a minimum, the baseline groundwater quality will be reviewed and updated (if required) every five years or sooner if required.

The next ‘must have’ review and edit is: **7 April 2030**

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FIGURES

Legend

- Site Boundary Fenceline
- Interior Site Area
- Internal Locked Gate
- External locked Gate

0 4.5 9 18 27 36

Metres

Land & Water Consulting
Email: enquiries@lwconsulting.com.au
Web: www.lwconsulting.com.au

N

Project: Kapunda Hydro Testing

Figure Title: Kapunda Mine Site Hydro Testing Area

Site Layout Plan

Date:	Projection: GDA 2020 - MGA 54
Scale: See Plan	Figure in Set: X of X
Site Address: Kapunda Mine Site, Kapunda	Figure X Revision A
Drawing Reference AAAA	

FIGURE 2 – WELL LOCATIONS

APPENDIX A CHARGE BALANCE

Well ID	KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01		KPSELTX01	
Date	14/02/2024		1/03/2024		13/03/2024		27/03/2024		26/04/2024		1/05/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		29/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024		
Report No.	1027367		1027625		1028004		1028191		1028506		1028506		1028571		139202		102047		144130		147212		170120		172437		175661		185372		
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	1500	-42	2000	-56	2300	-65	3200	-90	2400	-68	2600	-73	2600	-73	2400	-68	1800	-51	1700	-48	1700	-48	1900	-54	1800	-51	1700	-48	1600	-45	0
Bicarbonate Alkalinity (as CaCO3)	450	-7	410	-7	380	-6	480	-8	450	-7	500	-8	500	-8	480	-8	450	-7	480	-8	410	-7	450	-7	430	-7	570	-9	450	-7	0
Sulphate (as SO4)	750	-16	980	-20	930	-19	1200	-20	1100	-23	1200	-25	1200	-25	1100	-23	900	-19	890	-19	890	-19	1100	-23	1100	-23	890	-19	740	-15	0
Sum		-65		-84		-90		-118		-98		-107		-107		-98		-77		-74		-73		-84		-81		-76		-68	0
Cations																															
Calcium	140	7	180	9	170	8	210	10	170	8	210	10	210	10	170	8	140	7	120	6	120	6	160	8	140	7	130	6	120	6	0
Magnesium	160	13	200	16	190	16	270	22	210	17	270	22	270	22	200	16	170	14	140	12	130	11	170	14	160	13	150	12	150	12	0
Potassium	33	1	40	1	41	1	47	1	40	1	47	1	47	1	38	1	40	1	37	1	36	1	41	1	37	1	37	1	37	1	0
Sodium	1100	48	1400	61	1400	61	1800	78	1600	70	1800	78	1800	78	1500	65	1400	61	1200	52	1200	52	1300	57	1300	57	1200	52	1300	57	0
Sum		69		87		86		112		96		112		112		91		83		71		70		80		78		72		76	0
Aluminium (filtered)	0.1	0	0.1	0	0.01	0	0.01	0	0.15	0	0.1	0	0.1	0	1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0
Copper (filtered)	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0
Iron	0.1	0	0.1	0	0.01	0	0.01	0	0.01	0	0.01	0	0.01	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0
Lead	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0
Sum		69		87		86		112		96		112		112		91		83		71		70		80		78		72		76	0
Conductivity (at 25 °C)	6900	69	8700	87	8000	80	11000	110	8900	89	10000	100	10000	100	9300	93	7500	75	6900	69	6600	66	7700	77	7300	73	7200	72	6900	69	0
% electrical balance		2.65		2.24		-2.50		-2.44		-0.81		2.60		2.60		-3.79		3.77		-2.54		-2.37		-2.62		-1.93		-2.60		5.52	#DIV/0!

^Purged 200L Hydro work

^Low flow

Well ID	KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01		KPSELTI01	
Date	14/02/2024		1/03/2024		13/03/2024		27/03/2024		26/04/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		29/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024			
Report No.	1027367		1027625		1028004		1028191		1028191		1028571		139195		102040		144123		147205		170121		172430		175654		185365			
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	270	*-8*	2500	*-71*	4300	*-121*	3800	*-107*	2900	*-82*	2700	*-76*	3700	*-104*	2400	*-68*	2400	*-68*	2400	*-68*	2200	*-62*	2300	*-65*	2200	*-62*	2400	*-68*		*0*
Bicarbonate Alkalinity (as CaCO3)	1	*0*	430	*-7*	380	*-6*	460	*-8*	360	*-6*	330	*-5*	400	*-7*	380	*-6*	340	*-6*	310	*-5*	360	*-6*	340	*-6*	360	*-6*	430	*-7*		*0*
Sulphate (as SO4)	92	*-2*	1200	*-25*	1600	*-33*	1400	*-29*	1100	*-23*	1200	*-25*	1400	*-29*	1100	*-23*	1200	*-25*	1100	*-23*	1100	*-23*	1000	*-21*	980	*-20*	780	*-16*		*0*
Sum		*-10*		*-103*		*-161*		*-144*		*-111*		*-107*		*-140*		*-97*		*-98*		*-96*		*-91*		*-91*		*-88*		*-91*		*0*
Cations																														
Calcium	150	*7*	210	*10*	300	*15*	240	*12*	160	*8*	170	*8*	260	*13*	160	*8*	160	*8*	140	*7*	150	*7*	140	*7*	140	*7*	140	*7*		*0*
Magnesium	0.21	*0*	250	*21*	370	*30*	300	*25*	220	*18*	220	*18*	300	*25*	180	*15*	180	*15*	160	*13*	170	*14*	160	*13*	160	*13*	170	*14*		*0*
Potassium	49	*1*	53	*1*	65	*2*	55	*1*	48	*1*	50	*1*	55	*1*	49	*1*	47	*1*	46	*1*	48	*1*	47	*1*	45	*1*	49	*1*		*0*
Sodium	270	*12*	1900	*83*	2600	*113*	2100	*91*	1800	*78*	1900	*83*	2300	*100*	1700	*74*	1600	*70*	1700	*74*	1600	*70*	1600	*70*	1600	*70*	1600	*70*		*0*
Sum		*20*		*115*		*160*		*129*		*106*		*111*		*139*		*98*		*94*		*95*		*92*		*91*		*91*		*92*		*0*
Aluminium (filtered)	0.47	*0*	0.01	*0*	0.01	*0*	0.01	*0*	0.23	*0*	0.1	*0*	2	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Copper (filtered)	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Iron	0.19	*0*	0.01	*0*	0.01	*0*	0.01	*0*	0.01	*0*	0.1	*0*	0.2	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Lead	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Sum		*21*		*115*		*160*		*129*		*106*		*111*		*139*		*98*		*94*		*95*		*92*		*91*		*91*		*92*		*0*
Conductivity (at 25 °C)	3400	*34*	11000	*110*	14000	*140*	13000	*130*	10000	*100*	10000	*100*	13000	*130*	9300	*93*	8900	*89*	9000	*90*	8900	*89*	8900	*89*	8700	*87*	8300	*83*		*0*
% electrical balance		*36.59*		*5.75*		*-0.21*		*-5.29*		*-2.30*		*1.83*		*-0.26*		*0.61*		*-2.42*		*-0.21*		*0.79*		*-0.17*		*1.42*		*0.47*		*#DIV/0!*

Well ID	KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02		KPSELTI02	
Date	26/04/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		29/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024			
Report No.	1028506		1028571		139196		102041		144124		147206		170122		172432		175655		185366			
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	2900	-82	3000	-85	3100	-87	3000	-85	2900	-82	3200	-90	3000	-85	3200	-90	3300	-93	3500	-99		0
Bicarbonate Alkalinity (as CaCO3)	640	-10	670	-11	710	-12	640	-10	530	-9	710	-12	690	-11	740	-12	760	-12	740	-12		0
Sulphate (as SO4)	2000	-42	2200	-46	2400	-50	2200	-46	2100	-44	2300	-48	2200	-46	2400	-50	2300	-48	1800	-37		0
Sum		-134		-141		-149		-141		-134		-150		-142		-152		-153		-148		0
Cations																						
Calcium	360	18	450	22	430	21	430	21	360	18	430	21	430	21	460	23	460	23	410	20		0
Magnesium	360	30	430	35	400	33	400	33	340	28	400	33	390	32	430	35	430	35	430	35		0
Potassium	54	1	63	2	58	1	63	2	59	2	60	2	63	2	61	2	63	2	63	2		0
Sodium	2000	87	2400	104	2200	96	2300	100	2100	91	2200	96	2100	91	2300	100	2300	100	2300	100		0
Sum		136		164		152		156		139		152		146		160		160		157		0
Aluminium (filtered)	0.1	0	0.1	0	2	0	0.1	0	0.2	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Copper (filtered)	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Iron	0.01	0	0.1	0	0.2	0	0.1	0	0.1	0	0.1	0	0.1	0	0.5	0	0.1	0	0.1	0		0
Lead	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Sum		136		164		152		156		139		152		147		160		160		158		0
Conductivity (at 25 °C)	12000	120	13000	130	14000	140	12000	120	11000	110	13000	130	13000	130	14000	140	14000	140	13000	130		0
% electrical balance		0.75		7.35		0.91		5.09		1.69		0.60		1.66		2.44		2.10		3.00		#DIV/0!

Well ID	KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03		KPSELTI03	
Date	26/04/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		29/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024			
Report No.	1028506		1028571		139197		102042		144125		147207		170123		172433		175657		185367			
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	3000	*-85*	2800	*-79*	2600	*-73*	2600	*-73*	2400	*-68*	2500	*-71*	2400	*-68*	2400	*-68*	2700	*-76*	2100	*-59*		*0*
Bicarbonate Alkalinity (as CaCO3)	500	*-8*	500	*-8*	500	*-8*	500	*-8*	380	*-6*	450	*-7*	460	*-8*	480	*-8*	600	*-10*	520	*-9*		*0*
Sulphate (as SO4)	1300	*-27*	1300	*-27*	1300	*-27*	1300	*-27*	1200	*-25*	1200	*-25*	1200	*-25*	1300	*-27*	1200	*-25*	950	*-20*		*0*
Sum		*-120*		*-114*		*-109*		*-109*		*-99*		*-103*		*-100*		*-103*		*-111*		*-88*		*0*
Cations																						
Calcium	210	*10*	210	*10*	190	*9*	200	*10*	180	*9*	170	*8*	180	*9*	180	*9*	210	*10*	160	*8*		*0*
Magnesium	290	*24*	270	*22*	230	*19*	240	*20*	210	*17*	210	*17*	210	*17*	210	*17*	250	*21*	220	*18*		*0*
Potassium	49	*1*	48	*1*	44	*1*	47	*1*	44	*1*	42	*1*	44	*1*	42	*1*	46	*1*	45	*1*		*0*
Sodium	2100	*91*	1900	*83*	1800	*78*	1900	*83*	1700	*74*	1700	*74*	1600	*70*	1700	*74*	1800	*78*	1600	*70*		*0*
Sum		*127*		*117*		*108*		*114*		*101*		*101*		*97*		*101*		*111*		*97*		*0*
Aluminium (filtered)	0.18	*0*	0.1	*0*	1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Copper (filtered)	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Iron	0.01	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.3	*0*	0.2	*0*		*0*
Lead	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Sum		*127*		*117*		*108*		*114*		*101*		*101*		*97*		*101*		*111*		*97*		*0*
Conductivity (at 25 °C)	11000	*110*	11000	*110*	10000	*100*	9900	*99*	9100	*91*	9300	*93*	9400	*94*	9400	*94*	10000	*100*	9200	*92*		*0*
% electrical balance		*2.86*		*1.01*		*-0.30*		*2.24*		*1.22*		*-1.02*		*-1.63*		*-0.66*		*-0.20*		*5.05*		*#DIV/0!*

Well ID	KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04		KPSELTI04	
Date	26/04/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		29/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024			
Report No.	1028506		1028571		139198		102043		144126		147208		170124		172434		175658		185369			
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	550	*-16*	2100	*-59*	2000	*-56*	1900	*-54*	1900	*-54*	2000	*-56*	2000	*-56*	2000	*-56*	1900	*-54*	1900	*-54*		*0*
Bicarbonate Alkalinity (as CaCO3)	710	*-12*	460	*-8*	450	*-7*	450	*-7*	380	*-6*	410	*-7*	410	*-7*	410	*-7*	410	*-7*	430	*-7*		*0*
Sulphate (as SO4)	750	*-16*	920	*-19*	920	*-19*	900	*-19*	860	*-18*	940	*-20*	900	*-19*	980	*-20*	830	*-17*	710	*-15*		*0*
Sum		*-43*		*-86*		*-83*		*-80*		*-78*		*-83*		*-82*		*-84*		*-78*		*-75*		*0*
Cations																						
Calcium	88	*4*	170	*8*	120	*6*	130	*6*	130	*6*	130	*6*	130	*6*	130	*6*	130	*6*	120	*6*		*0*
Magnesium	95	*8*	220	*18*	160	*13*	170	*14*	160	*13*	160	*13*	160	*13*	170	*14*	160	*13*	170	*14*		*0*
Potassium	24	*1*	46	*1*	33	*1*	38	*1*	36	*1*	36	*1*	38	*1*	36	*1*	35	*1*	37	*1*		*0*
Sodium	720	*31*	1800	*78*	1300	*57*	1500	*65*	1300	*57*	1400	*61*	1300	*57*	1400	*61*	1300	*57*	1400	*61*		*0*
Sum		*44*		*106*		*77*		*87*		*77*		*81*		*77*		*82*		*77*		*82*		*0*
Aluminium (filtered)	0.14	*0*	0.1	*0*	1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Copper (filtered)	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Iron	0.01	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Lead	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*	0.1	*0*		*0*
Sum		*44*		*106*		*77*		*87*		*77*		*81*		*77*		*82*		*77*		*82*		*0*
Conductivity (at 25 °C)	4000	*40*	8500	*85*	8100	*81*	7700	*77*	7500	*75*	7600	*76*	7700	*77*	7700	*77*	7600	*76*	7600	*76*		*0*
% electrical balance		*1.60*		*10.49*		*-3.94*		*4.21*		*-0.38*		*-0.74*		*-2.95*		*-0.74*		*-0.31*		*4.08*		*#DIV/0!*

Well ID	KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01		KPSELTM01	
Date	21/02/2024		1/03/2024		13/03/2024		27/03/2024		26/04/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024			
Report No.	1027459		1027625		1028004		1028191		1028506		1028571		139199		102045		144127		170125		172435		175659		185370			
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	2700	-76	2100	-59	1700	-48	2600	-73	2900	-82	3700	-104	3800	-107	3700	-104	3700	-104	3500	-99	3500	-99	3500	-99	3700	-104		0
Bicarbonate Alkalinity (as CaCO3)	310	-5	400	-7	380	-6	340	-6	500	-8	770	-13	740	-12	740	-12	740	-12	720	-12	720	-12	710	-12	720	-12		0
Sulphate (as SO4)	1400	-29	1500	-31	1700	-35	1600	-33	2000	-42	2500	-52	2600	-54	2600	-54	2600	-54	2400	-50	2500	-52	2300	-48	1900	-40		0
Sum		-110		-97		-90		-112		-132		-169		-173		-171		-171		-160		-163		-158		-156		0
Cations																												
Calcium	280	14	280	14	160	8	270	13	310	15	450	22	390	19	400	20	410	20	400	20	400	20	400	20	350	17		0
Magnesium	260	21	270	22	190	16	260	21	350	29	560	46	480	39	490	40	490	40	470	39	490	40	480	39	500	41		0
Potassium	71	2	68	2	42	1	66	2	67	2	74	2	66	2	70	2	73	2	73	2	67	2	69	2	71	2		0
Sodium	1600	70	1600	70	1400	61	1500	65	1900	83	2700	117	2400	104	2500	109	2500	109	2400	104	2500	109	2500	109	2600	113		0
Sum		107		108		86		102		129		188		165		171		171		165		171		170		174		0
Aluminium (filtered)	0.01	0	0.01	0	0.01	0	0.01	0	0.04	0	0.1	0	2	0	0.6	0	0.1	0	0.2	0	0.1	0	0.1	0	0.1	0		0
Copper (filtered)	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Iron	0.01	0	0.01	0	0.01	0	0.01	0	2	0	0.1	0	1	0	0.6	0	0.1	0	0.1	0	3	0	2	0	0.1	0		0
Lead	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Sum		107		108		86		102		129		188		165		171		171		165		171		170		174		0
Conductivity (at 25 °C)	9500	95	9700	97	10000	100	10000	100	12000	120	15000	150	15000	150	15000	150	14000	140	14000	140	15000	150	14000	140	15000	150		0
% electrical balance		-1.66		5.13		-2.28		-4.87		-1.11		5.28		-2.40		0.08		0.22		1.36		2.50		3.60		5.41		#DIV/0!

Well ID	KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03		KPSELTM03	
Date	21/02/2024		1/03/2024		13/03/2024		27/03/2024		26/04/2024		1/05/2024		7/05/2024		15/05/2024		21/05/2024		29/05/2024		5/06/2024		12/06/2024		24/06/2024		22/07/2024			
Report No.	1027459		1027625		1028004		1028191		1028506		1028571		139200		102046		144128		147209		170126		172436		175660		185371			
Anions	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L	mgL	meq/L
Chloride	810	-23	890	-25	2300	-65	810	-23	780	-22	820	-23	1000	-28	800	-23	850	-24	890	-25	890	-25	850	-24	850	-24	800	-23		0
Bicarbonate Alkalinity (as CaCO3)	260	-4	290	-5	360	-6	330	-5	340	-6	380	-6	360	-6	340	-6	310	-5	360	-6	380	-6	380	-6	310	-5	350	-6		0
Sulphate (as SO4)	380	-8	420	-9	440	-9	410	-9	440	-9	440	-9	470	-10	430	-9	440	-9	460	-10	440	-9	480	-10	400	-8	400	-8		0
Sum		-35		-39		-80		-37		-37		-39		-44		-37		-38		-41		-40		-40		-37		-37		0
Cations																														
Calcium	50	2	50	2	160	8	45	2	42	2	49	2	46	2	42	2	39	2	42	2	42	2	43	2	40	2	41	2		0
Magnesium	59	5	63	5	190	16	57	5	54	4	62	5	61	5	52	4	51	4	52	4	52	4	55	5	51	4	53	4		0
Potassium	25	1	22	1	41	1	20	1	19	0	22	1	21	1	20	1	22	1	20	1	21	1	20	1	19	0	20	1		0
Sodium	700	30	740	32	1400	61	710	31	710	31	820	36	790	34	740	32	710	31	730	32	710	31	740	32	740	32	730	32		0
Sum		38		40		86		38		38		44		42		39		38		39		38		39		39		39		0
Aluminium (filtered)	0.01	0	0.01	0	0.01	0	0.01	0	0.01	0	0.1	0	1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Copper (filtered)	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Iron	0.01	0	0.01	0	0.01	0	0.01	0	0.01	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Lead	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0	0.1	0		0
Sum		38		40		86		38		38		44		42		39		38		39		38		39		39		39		0
Conductivity (at 25 °C)	4000	40	4100	41	8000	80	4000	40	3800	38	4100	41	4600	46	3800	38	3900	39	3900	39	4000	40	4000	40	3900	39	3900	39		0
% electrical balance		4.65		2.32		3.40		2.05		1.58		6.41		-1.81		2.63		-0.81		-2.43		-3.42		-1.02		1.97		2.73		#DIV/0!

APPENDIX B RELATIVE PERCENT DIFFERENCE

Relative Percent Difference Assessment

Bore_ID	KPSELTX01	KPSELTX01		KPSELTI01	KPSELTI01		KPSELTI01			KPSELTI03	KPSELTI03			KPSELTI03			KPSELTI02	KPSELTI02		KPSELTI02			KPSELTI04	KPSELTI04			KPSELTI04			KPSELTM01	KPSELTM01			KPSELTM01			KPSELTM03	KPSELTM03			KPSELTM03			KPSELTX01	KPSELTX01		KPSELTX01			KPSELTI01	KPSELTI01		KPSELTI01			KPSELTI02	KPSELTI02	KPSELTI02		KPSELTM03	KPSELTM03		KPSELTK03	
Date	27/03/2024	27/03/2024		26/04/2024	26/04/2024		26/04/2024			1/05/2024	1/05/2024			1/05/2024			7/05/2024	7/05/2024		7/05/2024			15/05/2024	15/05/2024			15/05/2024			21/05/2024	21/05/2024			21/05/2024			29/05/2024	29/05/2024			29/05/2024			5/06/2024	5/06/2024		5/06/2024			12/06/2024	12/06/2024		12/06/2024			24/06/2024	24/06/2024	24/06/2024		22/07/2024	22/07/2024		22/07/2024	
Report	1028191	1028191		1028596	1028506		1091541			1028571	1028571			1093049			139196	139201		1094681			102043	102044			1097817			144127	144129			144127			147210	147210			147209			170127	170128		1105050			172430	172431		1107157			175655	175656	1111150		185367	185368		1120138	
Type	Primary	Intra	RPD	Primary	Intra	RPD	Inter	RPD		Primary	Intra	RPD		Inter	RPD		Primary	Intra	RPD	Inter	RPD		Primary	Intra	RPD		Inter	RPD		Primary	Intra	RPD		Inter	RPD		Primary	Intra	RPD		Inter	RPD		Primary	Intra	RPD	Inter	RPD		Primary	Intra	RPD	Inter	RPD		Primary	Intra	RPD	Inter	RPD		Inter	RPD	
pH at Measured Temp	7.2	7.3	1.4	8	8.1	1.2	7.4	7.8	0.0	7.4	7.4	0.0		7.9	6.5		7.1	7.1	0.0	7.9	10.7		7.7	7.7	0.0		7.8	1.3		7.7	7.5	2.6			9.5		7.5	7.5	0.0		7.4	1.3	8.5	12.5	8.1	8.3	2.4		8.2	1.2		8.3	8.3	0.0	8.3	0.0		6.7	6.7	0.0	7.1	5.8	7	7.0	0.0	7.7	9.5
Measured Temp. °C	20.4	20.2	1.0	13.8	14.4	4.3		18.8	18.7	0.5							19.9	20	0.5				17.3	17.3	0.0					19.8	19.8	0.0					19.8	19.8	0.0					18	18	0.0				16.2	16	1.2				13.4	13.1	2.3		19.9	19.9	0.0		
Conductivity at 25°C µS/cm	11000	11000	0.0	10000	10000	0.0	9300	7.3		11000	11000	0.0		9500	14.6		14000	14000	0.0	13000	7.4		7700	7700	0.0		7100	8.1		14000	14000	0.0		7200	64.2		3900	3900	0.0		6600	51.4	4000	2.5	7700	8400	8.7	7600	1.3		8900	8900	0.0	8800	1.1		14000	14000	0.0	12000	15.4		9200	9200	0.0	9200	0.0
Resistivity at 25°C ohm m	0.91	0.91	0.0	1	1	0.0		0.91	0.91	0.0							0.73	0.73	0.0				0.7	0.7	0.0					2.55	2.54	0.4		1.51	51.2							1.3	1.19	8.8				1.12	1.13	0.9				0.73	0.73	0.0		1.09	1.09	0.0		
Calculated Total Dissolved Solids mg/L	7200	7100	1.4	6400	6400	0.0		7000	7000	0.0							8800	8700	1.1				9200	9200	0.0					2500	2500	0.0		4200	50.7							4900	5400	9.7				5700	5700	0.0				8800	8800	0.0		5900	5900	0.0		
Potassium as K mg/L	47	47	0.0	48	48	0.0	48	0.0		48	52	8.0		45	6.5		58	55	5.3	56	3.5		38	39	2.6		33	14.1		73	71	2.8		65	11.6		20	20	0.0		22	9.5	19	5.1	41	42	2.4	36	13.0		47	48	2.1	46	2.2		63	62	1.6	59	6.6		45	43	4.5	39	14.3
Sodium as Na mg/L	1800	1800	0.0	1800	1800	0.0	1700	5.7		1900	2100	10.0		1700	11.1		2200	2100	4.7	2000	9.5		1500	1500	0.0		1300	14.3		2500	2400	4.1		2300	8.3		730	750	2.7		750	2.7	760	4.0	1300	1400	7.4	1200	8.0		1600	1600	0.0	1700	6.1		2300	2300	0.0	2200	4.4		1600	1700	6.1	1400	13.3
Barium as Ba mg/L	0.01	0.01	0.0	0.01	0.01	0.0	0.2	181.0		0.1	0.1	0.0		0.02	133.3		0.1	0.1	0.0	0.03	107.7		0.1	0.1	0.0		0.04	85.7		0.1	0.1	0.0		0.03	107.7		0.1	0.1	0.0		0.1	0.0	0.02	133.3	0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0	0.06	50.0		0.1	0.1	0.0	0.02	133.3		0.1	0.1	0.0	0.02	133.3
Calcium as Ca mg/L	210	210	0.0	160	160	0.0	210	230	9.1	180	180	15.4		430	400	7.2	370	370	15.0	130	140	7.4	120	120	8.0		410	400	2.5	380	380	7.6		42	42	0.0		41	2.4	40	4.9	160	180	11.8	140	13.3		140	140	0.0	150	6.9		460	460	0.0	420	9.1		160	160	0.0	160	0.0
Iron as Fe mg/L	0.01	0.01	0.0	0.01	0.01	0.0	0.5	192.2		0.1	0.1	0.0		0.05	66.7		0.2	0.2	0.0	0.05	120.0		0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0		0.05	66.7	0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0	0.05	66.7		0.1	0.1	0.0	0.09	10.5		0.2	0.2	0.0	0.5	85.7
Magnesium as Mg mg/L	270	270	0.0	220	210	4.7	200	9.5		270	290	7.1		0.05	199.9		400	370	7.8	360	10.5		170	170	0.0		160	6.1		490	470	4.2		460	6.3		52	53	1.9		54	3.8	49	5.9	170	190	11.1	150	12.5		160	160	0.0	170	6.1		430	430	0.0	400	7.2		220	210	4.7	190	14.6
Strontium as Sr mg/L	1	1	0.0	2	2	0.0	2	0.0		3	3	0.0		0.05	193.4		5	4	22.2	4.9	2.0		2	2	0.0		1.6	22.2		5	5	0.0		5	0.0		0.3	0.3	0.0		0.1	100.0	0.63	71.0	2	2	0.0		2.3	14.0		2.1	4.9		5	5	0.0	4.8	4.1		2	2	0.0	1.8	10.5
Aluminium as Al mg/L	0.01	0.01	0.0	0.23	0.18	24.4	0.5	74.0		0.1	0.1	0.0		0.05	66.7		2	2	0.0	0.05	190.2		0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0		0.1	0.0	0.05	66.7	0.1	0.1	0.0		0.05	66.7		0.1	0.1	0.0	0.18	57.1		0.1	0.1	0.0	0.09	66.7		0.1	0.1	0.0	0.55	138.5
Total Cations mg/L	2400	2300	4.3	2200	2200	0.0		2500	2700	7.7							3100	2900	6.7				1800	1800	0.0					3500	3400	2.9					840	860	2.4		870	3.5			1700	1800	5.7				2000	2000	0.0				3300	3300	0.0		2100	2100	0.0		
Potassium as K meq/L	1	1	0.0	1	1	0.0		1	1	0.0							1	1	0.0				2	2	0.0					2	2	0.0					0.51	0.52	1.9		0.56	9.3			1	1	0.0				1	1	0.0				2	2	0.0				
Sodium as Na meq/L	79	78	1.3	78	77	1.3		84	93	10.2							96	91	5.3				64	64	0.0					110	110	0.0					32	33	3.1		33	3.1			58	61	5.0				70	70	0.0				100	100	0.0		71	72	1.4		
Barium as Ba meq/L	0.01	0.01	0.0	0.01	0.01	0.0		0.01	0.01	0.0							0.01	0.01	0.0				0.01	0.01	0.0					0.01	0.01	0.0					0.01	0.01	0.0		0.01	0.0			0.01	0.01	0.0				0.01	0.01	0.0				0.01	0.01	0.0		0.01	0.01	0.0		
Calcium as Ca meq/L	11	10	9.5	8	8	0.0		10	11	9.5							21	20	4.9				7	7	0.0					21	20	4.9					2	2	0.0		2	0.0			8	9	11.8				23	23	0.0				8	8	0.0				
Iron as Fe meq/L	0.01	0.01	0.0	0.01	0.01	0.0		0.01	0.01	0.0							0.01	0.01	0.0				0.01	0.01	0.0					0.01	0.01	0.0					0.01	0.01	0.0		0.01	0.0			0.01	0.01	0.0				0.01	0.01	0.0				0.01	0.01	0.0		0.01	0.01	0.0		
Magnesium as Mg meq/L	22	22	0.0	18	17	5.7		22	24	8.7							33	31	6.3				14	14	0.0					40	39	2.5					4	4	0.0		4	0.0			14	16	13.3				35	35	0.0				18	17	5.7				
Strontium as Sr meq/L	0.03	0.02	40.0	0.05	0.05	0.0		0.06	0.06	0.0							0.11	0.1	9.5				0.04	0.04	0.0					0.12	0.11	8.7					0.01	0.01	0.0		0.01	0.0			0.04	0.04	0.0				0.04	0.04	0.0				0.12	0.12	0.0				0.05	0.05	0.0			
Aluminium as Al meq/L	0.01	0.01	0.0	0.01	0.01	0.0		0.01	0.01	0.0							0.08	0.07	13.3				0.01	0.01	0.0					0.01	0.01	0.0					0.01	0.01	0.0		0.01	0.0			0.01	0.01	0.0				0.01	0.01	0.0				0.01	0.01	0.0		0.01	0.01	0.0		
Total Cations meq/L	110	110	0.0	100	100	0.0		120	130	8.0							150	140	6.9				86	87	1.2					170	170	0.0					39	39	0.0		40	2.5			81	87	7.1				92	92	0.0				160	160	0.0		98	99	1.0		
Boron as B mg/L	1	1	0.0	1	1	0.0	5	133.3		2	2	0.0		0.05	190.2		2	2	0.0	2.2	9.5		1	2	66.7		1.5	40.0		3	3	0.0		2.6	14.3		1	1	0.0		1.4	33.3			1	2	66.7		1.8	57.1		1	2	66.7	1.6	46.2		2	2	0.0	2.3	14.0		2	2	0.0	1.5	28.6
Silicon as Si mg/L	9	9	0.0	9	9	0.0	9.3	3.3		12	13	8.0		0.05	198.3		14	13	7.4	14	0.0		11	11	0.0		10	9.5		16	15	6.5		17	6.1		11	11	0.0		11	0.0	8.5	25.6	10	9	10.5		9.3	7.3		10	10	0.0	7.7	26.0		16	16	0.0	16	0.0		12	13	8.0	12	28.6
Lithium as Li mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.1	66.7		0.1	0.1	0.0		0.01	163.6		0.1	0.1	0.0	0.02	133.3		0.1	0.1	0.0		0.025	120.0		0.1	0.1	0.0		0.006	177.4		0.1	0.1	0.0		0.005	181.0	0.1	0.1	0.0		0.016	144.8		0.1	0.1	0.0	0.021	130.6		0.1	0.1	0.0	0.02	133.3		0.1	0.1	0.0	0.009	167.0
Cadmium as Cd mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.002	192.2		0.1	0.1	0.0		0.0002	199.2		0.1	0.1	0.0	0.0002	199.2		0.1	0.1	0.0		0.0002	199.2		0.1	0.1	0.0		0.0002	199.2		0.1	0.1	0.0		0.0002	199.2	0.1	0.1	0.0		0.0002	199.2		0.1	0.1	0.0	0.0002	199.2		0.1	0.1	0.0	0.0002	199.2		0.1	0.1	0.0	0.0002	199.2	
Chromium as Cr mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.1	163.6		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0	0.001	196.0		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0		0.001	196.0	0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0	0.001	196.0		0.1	0.1	0.0	0.001	196.0		0.1	0.1	0.0	0.002	192.2	
Vanadium as V mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.05	66.7		0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0	0.005	181.0		0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0		0.005	193.4	0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0	0.005	181.0		0.1	0.1	0.0	0.005	181.0		0.1	0.1	0.0	0.005	181.0	
Nickel as Ni mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.021	130.6		0.1	0.1	0.0		0.021	130.6		0.1	0.1	0.0	0.027	115.0		0.1	0.1	0.0		0.017	141.9		0.1	0.1	0.0		0.023	125.2		0.1	0.1	0.0		0.019	136.1	0.1	0.1	0.0		0.031	105.3		0.1	0.1	0.0	0.004	184.6		0.1	0.1	0.0	0.028	112.5		0.1	0.1	0.0	0.01	163.6
Zinc as Zn mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.05	66.7		0.1	0.1	0.0		0.054	59.7		0.1	0.1	0.0	0.059	51.6		0.1	0.1	0.0		0.048	70.3		0.1	0.1	0.0		0.06	50.0		0.1	0.1	0.0		0.06	50.0	0.1	0.1	0.0		0.037	92.0		0.1	0.1	0.0	0.02	133.3		0.1	0.1	0.0	0.01	163.6		0.1	0.1	0.0	0.021	130.6	
Lead as Pb mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.01	163.6		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0	0.001	196.0		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0		0.001	196.0	0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0	0.001	196.0		0.1	0.1	0.0	0.001	196.0		0.1	0.1	0.0	0.001	196.0	
Copper as Cu mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.063	45.4		0.1	0.1	0.0		0.029	110.1		0.1	0.1	0.0	0.012	157.1		0.1	0.1	0.0		0.051	64.9		0.1	0.1	0.0		0.001	196.0		0.1	0.1	0.0		0.022	127.9	0.1	0.1	0.0		0.063	45.4		0.1	0.1	0.0	0.014	150.9		0.1	0.1	0.0	0.008	170.4		0.1	0.1	0.0	0.009	167.0
Manganese as Mn mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.063	45.4		0.1	0.1	0.0		0.052	63.2		0.1	0.1	0.0	0.16	46.2		0.1	0.1	0.0		0.075	28.6		0.1	0.1	0.0		0.14	33.3		0.1	0.1	0.0		0.025	120.0	0.1	0.1	0.0		0.096	4.1		0.1	0.1	0.0	0.083	18.6		0.2	0.2	0.0	0.17	16.2		0.1	0.1	0.0	0.048	70.3
Tin as Sn mg/L	0.1	0.1	0.0	0.1	0.1	0.0		0.1	200.0	0.1	0.1	0.0			200.0		0.1	0.1	0.0		200.0		0.1	0.1	0.0			200.0		1	1	0.0			200.0		0.1	0.1	0.0			200.0	0.1	0.1	0.0			200.0		0.1	0.1	0.0		200.0		0.1	0.1	0.0		200.0		0.1	0.1	0.0		200.0	
Phosphorus as P mg/L	0.2	0.2	0.0	0.2	0.2	0.0	0.07	96.3		0.3	0.2	40.0		0.02	175.0		0.2	0.5	85.7	0.02	163.6		0.2	0.2	0.0		0.01	181.0		0.2	0.2	0.0		0.02	163.6		0.2	0.2	0.0		0.01	181.0	0.2	0.2	0.0		0.02	163.6		0.2	0.2	0.0	0.02	163.6		0.2	0.2	0.0	0.02	163.6		0.2	0.2	0.0	< 0.01	#VALUE!	
Molybdenum as Mo mg/L	0.1	0.1	0.0	0.1	0.1	0.0	0.5	66.7		0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0	0.005	181.0		0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0		0.005	181.0	0.1	0.1	0.0		0.005	181.0		0.1	0.1	0.0	0.005	181.0		0.1	0.1	0.0	0.005	181.0		0.1	0.1	0.0	0.005	181.0	
Bromide as Br mg/L	10	10	0.0	9	9	0.0	10	10.5		8	9	11.8		10	22.2		9	9	0.0	5.8	43.2		7	6	15.4		1	150.0		12	12	0.0		6.3	62.3		5	5	0.0		4	22.2	3.6	38.1	3	3	0.0		1	100.0		4	4	0.0	1	142.9		7	7	0.0	1	150.0		7	7	0.0	6.3	10.5	
Chloride as Cl mg/L	3200	3200	0.0	2900	2500	14.8	2700	7.1		2800	2800	0.0		2700	3.6		3100	3200	3.2	3300	6.3		1900	1900	0.0		1800	5.4		3700	3700	0.0		3900	5.3		890	920	3.3		900	1.1	790	11.9	1900	2000	5.1	1600	17.1		2300	2200	4.4	1900	19.0		3300	3300	0.0	2800	16.4		2100	2700	25.0	2200	4.7
Fluoride as F mg/L	0.6	0.6	0.0	0.7	0.7	0.0	1.2	52.6		0.7	0.7	0.0		2.6	115.2		0.9	0.5	57.1	2	75.9		0.9	1	10.5		0.5	57.1		0.6	0.6	0.0		1.3	73.7		0.9	0.9	0.0		1	10.5	1.9	71.4	1	1	0.0		0.5	66.7		0.9	0.8	11.8	0.5	57.1		0.4	0.4	0.0	1.5	115.8		0.7	0.7	0.0	1.4	66.7	
Nitrate as NO2 mg/L	2	2	0.0	2	2	0.0	0.23	158.7		7	2	111.1		0.11	193.8		0.6	0.1	142.9	0.04	175.0		0.4	0.1	120.0		0.02	181.0		0.3	0.1	100.0		0.02	175.0		0.1	0.1	0.0		0.1	0.0	0.02	133.3	0.1	0.1	0.0		0.1	0.0		0.1	0.1	0.0	0.1	0.0		0.1	0.1	0.0	0.1	0.0		0.1	0.1	0.0	0.2	133.3	
Sulphate as SO2 mg/L	1200	1200	0.0	1100	1100	0.0	1100	0.0		1300	1300	0.0		1300	0.0		2400	2400	0.0	2300	4.3		900	890	1.1		840	6.9		2600	2600	0.0		2600	0.0		460	460	0.0		470	2.2	450	2.2	1100	1300	16.7	1200	8.7		1000	1000	0.0	1100	9.5		2300	2300	0.0	2700	16.0		950	960	1.0	1200	23.3
Bromide as Br meq/L	0.12	0.12	0.0	0.11	0.11	0.0		0.099	0.11	10.5							0.11	0.11	0.0				0.09	0.08	11.8					0.16	0.15	6.5					0.06	0.06	0.0		0.06	0.0			0.06	0.05	22.2				0.08	0.07	13.3				0.09	0.09	0.0				0.09	0.09	0.0			
Chloride as Cl meq/L	91	89	2.2	82	69	17.2		78	79	1.3							88	91	3.4				55	54	1.8					110	110	0.0					25	26	3.9		25	0.0			53	57	7.3				64	63	1.6				93	94	1.1				60	75	22.2			
Fluoride as F meq/L	0.03	0.03	0.0	0.04	0.04	0.0		0.04	0.04	0.0							0.05	0.03	50.0				0.05	0.05	0.0					0.03	0.03	0.0					0.05	0.05	0.0		0.05	0.0			0.05	0.06	18.2				0.05	0.04	22.2				0.02	0.02	0.0				0.04	0.04	0.0			
Nitrate as NO2 meq/L	0.04	0.04	0.0	0.03	0.03	0.0		0.12	0.03	120.0							0.01	0.01	0.0				0.01	0.01	0.0					0.01	0.01	0.0					0.01	0.01	0.0		0.01	0.0			0.01	0.01	0.0				0.03	0.01	100.0				0.01	0.01	0.0				0.01	0.01	0.0			
Sulphate as SO2 meq/L	26	26	0.0	23	24	4.3		27	27	0.0							50	50	0.0				19	19	0.0					55	54	1.8					10	10	0.0		10	0.0			23	26	12.2				21	20	4.9				47	47	0.0				20	20	0.0			
Hydroxide CaCO3 mg/L	1	1	0.0	1	1	0.0	20	181.0		1	1	0.0		20	181.0		1	1	0.0	20	181.0		1	1	0.0		20	181.0		1	1	0.0		20	181.0		1	1	0.0		20	181.0	1	1	0.0		20	181.0		1	1	0.0	20	181.0		1	1	0.0	20	181.0		1	1	0.0	20	181.0	
Carbonate CaCO3 mg/L	1	1	0.0	1	1	0.0	10	163.6		1	1	0.0		10	163.6		1	1	0.0	10	163.6		1	1	0.0		10	163.6		1	1	0.0		10	163.6		1	1	0.0		10	163.6	1	1	0.0		10	163.6		1	1	0.0	10	163.6		1	1	0.0	10	163.6		1	1	0.0	10	163.6	
Bicarbonate CaCO3 mg/L	480	480	0.0	360	340	5.7	230	44.1		500	530	5.8		340	38.1		710	720	1.4	710	0.0		450	450	0.0		480	6.5		740	650	12.9		580	24.2		360	340	5.7		410	13.0	380	5.4	450	460	2.2	460	2.2		340	290	15.9	4400	171.3		760	670	12.6	760	0.0		520	480	8.0	490	5.9	
Total Alkalinity CaCO3 mg/L	480	480	0.0	360	1900	136.3	230	44.1		500	530	5.8		340	38.1		710	720	1.4	710	0.0		450	450	0.0		480	6.5		7100	7000	1.4		580	169.8		360	340	5.7

APPENDIX C LABORATORY REPORTS

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Leon Faulkner

Project Name	**24PEAD0000350**
Client Ref:	00202112

Customer Sample ID		**KPSELTX01**	**KPSELTI01**
Date Collected		**14/02/2024**	**14/02/2024**
Date Started		**16/02/2024**	**16/02/2024**
Sample Type		**Water**	**Water**
Test/Reference	Unit		
Heavy Metals *			
Arsenic*	mg/L	0.007	0.003
Beryllium*	mg/L	<0.001	<0.001
Cadmium*	mg/L	<0.0002	<0.0002
Cobalt*	mg/L	0.011	<0.001
Mercury*	mg/L	<0.0001	<0.0001
Selenium*	mg/L	0.002	0.005
Silver*	mg/L	<0.005	<0.005
Uranium*	mg/L	0.021	<0.005
Sulphur *			
Total Oxidised Sulphur (as S)*	mg/L	230	33
WATER ANALYSIS			
Test/Reference	Unit		
PROPERTIES: APHA 4500-H+ A,B			
pH at Measured Temp.		7.9	12.1
Measured Temp.	°C	20.2	20.2
PROPERTIES: APHA 2510 A,B			
Electrical Conductivity @ 25°C	µS/cm	6900	3400
Resistivity @ 25°C	ohm.m	1.45	2.94
ANIONS mg/L APHA 2320 A,B			
Hydroxide as CaCO3	mg/L	<1	480
Carbonate as CaCO3	mg/L	<1	100
Bicarbonate as CaCO3	mg/L	450	<1
ANIONS mg/L APHA 4110			
Chloride as Cl	mg/L	1500	270
Nitrate as NO3	mg/L	<0.1	0.6
Sulphate as SO4	mg/L	750	92
Total Anions	mg/L	2700	940
ANIONS meq/L APHA 1050 A*			
Hydroxide as OH*	meq/L	<0.01	10
Carbonate as CO3*	meq/L	<0.01	2
Bicarbonate as HCO3*	meq/L	9	<0.01
Chloride as Cl*	meq/L	43	7
Nitrate as NO3*	meq/L	<0.01	<0.01
Sulphate as SO4*	meq/L	16	2
Total Anions*	meq/L	68	21
CATIONS Dissolved mg/L P3100-PW-012			

Customer Sample ID		**KPSELTX01**	**KPSELTI01**
Date Collected		**14/02/2024**	**14/02/2024**
Date Started		**16/02/2024**	**16/02/2024**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
Potassium as K	mg/L	33	49
Sodium as Na	mg/L	1100	270
Barium as Ba	mg/L	<0.1	0.24
Calcium as Ca	mg/L	140	150
Iron as Fe	mg/L	<0.1	0.19
Magnesium as Mg	mg/L	160	0.21
Strontium as Sr	mg/L	2	3
Aluminium as Al	mg/L	<0.1	0.47
Boron as B	mg/L	1	0.4
Silicon as Si	mg/L	10	3
Lithium as Li	mg/L	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1
Manganese as Mn	mg/L	0.1	<0.1
Tin as Sn	mg/L	<0.1	0.3
Phosphorus as P	mg/L	8	6
Molybdenum as Mo	mg/L	<0.1	0.3
CATIONS mg/L P3100-PW-012			
Total Cations	mg/L	1500	470
CATIONS meq/L APHA 1050 A*			
Potassium as K*	meq/L	0.85	1
Sodium as Na*	meq/L	48	12
Barium as Ba*	meq/L	<0.01	<0.01
Calcium as Ca*	meq/L	7	8
Iron as Fe*	meq/L	<0.01	0.01
Magnesium as Mg*	meq/L	13	0.02
Strontium as Sr*	meq/L	0.04	0.06
Aluminium as Al*	meq/L	<0.01	0.02
Total Cations*	meq/L	70	21
DERIVED PARAMETERS APHA 4110 & 3120			
Ion balance (Diff * 100/Sum)	%	1	1
Acceptance Criteria	%	5	5
Satisfactory		Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B			
Total Alkalinity (calc as CaCO3)	mg/L	450	590
DERIVED PARAMETERS APHA 4110 & P3100-PW-012			
Total Cations + Anions	mg/L	4200	1400
DERIVED PARAMETERS APHA 2340 B*			
Hardness (calc as CaCO3)*	mg/L	1000	380
DERIVED PARAMETERS APHA 2540 A,B,C,D*			
Calculated Total Dissolved Solids*	mg/L	4400	2200

Test Description

DERIVED PARAMETERS — If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1069794-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1069794-W

Authorised By

Valentina Pavlovic — Manager - Chemist — Accreditation No 626

Final Report

- Indicates Not Requested

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

Samples will be discarded after 30 days unless otherwise notified.

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Philippa Faulkner

Project Name **24PEAD0000401**
Client Ref: 00202112

Customer Sample ID		**KPSELTM01**	**KPSELTM03**
Date Collected		**21/02/2024**	**21/02/2024**
Date Started		**23/02/2024**	**23/02/2024**
Sample Type		**Water**	**Water**
Test/Reference	Unit		
Heavy Metals *			
Arsenic*	mg/L	0.021	0.031
Beryllium*	mg/L	<0.001	<0.001
Cadmium*	mg/L	<0.0002	<0.0002
Cobalt*	mg/L	0.022	0.015
Mercury*	mg/L	<0.0001	<0.0001
Selenium*	mg/L	0.003	0.005
Silver*	mg/L	<0.005	<0.005
Uranium*	mg/L	0.14	0.13
Sulphur *			
Total Oxidised Sulphur (as S)*	mg/L	480	120
WATER ANALYSIS			
Test/Reference	Unit		
PROPERTIES: APHA 4500-H+ A,B			
pH at Measured Temp.		7.2	7.7
Measured Temp.	°C	21.1	21.1
PROPERTIES: APHA 2510 A,B			
Electrical Conductivity @ 25°C	µS/cm	9500	4000
Resistivity @ 25°C	ohm.m	1.05	2.50
ANIONS mg/L APHA 2320 A,B			
Hydroxide as CaCO3	mg/L	<1	<1
Carbonate as CaCO3	mg/L	<1	<1
Bicarbonate as CaCO3	mg/L	310	260
ANIONS mg/L APHA 4110			
Chloride as Cl	mg/L	2700	810
Nitrate as NO3	mg/L	3	0.5
Sulphate as SO4	mg/L	1400	380
Total Anions	mg/L	4500	1500
ANIONS meq/L APHA 1050 A*			
Hydroxide as OH*	meq/L	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	6	5
Chloride as Cl*	meq/L	77	23
Nitrate as NO3*	meq/L	0.05	<0.01
Sulphate as SO4*	meq/L	30	8
Total Anions*	meq/L	110	36
CATIONS Dissolved mg/L P3100-PW-012			

Customer Sample ID		**KPSELTM01**	**KPSELTM03**
Date Collected		**21/02/2024**	**21/02/2024**
Date Started		**23/02/2024**	**23/02/2024**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
Potassium as K	mg/L	71	25
Sodium as Na	mg/L	1600	700
Barium as Ba	mg/L	<0.1	<0.1
Calcium as Ca	mg/L	280	50
Iron as Fe	mg/L	<0.1	<0.1
Magnesium as Mg	mg/L	260	59
Strontium as Sr	mg/L	3	0.68
Aluminium as Al	mg/L	<0.1	<0.1
Boron as B	mg/L	1	1
Silicon as Si	mg/L	8	10
Lithium as Li	mg/L	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1
Manganese as Mn	mg/L	0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2
Molybdenum as Mo	mg/L	0.2	<0.1
CATIONS mg/L P3100-PW-012			
Total Cations	mg/L	2200	830
CATIONS meq/L APHA 1050 A*			
Potassium as K*	meq/L	2	0.64
Sodium as Na*	meq/L	69	30
Barium as Ba*	meq/L	<0.01	<0.01
Calcium as Ca*	meq/L	14	3
Iron as Fe*	meq/L	<0.01	<0.01
Magnesium as Mg*	meq/L	21	5
Strontium as Sr*	meq/L	0.07	0.02
Aluminium as Al*	meq/L	<0.01	<0.01
Total Cations*	meq/L	110	38
DERIVED PARAMETERS APHA 4110 & 3120			
Ion balance (Diff * 100/Sum)	%	3	3
Acceptance Criteria	%	5	5
Satisfactory		Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B			
Total Alkalinity (calc as CaCO3)	mg/L	350	260
DERIVED PARAMETERS APHA 4110 & P3100-PW-012			
Total Cations + Anions	mg/L	6700	2300
DERIVED PARAMETERS APHA 2340 B*			
Hardness (calc as CaCO3)*	mg/L	1700	370
DERIVED PARAMETERS APHA 2540 A,B,C,D*			
Calculated Total Dissolved Solids*	mg/L	6100	2500

Test Description

DERIVED PARAMETERS — If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1072100-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1072100-W

Authorised By

Valentina Pavlovic — Manager - Chemist — Accreditation No 626

Final Report

- Indicates Not Requested

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

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Philippa Faulkner

Project Name **24PEAD0000458**
Client Ref: 00202112

Customer Sample ID		**KPSELTM01**	**KPSELTM03**	**KPSELTI01**
Date Collected		**01/03/2024**	**01/03/2024**	**01/03/2024**
Date Started		**05/03/2024**	**05/03/2024**	**05/03/2024**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.003	0.014	0.009
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cadmium*	mg/L	<0.0002	<0.0002	<0.0002
Cobalt*	mg/L	0.016	0.007	0.009
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	0.002	0.005	0.008
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.12	0.11	0.018
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	510	130	390
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		7.2	7.7	7.7
Measured Temp.	°C	22.7	22.7	22.7
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	9700	4100	11000
Resistivity @ 25°C	ohm.m	1.03	2.44	0.91
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	400	290	430
ANIONS mg/L APHA 4110				
Chloride as Cl	mg/L	2100	890	2500
Nitrate as NO3	mg/L	3	0.8	2
Sulphate as SO4	mg/L	1500	420	1200
Total Anions	mg/L	4000	1600	4100
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	8	6	9
Chloride as Cl*	meq/L	59	25	71
Nitrate as NO3*	meq/L	0.04	0.01	0.04
Sulphate as SO4*	meq/L	32	9	25
Total Anions*	meq/L	99	40	100
CATIONS Dissolved mg/L P3100-PW-012				

Customer Sample ID		KPSELTM01	KPSELTM03	KPSELTI01
Date Collected		01/03/2024	01/03/2024	01/03/2024
Date Started		05/03/2024	05/03/2024	05/03/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
Potassium as K	mg/L	68	22	53
Sodium as Na	mg/L	1600	740	1900
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	280	50	210
Iron as Fe	mg/L	<0.1	<0.1	<0.1
Magnesium as Mg	mg/L	270	63	250
Strontium as Sr	mg/L	3	0.62	3
Aluminium as Al	mg/L	<0.1	<0.1	<0.1
Boron as B	mg/L	1	1	1
Silicon as Si	mg/L	8	10	11
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	0.2	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1	<0.1
Phosphorus as P	mg/L	1	<0.2	6
Molybdenum as Mo	mg/L	0.2	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2200	880	2400
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	2	0.56	1
Sodium as Na*	meq/L	69	32	84
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	14	2	10
Iron as Fe*	meq/L	<0.01	<0.01	<0.01
Magnesium as Mg*	meq/L	22	5	20
Strontium as Sr*	meq/L	0.07	0.01	0.06
Aluminium as Al*	meq/L	<0.01	<0.01	<0.01
Total Cations*	meq/L	110	41	120
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	4	1	5
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	400	290	430
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	6200	2500	6600
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	1800	380	1500
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	6200	2600	6900

Customer Sample ID		**KPSELTX01**
Date Collected		**01/03/2024**
Date Started		**05/03/2024**
Sample Type		**Water**
Test/Reference	Unit	
Heavy Metals *		
Arsenic*	mg/L	0.012
Beryllium*	mg/L	<0.001
Cadmium*	mg/L	<0.0002
Cobalt*	mg/L	0.027
Mercury*	mg/L	<0.0001
Selenium*	mg/L	0.002
Silver*	mg/L	<0.005
Uranium*	mg/L	0.022
Sulphur *		
Total Oxidised Sulphur (as S)*	mg/L	300

WATER ANALYSIS

Test/Reference	Unit	
PROPERTIES: APHA 4500-H+ A,B		
pH at Measured Temp.		7.6
Measured Temp.	°C	22.7
PROPERTIES: APHA 2510 A,B		
Electrical Conductivity @ 25°C	µS/cm	8700
Resistivity @ 25°C	ohm.m	1.15
ANIONS mg/L APHA 2320 A,B		
Hydroxide as CaCO3	mg/L	<1
Carbonate as CaCO3	mg/L	<1
Bicarbonate as CaCO3	mg/L	410
ANIONS mg/L APHA 4110		
Chloride as Cl	mg/L	2000
Nitrate as NO3	mg/L	2
Sulphate as SO4	mg/L	980
Total Anions	mg/L	3400
ANIONS meq/L APHA 1050 A*		
Hydroxide as OH*	meq/L	<0.01
Carbonate as CO3*	meq/L	<0.01
Bicarbonate as HCO3*	meq/L	8
Chloride as Cl*	meq/L	57
Nitrate as NO3*	meq/L	0.03
Sulphate as SO4*	meq/L	20
Total Anions*	meq/L	86
CATIONS Dissolved mg/L P3100-PW-012		
Potassium as K	mg/L	40
Sodium as Na	mg/L	1400
Barium as Ba	mg/L	<0.1
Calcium as Ca	mg/L	180
Iron as Fe	mg/L	<0.1
Magnesium as Mg	mg/L	200
Strontium as Sr	mg/L	2
Aluminium as Al	mg/L	<0.1

Customer Sample ID		**KPSELTX01**
Date Collected		**01/03/2024**
Date Started		**05/03/2024**
Sample Type		**Water**

WATER ANALYSIS

Test/Reference	Unit	
Boron as B	mg/L	1
Silicon as Si	mg/L	11
Lithium as Li	mg/L	<0.1
Cadmium as Cd	mg/L	<0.1
Chromium as Cr	mg/L	<0.1
Vanadium as V	mg/L	<0.1
Nickel as Ni	mg/L	<0.1
Zinc as Zn	mg/L	<0.1
Lead as Pb	mg/L	<0.1
Copper as Cu	mg/L	<0.1
Manganese as Mn	mg/L	0.2
Tin as Sn	mg/L	<0.1
Phosphorus as P	mg/L	2
Molybdenum as Mo	mg/L	<0.1
CATIONS mg/L P3100-PW-012		
Total Cations	mg/L	1900
CATIONS meq/L APHA 1050 A*		
Potassium as K*	meq/L	1
Sodium as Na*	meq/L	63
Barium as Ba*	meq/L	<0.01
Calcium as Ca*	meq/L	9
Iron as Fe*	meq/L	<0.01
Magnesium as Mg*	meq/L	17
Strontium as Sr*	meq/L	0.05
Aluminium as Al*	meq/L	<0.01
Total Cations*	meq/L	90
DERIVED PARAMETERS APHA 4110 & 3120		
Ion balance (Diff * 100/Sum)	%	2
Acceptance Criteria	%	5
Satisfactory		Yes
DERIVED PARAMETERS APHA 2320 A,B		
Total Alkalinity (calc as CaCO3)	mg/L	410
DERIVED PARAMETERS APHA 4110 & P3100-PW-012		
Total Cations + Anions	mg/L	5300
DERIVED PARAMETERS APHA 2340 B*		
Hardness (calc as CaCO3)*	mg/L	1300
DERIVED PARAMETERS APHA 2540 A,B,C,D*		
Calculated Total Dissolved Solids*	mg/L	5600

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1074877-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1074877-W

Authorised By

Valentina Pavlovic	Manager - Chemist	Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Philippa Faulkner

Project Name **24PEAD0000534**
Client Ref: 00202112

Customer Sample ID		**KPSELTI01**	**KPSELTM01**	**KPSELTM03**
Date Collected		**13/03/2024**	**13/03/2024**	**13/03/2024**
Date Started		**19/03/2024**	**19/03/2024**	**19/03/2024**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.084	0.003	0.011
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cadmium*	mg/L	<0.0002	<0.0002	<0.0002
Cobalt*	mg/L	0.052	0.02	0.01
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	0.006	0.002	0.004
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.038	0.12	0.093
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	500	560	140
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		7.2	7.1	7.2
Measured Temp.	°C	22.4	22.9	22.7
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	14000	10000	8000
Resistivity @ 25°C	ohm.m	0.71	1.00	1.25
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	380	380	360
ANIONS mg/L APHA 4110				
Bromide as Br	mg/L	12	8	3
Chloride as Cl	mg/L	4300	1700	2300
Fluoride as F	mg/L	0.6	1	1
Nitrate as NO3	mg/L	3	2	2
Sulphate as SO4	mg/L	1600	1700	440
Total Anions	mg/L	6200	3800	3100
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	8	8	7
Bromide as Br*	meq/L	0.16	0.95e-1	0.04
Chloride as Cl*	meq/L	120	48	64
Fluoride as F*	meq/L	0.03	0.06	0.05

Customer Sample ID		KPSELTI01	KPSELTM01	KPSELTM03
Date Collected		**13/03/2024**	**13/03/2024**	**13/03/2024**
Date Started		**19/03/2024**	**19/03/2024**	**19/03/2024**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Nitrate as NO3*	meq/L	0.04	0.03	0.02
Sulphate as SO4*	meq/L	33	36	9
Total Anions*	meq/L	160	92	81
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	65	42	41
Sodium as Na	mg/L	2600	1400	1400
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	300	160	160
Iron as Fe	mg/L	<0.1	<0.1	<0.1
Magnesium as Mg	mg/L	370	190	190
Strontium as Sr	mg/L	4	2	2
Aluminium as Al	mg/L	<0.1	<0.1	<0.1
Boron as B	mg/L	1	1	1
Silicon as Si	mg/L	10	9	9
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	0.1	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2	13
Molybdenum as Mo	mg/L	0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	3300	1800	1800
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	2	1	1
Sodium as Na*	meq/L	110	62	61
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	15	8	8
Iron as Fe*	meq/L	<0.01	<0.01	<0.01
Magnesium as Mg*	meq/L	30	16	15
Strontium as Sr*	meq/L	0.08	0.04	0.04
Aluminium as Al*	meq/L	<0.01	<0.01	<0.01
Total Cations*	meq/L	160	87	86
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	0	3	3
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	380	380	360
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	9600	5700	4900

Customer Sample ID		KPSELTI01	KPSELTM01	KPSELTM03
Date Collected		**13/03/2024**	**13/03/2024**	**13/03/2024**
Date Started		**19/03/2024**	**19/03/2024**	**19/03/2024**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	2300	1200	1200
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	9100	6600	5100

Customer Sample ID		KPSELTX01
Date Collected		**13/03/2024**
Date Started		**19/03/2024**
Sample Type		**Water**
Test/Reference	Unit	
Heavy Metals *		
Arsenic*	mg/L	0.009
Beryllium*	mg/L	<0.001
Cadmium*	mg/L	<0.0002
Cobalt*	mg/L	0.014
Mercury*	mg/L	<0.0001
Selenium*	mg/L	0.004
Silver*	mg/L	<0.005
Uranium*	mg/L	0.019
Sulphur *		
Total Oxidised Sulphur (as S)*	mg/L	290
WATER ANALYSIS		
Test/Reference	Unit	
PROPERTIES: APHA 4500-H+ A,B		
pH at Measured Temp.		7.2
Measured Temp.	°C	22.5
PROPERTIES: APHA 2510 A,B		
Electrical Conductivity @ 25°C	µS/cm	8000
Resistivity @ 25°C	ohm.m	1.25
ANIONS mg/L APHA 2320 A,B		
Hydroxide as CaCO3	mg/L	<1
Carbonate as CaCO3	mg/L	<1
Bicarbonate as CaCO3	mg/L	380
ANIONS mg/L APHA 4110		
Bromide as Br	mg/L	6
Chloride as Cl	mg/L	2300
Fluoride as F	mg/L	0.9
Nitrate as NO3	mg/L	2
Sulphate as SO4	mg/L	930
Total Anions	mg/L	3600
ANIONS meq/L APHA 1050 A*		
Hydroxide as OH*	meq/L	<0.01
Carbonate as CO3*	meq/L	<0.01
Bicarbonate as HCO3*	meq/L	8

Customer Sample ID		**KPSELTX01**
Date Collected		**13/03/2024**
Date Started		**19/03/2024**
Sample Type		**Water**
WATER ANALYSIS		
Test/Reference	Unit	
Bromide as Br*	meq/L	0.07
Chloride as Cl*	meq/L	64
Fluoride as F*	meq/L	0.05
Nitrate as NO3*	meq/L	0.04
Sulphate as SO4*	meq/L	19
Total Anions*	meq/L	91
CATIONS Dissolved mg/L P3100-PW-012		
Potassium as K	mg/L	41
Sodium as Na	mg/L	1400
Barium as Ba	mg/L	<0.1
Calcium as Ca	mg/L	170
Iron as Fe	mg/L	<0.1
Magnesium as Mg	mg/L	190
Strontium as Sr	mg/L	2
Aluminium as Al	mg/L	<0.1
Boron as B	mg/L	1
Silicon as Si	mg/L	9
Lithium as Li	mg/L	<0.1
Cadmium as Cd	mg/L	<0.1
Chromium as Cr	mg/L	<0.1
Vanadium as V	mg/L	<0.1
Nickel as Ni	mg/L	<0.1
Zinc as Zn	mg/L	<0.1
Lead as Pb	mg/L	<0.1
Copper as Cu	mg/L	<0.1
Manganese as Mn	mg/L	<0.1
Tin as Sn	mg/L	<0.1
Phosphorus as P	mg/L	19
Molybdenum as Mo	mg/L	<0.1
CATIONS mg/L P3100-PW-012		
Total Cations	mg/L	1800
CATIONS meq/L APHA 1050 A*		
Potassium as K*	meq/L	1
Sodium as Na*	meq/L	62
Barium as Ba*	meq/L	<0.01
Calcium as Ca*	meq/L	8
Iron as Fe*	meq/L	<0.01
Magnesium as Mg*	meq/L	16
Strontium as Sr*	meq/L	0.04
Aluminium as Al*	meq/L	<0.01
Total Cations*	meq/L	87
DERIVED PARAMETERS APHA 4110 & 3120		
Ion balance (Diff * 100/Sum)	%	2
Acceptance Criteria	%	5
Satisfactory		Yes
DERIVED PARAMETERS APHA 2320 A,B		

Bureau Veritas 33-35 Cormack Rd Wingfield SA Australia 5013
ABN: 30 008 127 802 Telephone: +61 8 8416 5240 Facsimile: +61 8 8234 2933

Customer Sample ID		**KPSELTX01**
Date Collected		**13/03/2024**
Date Started		**19/03/2024**
Sample Type		**Water**

WATER ANALYSIS

Test/Reference	Unit	
Total Alkalinity (calc as CaCO3)	mg/L	380
DERIVED PARAMETERS APHA 4110 & P3100-PW-012		
Total Cations + Anions	mg/L	5400
DERIVED PARAMETERS APHA 2340 B*		
Hardness (calc as CaCO3)*	mg/L	1200
DERIVED PARAMETERS APHA 2540 A,B,C,D*		
Calculated Total Dissolved Solids*	mg/L	5100

Test Description

DERIVED PARAMETERS	If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1078977-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1078977-W

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Leon Faulkner

Project Name **24PEAD0000650**
Client Ref: 00202477

Customer Sample ID		**KPSELTI01**	**KPSELTM01**	**KPSELTM03**
Date Collected		**26/03/2024**	**27/03/2024**	**27/03/2024**
Date Started		**03/04/2024**	**03/04/2024**	**03/04/2024**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.046	0.008	0.008
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cobalt*	mg/L	0.029	0.023	0.016
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	0.005	0.002	0.005
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.03	0.14	0.087
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	460	510	140
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		6.8	7.3	7.6
Measured Temp.	°C	19.9	20.0	20.3
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	13000	10000	4000
Resistivity @ 25°C	ohm.m	0.77	1.00	2.50
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	460	340	330
ANIONS mg/L APHA 4110				
Bromide as Br	mg/L	13	9	4
Chloride as Cl	mg/L	3800	2600	810
Fluoride as F	mg/L	0.6	0.7	0.8
Nitrate as NO3	mg/L	3	2	1
Sulphate as SO4	mg/L	1400	1600	410
Total Anions	mg/L	5700	4500	1600
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	9	7	7
Bromide as Br*	meq/L	0.16	0.11	0.05
Chloride as Cl*	meq/L	110	72	23
Fluoride as F*	meq/L	0.03	0.04	0.04
Nitrate as NO3*	meq/L	0.05	0.03	0.02

Customer Sample ID		KPSELTI01	KPSELTM01	KPSELTM03
Date Collected		26/03/2024	27/03/2024	27/03/2024
Date Started		03/04/2024	03/04/2024	03/04/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
Sulphate as SO4*	meq/L	30	34	9
Total Anions*	meq/L	150	110	38
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	55	66	20
Sodium as Na	mg/L	2100	1500	710
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	240	270	45
Iron as Fe	mg/L	<0.1	<0.1	<0.1
Magnesium as Mg	mg/L	300	260	57
Strontium as Sr	mg/L	1	2	0.57
Aluminium as Al	mg/L	<0.1	<0.1	<0.1
Boron as B	mg/L	1	1	1
Silicon as Si	mg/L	8	7	10
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	0.2	<0.1
Tin as Sn	mg/L	0.3	0.3	<0.1
Phosphorus as P	mg/L	<0.2	<0.2	2
Molybdenum as Mo	mg/L	0.2	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2700	2100	840
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	1	2	0.52
Sodium as Na*	meq/L	93	67	31
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	12	14	2
Iron as Fe*	meq/L	<0.01	<0.01	<0.01
Magnesium as Mg*	meq/L	25	21	5
Strontium as Sr*	meq/L	0.03	0.05	0.01
Aluminium as Al*	meq/L	<0.01	<0.01	<0.01
Total Cations*	meq/L	130	100	39
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	5	4	1
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	460	170	330
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	8400	6700	2400
DERIVED PARAMETERS APHA 2340 B*				

Customer Sample ID		KPSELTI01	KPSELTM01	KPSELTM03
Date Collected		**26/03/2024**	**27/03/2024**	**27/03/2024**
Date Started		**03/04/2024**	**03/04/2024**	**03/04/2024**
Sample Type		**Water**	**Water**	**Water**
WATER ANALYSIS				
Test/Reference	Unit			
Hardness (calc as CaCO3)*	mg/L	1800	1700	350
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	8500	6400	2500

Customer Sample ID		KPSELTX01 #1	KPSELTX01 #2
Date Collected		**27/03/2024**	**27/03/2024**
Date Started		**03/04/2024**	**03/04/2024**
Sample Type		**Water**	**Water**
Test/Reference	Unit		
Heavy Metals *			
Arsenic*	mg/L	0.089	0.057
Beryllium*	mg/L	<0.001	<0.001
Cobalt*	mg/L	0.039	0.029
Mercury*	mg/L	<0.0001	<0.0001
Selenium*	mg/L	0.008	0.007
Silver*	mg/L	<0.005	<0.005
Uranium*	mg/L	0.061	0.046
Sulphur *			
Total Oxidised Sulphur (as S)*	mg/L	390	390
WATER ANALYSIS			
Test/Reference	Unit		
PROPERTIES: APHA 4500-H+ A,B			
pH at Measured Temp.		7.2	7.3
Measured Temp.	°C	20.4	20.2
PROPERTIES: APHA 2510 A,B			
Electrical Conductivity @ 25°C	µS/cm	11000	11000
Resistivity @ 25°C	ohm.m	0.91	0.91
ANIONS mg/L APHA 2320 A,B			
Hydroxide as CaCO3	mg/L	<1	<1
Carbonate as CaCO3	mg/L	<1	<1
Bicarbonate as CaCO3	mg/L	480	480
ANIONS mg/L APHA 4110			
Bromide as Br	mg/L	10	10
Chloride as Cl	mg/L	3200	3200
Fluoride as F	mg/L	0.6	0.6
Nitrate as NO3	mg/L	2	2
Sulphate as SO4	mg/L	1200	1200
Total Anions	mg/L	5000	4900
ANIONS meq/L APHA 1050 A*			
Hydroxide as OH*	meq/L	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	10	10
Bromide as Br*	meq/L	0.12	0.12
Chloride as Cl*	meq/L	91	89

Customer Sample ID		KPSELTX01 #1	KPSELTX01 #2
Date Collected		**27/03/2024**	**27/03/2024**
Date Started		**03/04/2024**	**03/04/2024**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
Fluoride as F*	meq/L	0.03	0.03
Nitrate as NO3*	meq/L	0.04	0.04
Sulphate as SO4*	meq/L	26	26
Total Anions*	meq/L	130	120
CATIONS Dissolved mg/L P3100-PW-012			
Potassium as K	mg/L	47	47
Sodium as Na	mg/L	1800	1800
Barium as Ba	mg/L	<0.1	<0.1
Calcium as Ca	mg/L	210	210
Iron as Fe	mg/L	<0.1	<0.1
Magnesium as Mg	mg/L	270	270
Strontium as Sr	mg/L	1	1
Aluminium as Al	mg/L	<0.1	<0.1
Boron as B	mg/L	1	1
Silicon as Si	mg/L	9	9
Lithium as Li	mg/L	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	<0.1
Tin as Sn	mg/L	0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1
CATIONS mg/L P3100-PW-012			
Total Cations	mg/L	2400	2300
CATIONS meq/L APHA 1050 A*			
Potassium as K*	meq/L	1	1
Sodium as Na*	meq/L	79	78
Barium as Ba*	meq/L	<0.01	<0.01
Calcium as Ca*	meq/L	11	10
Iron as Fe*	meq/L	<0.01	<0.01
Magnesium as Mg*	meq/L	22	22
Strontium as Sr*	meq/L	0.03	0.02
Aluminium as Al*	meq/L	<0.01	<0.01
Total Cations*	meq/L	110	110
DERIVED PARAMETERS APHA 4110 & 3120			
Ion balance (Diff * 100/Sum)	%	5	5
Acceptance Criteria	%	5	5
Satisfactory		Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B			
Total Alkalinity (calc as CaCO3)	mg/L	480	480
DERIVED PARAMETERS APHA 4110 & P3100-PW-012			

Customer Sample ID		**KPSELTX01 #1**	**KPSELTX01 #2**
Date Collected		**27/03/2024**	**27/03/2024**
Date Started		**03/04/2024**	**03/04/2024**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
Total Cations + Anions	mg/L	7300	7200
DERIVED PARAMETERS APHA 2340 B*			
Hardness (calc as CaCO3)*	mg/L	1600	1600
DERIVED PARAMETERS APHA 2540 A,B,C,D*			
Calculated Total Dissolved Solids*	mg/L	7200	7100

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	Euofins, Accreditation: 1261, Report No: 1083423-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1083423-W

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Leon Faulkner

Project Name	**24PEAD0000822**
Collected by	Client
Client Ref:	PO 00202477

Customer Sample ID		**KPSELTMON01**	**KPSELTMON03**	**KPSELTX01**
Date Collected		**26/04/2024**	**26/04/2024**	**26/04/2024**
Date Started		**30/04/2024**	**30/04/2024**	**30/04/2024**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.002	0.007	0.02
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cobalt*	mg/L	0.012	0.015	0.019
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	<0.001	0.004	0.01
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.11	0.061	0.024
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	640	140	330
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		7.2	7.8	7.6
Measured Temp.	°C	14.5	14.1	12.8
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	12000	3800	8900
Resistivity @ 25°C	ohm.m	0.83	2.63	1.12
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	500	340	450
ANIONS mg/L APHA 4110				
Bromide as Br	mg/L	9	3	7
Chloride as Cl	mg/L	2900	780	2400
Fluoride as F	mg/L	0.6	1	0.9
Nitrate as NO3	mg/L	2	0.9	3
Sulphate as SO4	mg/L	2000	440	1100
Total Anions	mg/L	5400	1600	4000
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	10	7	9
Bromide as Br*	meq/L	0.11	0.03	0.09
Chloride as Cl*	meq/L	82	22	68
Fluoride as F*	meq/L	0.03	0.05	0.05

Customer Sample ID		KPSELTMON01	KPSELTMON03	KPSELTX01
Date Collected		26/04/2024	26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024	30/04/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
Nitrate as NO3*	meq/L	0.03	0.01	0.06
Sulphate as SO4*	meq/L	41	9	22
Total Anions*	meq/L	130	38	100
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	67	19	40
Sodium as Na	mg/L	1900	710	1600
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	310	42	170
Iron as Fe	mg/L	2	<0.1	<0.1
Magnesium as Mg	mg/L	350	54	210
Strontium as Sr	mg/L	4	0.55	2
Aluminium as Al	mg/L	1	0.27	0.15
Boron as B	mg/L	2	1	2
Silicon as Si	mg/L	12	12	12
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	0.2	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2	<0.2
Molybdenum as Mo	mg/L	0.3	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2700	830	2000
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	2	0.49	1
Sodium as Na*	meq/L	85	31	68
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	15	2	8
Iron as Fe*	meq/L	0.09	<0.01	<0.01
Magnesium as Mg*	meq/L	29	4	17
Strontium as Sr*	meq/L	0.09	0.01	0.05
Aluminium as Al*	meq/L	0.04	0.01	<0.01
Total Cations*	meq/L	130	38	95
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	1	0	3
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	510	340	450
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	8100	2400	5900

Customer Sample ID		KPSELTMON01	KPSELTMON03	KPSELTX01
Date Collected		26/04/2024	26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024	30/04/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	2200	330	1300
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	7500	2500	5700

Customer Sample ID		KPSELTI01#1	KPSELTI01#2	KPSELTI02
Date Collected		26/04/2024	26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024	30/04/2024
Sample Type		Water	Water	Water
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.004	0.004	0.009
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cobalt*	mg/L	0.01	0.009	0.028
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	0.006	0.006	0.005
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.014	0.013	0.24
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	370	380	730
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		8.0	8.1	7.4
Measured Temp.	°C	13.8	14.4	13.4
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	10000	10000	12000
Resistivity @ 25°C	ohm.m	1.00	1.00	0.83
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	360	340	640
ANIONS mg/L APHA 4110				
Bromide as Br	mg/L	9	9	9
Chloride as Cl	mg/L	2900	2500	2900
Fluoride as F	mg/L	0.7	0.7	0.9
Nitrate as NO3	mg/L	2	2	1
Sulphate as SO4	mg/L	1100	1100	2000
Total Anions	mg/L	4400	3900	5500
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	7	7	13
Bromide as Br*	meq/L	0.11	0.11	0.11

Customer Sample ID		KPSELTI01#1	KPSELTI01#2	KPSELTI02
Date Collected		26/04/2024	26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024	30/04/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
Chloride as Cl*	meq/L	82	69	81
Fluoride as F*	meq/L	0.04	0.04	0.05
Nitrate as NO3*	meq/L	0.03	0.03	0.02
Sulphate as SO4*	meq/L	23	24	42
Total Anions*	meq/L	110	100	140
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	48	48	54
Sodium as Na	mg/L	1800	1800	2000
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	160	160	360
Iron as Fe	mg/L	<0.1	<0.1	<0.1
Magnesium as Mg	mg/L	220	210	360
Strontium as Sr	mg/L	2	2	4
Aluminium as Al	mg/L	0.23	0.18	<0.1
Boron as B	mg/L	1	1	2
Silicon as Si	mg/L	9	9	12
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	<0.1	0.1
Tin as Sn	mg/L	<0.1	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1	0.2
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2200	2200	2800
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	1	1	1
Sodium as Na*	meq/L	78	77	88
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	8	8	18
Iron as Fe*	meq/L	<0.01	<0.01	<0.01
Magnesium as Mg*	meq/L	18	17	30
Strontium as Sr*	meq/L	0.05	0.05	0.09
Aluminium as Al*	meq/L	<0.01	<0.01	<0.01
Total Cations*	meq/L	100	100	140
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	4	2	1
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	360	1900	640

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Customer Sample ID		KPSELTI01#1	KPSELTI01#2	KPSELTI02
Date Collected		26/04/2024	26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024	30/04/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	6600	6100	8400
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	1300	1300	2400
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	6400	6400	7800

Customer Sample ID		KPSELTI03	KPSELTI04
Date Collected		26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024
Sample Type		Water	Water
Test/Reference	Unit		
Heavy Metals *			
Arsenic*	mg/L	0.005	0.005
Beryllium*	mg/L	<0.001	<0.001
Cobalt*	mg/L	0.015	0.003
Mercury*	mg/L	<0.0001	<0.0001
Selenium*	mg/L	0.003	0.01
Silver*	mg/L	<0.005	<0.005
Uranium*	mg/L	0.11	0.018
Sulphur *			
Total Oxidised Sulphur (as S)*	mg/L	420	230
WATER ANALYSIS			
Test/Reference	Unit		
PROPERTIES: APHA 4500-H+ A,B			
pH at Measured Temp.		7.5	7.8
Measured Temp.	°C	15.0	16.2
PROPERTIES: APHA 2510 A,B			
Electrical Conductivity @ 25°C	µS/cm	11000	4000
Resistivity @ 25°C	ohm.m	0.91	2.50
ANIONS mg/L APHA 2320 A,B			
Hydroxide as CaCO3	mg/L	<1	<1
Carbonate as CaCO3	mg/L	<1	<1
Bicarbonate as CaCO3	mg/L	500	710
ANIONS mg/L APHA 4110			
Bromide as Br	mg/L	9	2
Chloride as Cl	mg/L	3000	550
Fluoride as F	mg/L	0.8	2
Nitrate as NO3	mg/L	0.9	10
Sulphate as SO4	mg/L	1300	750
Total Anions	mg/L	4800	2000
ANIONS meq/L APHA 1050 A*			
Hydroxide as OH*	meq/L	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01

Customer Sample ID		KPSELTI03	KPSELTI04
Date Collected		26/04/2024	26/04/2024
Date Started		30/04/2024	30/04/2024
Sample Type		Water	Water
WATER ANALYSIS			
Test/Reference	Unit		
Bicarbonate as HCO3*	meq/L	10	14
Bromide as Br*	meq/L	0.12	0.02
Chloride as Cl*	meq/L	85	15
Fluoride as F*	meq/L	0.04	0.08
Nitrate as NO3*	meq/L	0.02	0.15
Sulphate as SO4*	meq/L	27	16
Total Anions*	meq/L	120	45
CATIONS Dissolved mg/L P3100-PW-012			
Potassium as K	mg/L	49	24
Sodium as Na	mg/L	2100	720
Barium as Ba	mg/L	<0.1	<0.1
Calcium as Ca	mg/L	210	88
Iron as Fe	mg/L	<0.1	<0.1
Magnesium as Mg	mg/L	290	95
Strontium as Sr	mg/L	3	1
Aluminium as Al	mg/L	0.18	0.14
Boron as B	mg/L	2	1
Silicon as Si	mg/L	12	14
Lithium as Li	mg/L	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1
CATIONS mg/L P3100-PW-012			
Total Cations	mg/L	2600	920
CATIONS meq/L APHA 1050 A*			
Potassium as K*	meq/L	1	0.62
Sodium as Na*	meq/L	91	31
Barium as Ba*	meq/L	<0.01	<0.01
Calcium as Ca*	meq/L	11	4
Iron as Fe*	meq/L	<0.01	<0.01
Magnesium as Mg*	meq/L	24	8
Strontium as Sr*	meq/L	0.06	0.02
Aluminium as Al*	meq/L	<0.01	<0.01
Total Cations*	meq/L	130	44
DERIVED PARAMETERS APHA 4110 & 3120			
Ion balance (Diff * 100/Sum)	%	2	2
Acceptance Criteria	%	5	5
Satisfactory		Yes	Yes

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Customer Sample ID		**KPSELTI03**	**KPSELTI04**
Date Collected		**26/04/2024**	**26/04/2024**
Date Started		**30/04/2024**	**30/04/2024**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
DERIVED PARAMETERS APHA 2320 A,B			
Total Alkalinity (calc as CaCO3)	mg/L	500	710
DERIVED PARAMETERS APHA 4110 & P3100-PW-012			
Total Cations + Anions	mg/L	7400	2900
DERIVED PARAMETERS APHA 2340 B*			
Hardness (calc as CaCO3)*	mg/L	1700	610
DERIVED PARAMETERS APHA 2540 A,B,C,D*			
Calculated Total Dissolved Solids*	mg/L	7200	2600

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1092068-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1092068-W

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1091541-W**
Project name KAPUNDA
Project ID 2
Received Date Apr 26, 2024

Client Sample ID			~~KPSELTI02_EF~~
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Ap0070553**
Date Sampled			**Apr 26, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.15
Bromide	1	mg/L	10
Chloride	1	mg/L	2700
Conductivity (at 25 °C)	10	uS/cm	9300
Fluoride	0.5	mg/L	1.2
Nitrate & Nitrite (as N)	0.05	mg/L	0.33
Nitrate (as N)	0.02	mg/L	0.23
Nitrite (as N)	0.02	mg/L	0.10
Organic Nitrogen (as N)*	0.2	mg/L	0.25
pH (at 25 °C)	0.1	pH Units	7.4
Phosphorus reactive (as P)	0.01	mg/L	0.15
Salinity (expressed as TDS)*	10	mg/L	4900
Sulphate (as SO4)	5	mg/L	1100
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4
Total Nitrogen (as N)*	0.2	mg/L	0.7
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	88
Phosphate total (as P)	0.01	mg/L	0.07
Silicon (filtered)	0.5	mg/L	9.3
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	230
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	230
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.5
Arsenic (filtered)	0.001	mg/L	< 0.01
Barium (filtered)	0.02	mg/L	< 0.2
Beryllium (filtered)	0.001	mg/L	< 0.01
Boron (filtered)	0.05	mg/L	< 5
Cadmium (filtered)	0.0002	mg/L	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01
Cobalt (filtered)	0.001	mg/L	< 0.01
Copper (filtered)	0.001	mg/L	0.063
Iron (filtered)	0.05	mg/L	< 0.5
Lead (filtered)	0.001	mg/L	< 0.01

Client Sample ID			KPSELTI02_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Ap0070553**
Date Sampled			**Apr 26, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	< 0.05
Manganese (filtered)	0.005	mg/L	0.063
Mercury (filtered)	0.0001	mg/L	< 0.001
Molybdenum (filtered)	0.005	mg/L	< 0.05
Nickel (filtered)	0.001	mg/L	0.021
Selenium (filtered)	0.001	mg/L	< 0.01
Silver (filtered)	0.005	mg/L	< 0.05
Strontium (filtered)	0.005	mg/L	2.0
Uranium (filtered)	0.005	mg/L	< 0.05
Vanadium (filtered)	0.005	mg/L	< 0.05
Zinc (filtered)	0.005	mg/L	< 0.05
Alkali Metals			
Calcium	0.5	mg/L	160
Magnesium	0.5	mg/L	200
Potassium	0.5	mg/L	48
Sodium	0.5	mg/L	1700

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	Apr 30, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Apr 30, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Apr 27, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Apr 30, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Apr 30, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Apr 30, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Apr 30, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Apr 30, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	May 03, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Apr 30, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Apr 30, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Apr 30, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Apr 30, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.: 00202525
Report #: 1091541
Phone: 08 7127 1110
Fax:

Received: Apr 26, 2024 3:45 PM
Due: May 3, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTI02_EF	Apr 26, 2024		Water	M24-Ap0070553	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	101			70-130	Pass	
Bromide	%	118			70-130	Pass	
Chloride	%	101			70-130	Pass	
Conductivity (at 25 °C)	%	92			70-130	Pass	
Fluoride	%	116			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrate & Nitrite (as N)	%	103			70-130	Pass	
Nitrite (as N)	%	104			70-130	Pass	
Phosphorus reactive (as P)	%	122			70-130	Pass	
Sulphate (as SO4)	%	98			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	119			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
Phosphate total (as P)	%	93			70-130	Pass	
Silicon (filtered)	%	102			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	70			70-130	Pass	
Total Alkalinity (as CaCO3)	%	71			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	98			80-120	Pass	
Magnesium	%	95			80-120	Pass	
Potassium	%	97			80-120	Pass	
Sodium	%	95			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	M24-Ap0058405	NCP	%	107			70-130	Pass	
Fluoride	B24-Ap0071289	NCP	%	81			70-130	Pass	
Nitrate & Nitrite (as N)	M24-Ap0069380	NCP	%	126			70-130	Pass	
Nitrite (as N)	M24-Ap0069380	NCP	%	116			70-130	Pass	
Sulphate (as SO4)	M24-Ap0069368	NCP	%	122			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Ap0069388	NCP	%	106			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Ap0074961	NCP	%	99			70-130	Pass	
Phosphate total (as P)	M24-Ap0069370	NCP	%	93			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Ap0069379	NCP	%	85			75-125	Pass	
Arsenic (filtered)	M24-Ap0069367	NCP	%	86			75-125	Pass	
Barium (filtered)	M24-Ap0069367	NCP	%	88			75-125	Pass	
Beryllium (filtered)	M24-Ap0069367	NCP	%	86			75-125	Pass	
Boron (filtered)	M24-Ap0069379	NCP	%	87			75-125	Pass	
Cadmium (filtered)	M24-Ap0069367	NCP	%	86			75-125	Pass	
Chromium (filtered)	M24-Ap0069367	NCP	%	87			75-125	Pass	
Cobalt (filtered)	M24-Ap0069367	NCP	%	86			75-125	Pass	
Copper (filtered)	M24-Ap0069389	NCP	%	86			75-125	Pass	
Iron (filtered)	M24-Ap0069367	NCP	%	83			75-125	Pass	
Lead (filtered)	M24-Ap0069367	NCP	%	80			75-125	Pass	
Lithium (filtered)	M24-Ap0069367	NCP	%	87			75-125	Pass	
Manganese (filtered)	M24-Ap0069367	NCP	%	87			75-125	Pass	
Molybdenum (filtered)	M24-Ap0069389	NCP	%	77			75-125	Pass	
Nickel (filtered)	M24-Ap0069367	NCP	%	84			75-125	Pass	
Selenium (filtered)	M24-Ap0069389	NCP	%	88			75-125	Pass	
Strontium (filtered)	M24-Ap0069367	NCP	%	86			75-125	Pass	
Uranium (filtered)	M24-Ap0069367	NCP	%	81			75-125	Pass	
Vanadium (filtered)	M24-Ap0069367	NCP	%	86			75-125	Pass	
Zinc (filtered)	M24-Ap0069367	NCP	%	77			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Calcium	M24-Ap0076590	NCP	%	93			75-125	Pass	
Magnesium	M24-Ap0061840	NCP	%	99			75-125	Pass	
Potassium	M24-Ap0061840	NCP	%	94			75-125	Pass	
Sodium	M24-Ap0076590	NCP	%	97			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)	M24-Ap0076668	NCP	mg/L	0.03	0.03	13	30%	Pass	
Chloride	M24-Ap0070553	CP	mg/L	2700	2700	<1	30%	Pass	
Fluoride	B24-Ap0071288	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M24-Ap0076668	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-Ap0076668	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-Ap0070553	CP	pH Units	7.4	7.4	pass	30%	Pass	
Sulphate (as SO4)	M24-Ap0070553	CP	mg/L	1100	1100	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Ap0069387	NCP	mg/L	1.2	1.0	10	30%	Pass	
Phosphate total (as P)	M24-Ap0069368	NCP	mg/L	< 0.01	rep0.005	<1	30%	Pass	
Silicon (filtered)	M24-Ap0068868	NCP	mg/L	0.8	0.8	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Ap0069367	NCP	mg/L	1.9	1.8	2.7	30%	Pass	
Arsenic (filtered)	M24-Ap0069367	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M24-Ap0069367	NCP	mg/L	0.03	0.03	3.4	30%	Pass	
Beryllium (filtered)	M24-Ap0069367	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Ap0069367	NCP	mg/L	0.18	0.18	2.0	30%	Pass	
Cadmium (filtered)	M24-Ap0069367	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Ap0069367	NCP	mg/L	0.003	0.003	1.5	30%	Pass	
Cobalt (filtered)	M24-Ap0069367	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M24-Ap0069367	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M24-Ap0069367	NCP	mg/L	0.64	0.63	1.8	30%	Pass	
Lead (filtered)	M24-Ap0069367	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Ap0069367	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	M24-Ap0069367	NCP	mg/L	0.049	0.048	2.1	30%	Pass	
Mercury (filtered)	M24-Ap0069367	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Ap0069367	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Ap0069367	NCP	mg/L	0.008	0.008	3.1	30%	Pass	
Selenium (filtered)	M24-Ap0069367	NCP	mg/L	0.024	0.011	75	30%	Fail	Q15
Silver (filtered)	M24-Ap0069367	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-Ap0069367	NCP	mg/L	0.066	0.065	1.7	30%	Pass	
Uranium (filtered)	M24-Ap0069367	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Ap0069367	NCP	mg/L	0.006	0.006	2.2	30%	Pass	
Zinc (filtered)	M24-Ap0069367	NCP	mg/L	0.13	0.13	1.4	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Ap0076590	NCP	mg/L	39	41	6.0	30%	Pass	
Magnesium	M24-Ap0076590	NCP	mg/L	1300	1300	6.0	30%	Pass	
Potassium	M24-Ap0076590	NCP	mg/L	1500	1600	6.8	30%	Pass	
Sodium	M24-Ap0076590	NCP	mg/L	11	11	5.4	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
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:

Savini Suduweli	Analytical Services Manager
Caitlin Breeze	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.

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Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Certificate of Analysis

Enviro Copper
Suite 4, Level 1, 155 King William Rd.,
Unley SA 5061
Australia

Attention: Philippa Faulkner

Project Name	**24PEAD0000845**
Collected by	Client
Client Ref:	PO 00202477

Customer Sample ID		**KPSELTI01**	**KPSELTI02**	**KPSELTI03**
Date Collected		**01/05/2024**	**01/05/2024**	**01/05/2024**
Date Started		**07/05/2024**	**07/05/2024**	**07/05/2024**
Sample Type		**Water**	**Water**	**Water**
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.005	0.012	0.009
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cobalt*	mg/L	0.007	0.027	0.011
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	0.005	0.004	0.004
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.014	0.26	0.087
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	360	760	400
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		7.8	7.1	7.4
Measured Temp.	°C	19.1	18.9	18.8
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	10000	13000	11000
Resistivity @ 25°C	ohm.m	1.00	0.77	0.91
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	330	670	500
ANIONS mg/L APHA 4110				
Bromide as Br	mg/L	9	8	8
Chloride as Cl	mg/L	2700	3000	2800
Fluoride as F	mg/L	1	0.8	0.7
Nitrate as NO3	mg/L	31	12	7
Sulphate as SO4	mg/L	1200	2200	1300
Total Anions	mg/L	4200	6000	4600
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	7	13	10
Bromide as Br*	meq/L	0.11	0.10	0.99e-1
Chloride as Cl*	meq/L	76	85	78
Fluoride as F*	meq/L	0.07	0.04	0.04

Customer Sample ID		KPSELTI01	KPSELTI02	KPSELTI03
Date Collected		01/05/2024	01/05/2024	01/05/2024
Date Started		07/05/2024	07/05/2024	07/05/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
Nitrate as NO3*	meq/L	0.50	0.19	0.12
Sulphate as SO4*	meq/L	25	47	27
Total Anions*	meq/L	110	150	120
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	50	63	48
Sodium as Na	mg/L	1900	2400	1900
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	170	450	210
Iron as Fe	mg/L	<0.1	<0.1	<0.1
Magnesium as Mg	mg/L	220	430	270
Strontium as Sr	mg/L	2	5	3
Aluminium as Al	mg/L	<0.1	<0.1	<0.1
Boron as B	mg/L	1	2	2
Silicon as Si	mg/L	9	13	12
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1	<0.1
Phosphorus as P	mg/L	2	4	0.3
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2300	3300	2500
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	1	2	1
Sodium as Na*	meq/L	82	100	84
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	9	22	10
Iron as Fe*	meq/L	<0.01	<0.01	<0.01
Magnesium as Mg*	meq/L	18	35	22
Strontium as Sr*	meq/L	0.05	0.11	0.06
Aluminium as Al*	meq/L	<0.01	<0.01	<0.01
Total Cations*	meq/L	110	160	120
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	1	5	1
Acceptance Criteria	%	5	5	5
Satisfactory		Yes	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	330	640	500
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	6600	9300	7000

Customer Sample ID		KPSELTI01	KPSELTI02	KPSELTI03
Date Collected		01/05/2024	01/05/2024	01/05/2024
Date Started		07/05/2024	07/05/2024	07/05/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	1300	2900	1600
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	6700	8200	7000

Customer Sample ID		KPSELTI04	KPSELTM01	KPSELTM03
Date Collected		01/05/2024	01/05/2024	01/05/2024
Date Started		07/05/2024	07/05/2024	07/05/2024
Sample Type		Water	Water	Water
Test/Reference	Unit			
Heavy Metals *				
Arsenic*	mg/L	0.008	0.007	0.01
Beryllium*	mg/L	<0.001	<0.001	<0.001
Cobalt*	mg/L	0.011	0.009	0.011
Mercury*	mg/L	<0.0001	<0.0001	<0.0001
Selenium*	mg/L	0.009	<0.001	0.002
Silver*	mg/L	<0.005	<0.005	<0.005
Uranium*	mg/L	0.093	0.052	0.051
Sulphur *				
Total Oxidised Sulphur (as S)*	mg/L	290	840	150
WATER ANALYSIS				
Test/Reference	Unit			
PROPERTIES: APHA 4500-H+ A,B				
pH at Measured Temp.		7.6	6.7	7.6
Measured Temp.	°C	18.8	18.8	18.8
PROPERTIES: APHA 2510 A,B				
Electrical Conductivity @ 25°C	µS/cm	8500	15000	4100
Resistivity @ 25°C	ohm.m	1.18	0.67	2.44
ANIONS mg/L APHA 2320 A,B				
Hydroxide as CaCO3	mg/L	<1	<1	<1
Carbonate as CaCO3	mg/L	<1	<1	<1
Bicarbonate as CaCO3	mg/L	460	770	380
ANIONS mg/L APHA 4110				
Bromide as Br	mg/L	6	11	3
Chloride as Cl	mg/L	2100	3700	820
Fluoride as F	mg/L	2	0.4	1
Nitrate as NO3	mg/L	9	4	2
Sulphate as SO4	mg/L	920	2500	440
Total Anions	mg/L	3500	7000	1600
ANIONS meq/L APHA 1050 A*				
Hydroxide as OH*	meq/L	<0.01	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01	<0.01
Bicarbonate as HCO3*	meq/L	9	15	8
Bromide as Br*	meq/L	0.07	0.14	0.04

Customer Sample ID		KPSELTI04	KPSELTM01	KPSELTM03
Date Collected		01/05/2024	01/05/2024	01/05/2024
Date Started		07/05/2024	07/05/2024	07/05/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
Chloride as Cl*	meq/L	59	100	23
Fluoride as F*	meq/L	0.11	0.02	0.05
Nitrate as NO3*	meq/L	0.15	0.06	0.03
Sulphate as SO4*	meq/L	19	52	9
Total Anions*	meq/L	88	170	40
CATIONS Dissolved mg/L P3100-PW-012				
Potassium as K	mg/L	46	74	22
Sodium as Na	mg/L	1800	2700	820
Barium as Ba	mg/L	<0.1	<0.1	<0.1
Calcium as Ca	mg/L	170	450	49
Iron as Fe	mg/L	<0.1	<0.1	<0.1
Magnesium as Mg	mg/L	220	560	62
Strontium as Sr	mg/L	2	5	0.62
Aluminium as Al	mg/L	<0.1	<0.1	<0.1
Boron as B	mg/L	2	3	1
Silicon as Si	mg/L	12	16	12
Lithium as Li	mg/L	<0.1	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1	<0.1
Phosphorus as P	mg/L	2	0.7	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1	<0.1
CATIONS mg/L P3100-PW-012				
Total Cations	mg/L	2200	3800	950
CATIONS meq/L APHA 1050 A*				
Potassium as K*	meq/L	1	2	0.57
Sodium as Na*	meq/L	76	120	36
Barium as Ba*	meq/L	<0.01	<0.01	<0.01
Calcium as Ca*	meq/L	8	23	2
Iron as Fe*	meq/L	<0.01	<0.01	<0.01
Magnesium as Mg*	meq/L	18	46	5
Strontium as Sr*	meq/L	0.05	0.12	0.01
Aluminium as Al*	meq/L	<0.01	<0.01	<0.01
Total Cations*	meq/L	100	190	44
DERIVED PARAMETERS APHA 4110 & 3120				
Ion balance (Diff * 100/Sum)	%	8	4	5
Acceptance Criteria	%	5	5	5
Satisfactory		No	Yes	Yes
DERIVED PARAMETERS APHA 2320 A,B				
Total Alkalinity (calc as CaCO3)	mg/L	580	770	380

Customer Sample ID		KPSELTI04	KPSELTM01	KPSELTM03
Date Collected		01/05/2024	01/05/2024	01/05/2024
Date Started		07/05/2024	07/05/2024	07/05/2024
Sample Type		Water	Water	Water
WATER ANALYSIS				
Test/Reference	Unit			
DERIVED PARAMETERS APHA 4110 & P3100-PW-012				
Total Cations + Anions	mg/L	5700	11000	2600
DERIVED PARAMETERS APHA 2340 B*				
Hardness (calc as CaCO3)*	mg/L	1300	3400	380
DERIVED PARAMETERS APHA 2540 A,B,C,D*				
Calculated Total Dissolved Solids*	mg/L	5400	9900	2600

Customer Sample ID		KPSELTX01	KPSELTI03#2
Date Collected		01/05/2024	01/05/2024
Date Started		07/05/2024	07/05/2024
Sample Type		Water	Water
Test/Reference	Unit		
Heavy Metals *			
Arsenic*	mg/L	0.015	0.008
Beryllium*	mg/L	<0.001	<0.001
Cobalt*	mg/L	0.015	0.01
Mercury*	mg/L	<0.0001	<0.0001
Selenium*	mg/L	0.006	0.004
Silver*	mg/L	<0.005	<0.005
Uranium*	mg/L	0.024	0.085
Sulphur *			
Total Oxidised Sulphur (as S)*	mg/L	360	400
WATER ANALYSIS			
Test/Reference	Unit		
PROPERTIES: APHA 4500-H+ A,B			
pH at Measured Temp.		7.3	7.4
Measured Temp.	°C	18.8	18.7
PROPERTIES: APHA 2510 A,B			
Electrical Conductivity @ 25°C	µS/cm	10000	11000
Resistivity @ 25°C	ohm.m	1.00	0.91
ANIONS mg/L APHA 2320 A,B			
Hydroxide as CaCO3	mg/L	<1	<1
Carbonate as CaCO3	mg/L	<1	<1
Bicarbonate as CaCO3	mg/L	500	530
ANIONS mg/L APHA 4110			
Bromide as Br	mg/L	8	9
Chloride as Cl	mg/L	2600	2800
Fluoride as F	mg/L	0.6	0.7
Nitrate as NO3	mg/L	3	2
Sulphate as SO4	mg/L	1200	1300
Total Anions	mg/L	4300	4600
ANIONS meq/L APHA 1050 A*			
Hydroxide as OH*	meq/L	<0.01	<0.01
Carbonate as CO3*	meq/L	<0.01	<0.01

Customer Sample ID		**KPSELTX01**	**KPSELTI03#2**
Date Collected		**01/05/2024**	**01/05/2024**
Date Started		**07/05/2024**	**07/05/2024**
Sample Type		**Water**	**Water**
WATER ANALYSIS			
Test/Reference	Unit		
Bicarbonate as HCO3*	meq/L	10	11
Bromide as Br*	meq/L	0.10	0.11
Chloride as Cl*	meq/L	74	79
Fluoride as F*	meq/L	0.03	0.04
Nitrate as NO3*	meq/L	0.05	0.03
Sulphate as SO4*	meq/L	24	27
Total Anions*	meq/L	110	120
CATIONS Dissolved mg/L P3100-PW-012			
Potassium as K	mg/L	47	52
Sodium as Na	mg/L	1800	2100
Barium as Ba	mg/L	<0.1	<0.1
Calcium as Ca	mg/L	210	230
Iron as Fe	mg/L	<0.1	<0.1
Magnesium as Mg	mg/L	270	290
Strontium as Sr	mg/L	3	3
Aluminium as Al	mg/L	<0.1	<0.1
Boron as B	mg/L	2	2
Silicon as Si	mg/L	12	13
Lithium as Li	mg/L	<0.1	<0.1
Cadmium as Cd	mg/L	<0.1	<0.1
Chromium as Cr	mg/L	<0.1	<0.1
Vanadium as V	mg/L	<0.1	<0.1
Nickel as Ni	mg/L	<0.1	<0.1
Zinc as Zn	mg/L	<0.1	<0.1
Lead as Pb	mg/L	<0.1	<0.1
Copper as Cu	mg/L	<0.1	<0.1
Manganese as Mn	mg/L	<0.1	<0.1
Tin as Sn	mg/L	<0.1	<0.1
Phosphorus as P	mg/L	<0.2	<0.2
Molybdenum as Mo	mg/L	<0.1	<0.1
CATIONS mg/L P3100-PW-012			
Total Cations	mg/L	2400	2700
CATIONS meq/L APHA 1050 A*			
Potassium as K*	meq/L	1	1
Sodium as Na*	meq/L	80	93
Barium as Ba*	meq/L	<0.01	<0.01
Calcium as Ca*	meq/L	11	11
Iron as Fe*	meq/L	<0.01	<0.01
Magnesium as Mg*	meq/L	22	24
Strontium as Sr*	meq/L	0.06	0.06
Aluminium as Al*	meq/L	<0.01	<0.01
Total Cations*	meq/L	110	130
DERIVED PARAMETERS APHA 4110 & 3120			
Ion balance (Diff * 100/Sum)	%	2	5
Acceptance Criteria	%	5	5
Satisfactory		Yes	Yes

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Customer Sample ID		**KPSELTX01**	**KPSELTI03#2**
Date Collected		**01/05/2024**	**01/05/2024**
Date Started		**07/05/2024**	**07/05/2024**
Sample Type		**Water**	**Water**

WATER ANALYSIS

Test/Reference	Unit		
DERIVED PARAMETERS APHA 2320 A,B			
Total Alkalinity (calc as CaCO3)	mg/L	500	530
DERIVED PARAMETERS APHA 4110 & P3100-PW-012			
Total Cations + Anions	mg/L	6700	7400
DERIVED PARAMETERS APHA 2340 B*			
Hardness (calc as CaCO3)*	mg/L	1600	1800
DERIVED PARAMETERS APHA 2540 A,B,C,D*			
Calculated Total Dissolved Solids*	mg/L	6600	7000

Test Description

DERIVED PARAMETERS If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Sample Digestion

Please note, samples were analysed without digestion

Sample Preservation

Please note, samples received were not preserved as per APHA water handbook requirements .

External Testing Details

Heavy Metals	Eurofins, Accreditation: 1261, Report No: 1093341-W
Sulphur	Eurofins, Accreditation: 1261, Report No: 1093341-W

Authorised By

Valentina Pavlovic Manager - Chemist Accreditation No 626

Final Report

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

Samples will be discarded after 30 days unless otherwise notified.

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1093049-W**
Project name KAPUNDA
Project ID 2
Received Date May 02, 2024

Client Sample ID			**KPSELTI03_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0005394**
Date Sampled			~~**Apr 26, 2024**~~
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.22
Bromide	1	mg/L	10
Chloride	1	mg/L	2700
Conductivity (at 25 °C)	10	uS/cm	9500
Fluoride	0.5	mg/L	2.6
Nitrate & Nitrite (as N)	0.05	mg/L	0.25
Nitrate (as N)	0.02	mg/L	0.11
Nitrite (as N)	0.02	mg/L	0.14
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2
pH (at 25 °C)	0.1	pH Units	7.9
Phosphorus reactive (as P)	0.01	mg/L	0.01
Salinity (expressed as TDS)*	10	mg/L	5900
Sulphate (as SO4)	5	mg/L	1300
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.3
Total Nitrogen (as N)*	0.2	mg/L	0.6
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	76
Phosphate total (as P)	0.01	mg/L	0.02
Silicon (filtered)	0.5	mg/L	13
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	340
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	340
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	0.09
Arsenic (filtered)	0.001	mg/L	0.005
Barium (filtered)	0.02	mg/L	0.02
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	1.6
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.009
Copper (filtered)	0.001	mg/L	0.029
Iron (filtered)	0.05	mg/L	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			KPSELTI03_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0005394**
Date Sampled			**Apr 26, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	0.010
Manganese (filtered)	0.005	mg/L	0.052
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.021
Selenium (filtered)	0.001	mg/L	0.004
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	2.1
Uranium (filtered)	0.005	mg/L	0.065
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.054
Alkali Metals			
Calcium	0.5	mg/L	180
Magnesium	0.5	mg/L	230
Potassium	0.5	mg/L	45
Sodium	0.5	mg/L	1700

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	May 04, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	May 04, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	May 02, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	May 04, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 04, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	May 04, 2024	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	May 04, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 04, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	May 08, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	May 04, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	May 04, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	May 04, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	May 04, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	May 04, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	May 04, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
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SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.:
Report #: 1093049
Phone: 08 7127 1110
Fax:

Received: May 2, 2024 3:14 PM
Due: May 9, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTI03_EF	Apr 26, 2024		Water	M24-My0005394	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	106			70-130	Pass	
Bromide	%	73			70-130	Pass	
Chloride	%	126			70-130	Pass	
Conductivity (at 25 °C)	%	100			70-130	Pass	
Fluoride	%	72			70-130	Pass	
Nitrate & Nitrite (as N)	%	111			70-130	Pass	
Nitrite (as N)	%	110			70-130	Pass	
Sulphate (as SO4)	%	108			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Kjeldahl Nitrogen (as N)	%	100			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	102			70-130	Pass	
Phosphate total (as P)	%	101			70-130	Pass	
Silicon (filtered)	%	103			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	98			70-130	Pass	
Total Alkalinity (as CaCO3)	%	101			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	95			80-120	Pass	
Magnesium	%	96			80-120	Pass	
Potassium	%	95			80-120	Pass	
Sodium	%	96			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Fluoride	M24-My0005438	NCP	%	79			70-130	Pass	
Nitrate & Nitrite (as N)	M24-My0002661	NCP	%	93			70-130	Pass	
Nitrite (as N)	M24-My0002661	NCP	%	109			70-130	Pass	
Sulphate (as SO4)	M24-My0006927	NCP	%	93			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B24-My0002939	NCP	%	106			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0007277	NCP	%	98			70-130	Pass	
Silicon (filtered)	M24-My0000104	NCP	%	97			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-My0005707	NCP	%	91			75-125	Pass	
Potassium	M24-My0001946	NCP	%	85			75-125	Pass	
Sodium	M24-My0005707	NCP	%	98			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M24-My0002665	NCP	mg/L	0.56	0.57	1.1	30%	Pass	
Chloride	M24-My0005394	CP	mg/L	2700	2700	<1	30%	Pass	
Fluoride	M24-My0005435	NCP	mg/L	< 0.5	0.6	19	30%	Pass	
Nitrate & Nitrite (as N)	M24-My0002665	NCP	mg/L	0.07	0.07	3.3	30%	Pass	
Nitrite (as N)	M24-My0002665	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-My0004292	NCP	pH Units	8.5	8.5	pass	30%	Pass	
Sulphate (as SO4)	M24-My0005394	CP	mg/L	1300	1200	8.3	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0004292	NCP	mg/L	36	38	4.3	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0005394	CP	mg/L	76	64	17	30%	Pass	
Phosphate total (as P)	M24-My0004292	NCP	mg/L	3.2	3.3	1.7	30%	Pass	
Silicon (filtered)	M24-My0000104	NCP	mg/L	16	15	5.9	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-My0005707	NCP	mg/L	620	630	1.7	30%	Pass	
Potassium	M24-My0001946	NCP	mg/L	14	15	2.8	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

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.

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00172

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Enviro Copper
Suite 4, Level 1,
155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref PO 00202477

BV Sample ID	139195	139196	139197
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	09-May-2024	10-May-2024	10-May-2024
Sample Type	Water	Water	Water
Date Sampled	07-May-2024	07-May-2024	07-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.3	7.1	7.4
	Measured Temp. ,°C	20.2	19.9	20.2
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	13000	14000	10000
	Resistivity at 25°C ,ohm m	0.75	0.73	0.96
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	8600	8800	6700
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	55	58	44
	Sodium as Na ,mg/L	2300	2200	1800
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	260	430	190
	Iron as Fe ,mg/L	0.2	0.2	<0.1
	Magnesium as Mg ,mg/L	300	400	230
	Strontium as Sr ,mg/L	3	5	2
	Aluminum as Al ,mg/L	2	2	1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2900	3100	2300
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	1	1
	* Sodium as Na ,meq/L	100	96	78
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	13	21	9
	* Iron as Fe ,meq/L	<0.01	0.01	<0.01
	* Magnesium as Mg ,meq/L	25	33	19
	* Strontium as Sr ,meq/L	0.07	0.11	0.05
	* Aluminium as Al ,meq/L	0.06	0.08	0.05
	* Total Cations ,meq/L	140	150	110
Anions APHA 4110	Bromide as Br ,mg/L	11	9	7
	Chloride as Cl ,mg/L	3700	3100	2600
	Fluoride as F ,mg/L	0.5	0.9	0.7
	Nitrate as NO_3 ,mg/L	<0.1	0.6	0.3
	Sulphate as SO_4 ,mg/L	1400	2400	1300
Anions APHA 1050A	* Bromide as Br ,meq/L	0.14	0.11	0.08
	* Chloride as Cl ,meq/L	100	88	74
	* Fluoride as F ,meq/L	0.03	0.05	0.04
	* Nitrate as NO_3 ,meq/L	<0.01	0.01	<0.01
	* Sulphate as SO_4 ,meq/L	30	50	26

First Reported: 17 May 2024

Date Issued: 17 May 2024

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BV Sample ID	139195	139196	139197
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	09-May-2024	10-May-2024	10-May-2024
Sample Type	Water	Water	Water
Date Sampled	07-May-2024	07-May-2024	07-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	400	710	500
	Total Alkalinity ,mg CaCO3/L	400	710	500
APHA 4110	Total Anions ,mg/L	5500	6300	4400
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	8	14	10
	* Total Anions ,meq/L	140	150	110
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	8500	9400	6700
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1900	2700	1400
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	0	1
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	450	780	400
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.009	0.011	0.007
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.011	0.025	0.008
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.002	0.002	0.005
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.024	0.22	0.073
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	2	2	1
	Silicon as Si ,mg/L	10	14	11
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	2	<0.2	<0.2
	Molybdenum as Mo ,mg/L	0.2	<0.1	<0.1

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BV Sample ID	139198	139199	139200
Customer Sample ID	KPSELTI04	KPSELTM01	KPSELTM03
Date Started	10-May-2024	10-May-2024	10-May-2024
Sample Type	Water	Water	Water
Date Sampled	07-May-2024	07-May-2024	07-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.6	6.9	7.6
	Measured Temp. ,°C	20.2	19.9	20.0
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	8100	15000	4600
	Resistivity at 25°C ,ohm m	1.24	0.65	2.16
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5200	9900	3000
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	33	66	21
	Sodium as Na ,mg/L	1300	2400	790
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	120	390	46
	Iron as Fe ,mg/L	<0.1	1	<0.1
	Magnesium as Mg ,mg/L	160	480	61
	Strontium as Sr ,mg/L	2	5	0.6
	Aluminum as Al ,mg/L	1	2	1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1700	3400	930
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.85	2	0.53
	* Sodium as Na ,meq/L	58	110	35
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	6	20	2
	* Iron as Fe ,meq/L	<0.01	0.06	<0.01
	* Magnesium as Mg ,meq/L	13	39	5
	* Strontium as Sr ,meq/L	0.03	0.11	0.01
	* Aluminium as Al ,meq/L	0.05	0.09	0.04
	* Total Cations ,meq/L	78	170	43
Anions APHA 4110	Bromide as Br ,mg/L	6	11	3
	Chloride as Cl ,mg/L	2000	3800	1000
	Fluoride as F ,mg/L	1	0.4	0.9
	Nitrate as NO_3 ,mg/L	0.4	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	920	2600	470
Anions APHA 1050A	* Bromide as Br ,meq/L	0.08	0.14	0.04
	* Chloride as Cl ,meq/L	57	110	29
	* Fluoride as F ,meq/L	0.07	0.02	0.05
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	19	54	10
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	450	740	360
	Total Alkalinity ,mg CaCO3/L	450	740	360
APHA 4110	Total Anions ,mg/L	3400	7200	1900
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	9	15	7
	* Total Anions ,meq/L	85	180	46

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BV Sample ID	139198	139199	139200
Customer Sample ID	KPSELTI04	KPSELTM01	KPSELTM03
Date Started	10-May-2024	10-May-2024	10-May-2024
Sample Type	Water	Water	Water
Date Sampled	07-May-2024	07-May-2024	07-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5000	11000	2800
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	940	2900	360
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	4	3	3
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	280	840	150
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.016	0.01	0.026
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.014	0.01	0.01
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.01	0.001	0.002
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.08	0.059	0.097
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	1
	Silicon as Si ,mg/L	10	14	10
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	0.3	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1

BV Sample ID	139201	139202
Customer Sample ID	KPSELTI02 #2	KPSELTX01
Date Started	10-May-2024	10-May-2024
Sample Type	Water	Water
Date Sampled	07-May-2024	07-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.1	7.6
	Measured Temp. ,°C	20.0	20.1
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	14000	9300

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BV Sample ID	139201	139202
Customer Sample ID	KPSELTI02 #2	KPSELTX01
Date Started	10-May-2024	10-May-2024
Sample Type	Water	Water
Date Sampled	07-May-2024	07-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Conductivity & Resistivity APHA 2510 A,B	Resistivity at 25°C ,ohm m	0.73	1.08
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	8700	5900
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	55	38
	Sodium as Na ,mg/L	2100	1500
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	400	170
	Iron as Fe ,mg/L	0.2	<0.1
	Magnesium as Mg ,mg/L	370	200
	Strontium as Sr ,mg/L	4	2
	Aluminum as Al ,mg/L	2	1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2900	1900
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	0.98
	* Sodium as Na ,meq/L	91	64
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	20	8
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	31	16
	* Strontium as Sr ,meq/L	0.10	0.05
	* Aluminium as Al ,meq/L	0.07	0.05
	* Total Cations ,meq/L	140	90
Anions APHA 4110	Bromide as Br ,mg/L	9	8
	Chloride as Cl ,mg/L	3200	2400
	Fluoride as F ,mg/L	0.5	0.7
	Nitrate as NO_3 ,mg/L	<0.1	0.9
	Sulphate as SO_4 ,mg/L	2400	1100
Anions APHA 1050A	* Bromide as Br ,meq/L	0.11	0.10
	* Chloride as Cl ,meq/L	91	66
	* Fluoride as F ,meq/L	0.03	0.04
	* Nitrate as NO_3 ,meq/L	<0.01	0.02
	* Sulphate as SO_4 ,meq/L	50	23
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	720	480
	Total Alkalinity ,mg CaCO3/L	720	480
APHA 4110	Total Anions ,mg/L	6400	3900
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	14	10
	* Total Anions ,meq/L	160	99
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	9300	5800
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	2500	1200
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	4	5

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Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240
ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00172

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

BV Sample ID	139201	139202
Customer Sample ID	KPSELTI02 #2	KPSELTX01
Date Started	10-May-2024	10-May-2024
Sample Type	Water	Water
Date Sampled	07-May-2024	07-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
[1] APHA 1030E	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	790	320
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.013	0.023
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.027	0.02
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	0.002	0.014
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.22	0.026
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	2	1
	Silicon as Si ,mg/L	13	10
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1
	Phosphorus as P ,mg/L	0.5	0.8
	Molybdenum as Mo ,mg/L	<0.1	<0.1

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1095162-W

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

First Reported: 17 May 2024

Date Issued: 17 May 2024

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Wingfield, South Australia, 5013, Australia
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ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00172

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Accreditation No 626

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

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The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1094681-W**
Project name KAPUNDA
Project ID 2
Received Date May 08, 2024

Client Sample ID			**KPSELTI02_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0020587**
Date Sampled			**May 07, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.10
Bromide	1	mg/L	5.8
Chloride	1	mg/L	3300
Conductivity (at 25 °C)	10	uS/cm	13000
Fluoride	0.5	mg/L	2.0
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	0.04
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.2
pH (at 25 °C)	0.1	pH Units	7.9
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	6800
Sulphate (as SO4)	5	mg/L	2300
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.3
Total Nitrogen (as N)*	0.2	mg/L	0.3
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	20
Phosphate total (as P)	0.01	mg/L	0.02
Silicon (filtered)	0.5	mg/L	14
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	710
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	710
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic (filtered)	0.001	mg/L	0.009
Barium (filtered)	0.02	mg/L	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	2.2
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.022
Copper (filtered)	0.001	mg/L	0.012
Iron (filtered)	0.05	mg/L	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			KPSELTI02_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0020587**
Date Sampled			**May 07, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	0.020
Manganese (filtered)	0.005	mg/L	0.16
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.027
Selenium (filtered)	0.001	mg/L	0.001
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	4.9
Uranium (filtered)	0.005	mg/L	0.18
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.059
Alkali Metals			
Calcium	0.5	mg/L	370
Magnesium	0.5	mg/L	360
Potassium	0.5	mg/L	56
Sodium	0.5	mg/L	2000

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	May 09, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	May 09, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	May 08, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	May 09, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 09, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	May 09, 2024	N/A
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	May 09, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 09, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	May 15, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	May 09, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	May 09, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	May 09, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	May 09, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	May 09, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	May 09, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1094681
Phone: 08 7127 1110
Fax:

Received: May 8, 2024 12:24 PM
Due: May 15, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTI02_EF	May 07, 2024		Water	M24-My0020587	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	120			70-130	Pass	
Bromide	%	105			70-130	Pass	
Chloride	%	102			70-130	Pass	
Conductivity (at 25 °C)	%	100			70-130	Pass	
Fluoride	%	104			70-130	Pass	
Nitrate & Nitrite (as N)	%	108			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrite (as N)	%	109			70-130	Pass	
Phosphorus reactive (as P)	%	80			70-130	Pass	
Sulphate (as SO4)	%	93			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	98			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	102			70-130	Pass	
Phosphate total (as P)	%	96			70-130	Pass	
Silicon (filtered)	%	99			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	90			70-130	Pass	
Total Alkalinity (as CaCO3)	%	107			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	100			80-120	Pass	
Arsenic (filtered)	%	100			80-120	Pass	
Boron (filtered)	%	95			80-120	Pass	
Cadmium (filtered)	%	101			80-120	Pass	
Chromium (filtered)	%	99			80-120	Pass	
Cobalt (filtered)	%	99			80-120	Pass	
Copper (filtered)	%	100			80-120	Pass	
Iron (filtered)	%	103			80-120	Pass	
Lead (filtered)	%	99			80-120	Pass	
Lithium (filtered)	%	98			80-120	Pass	
Manganese (filtered)	%	100			80-120	Pass	
Mercury (filtered)	%	95			80-120	Pass	
Molybdenum (filtered)	%	98			80-120	Pass	
Nickel (filtered)	%	101			80-120	Pass	
Selenium (filtered)	%	95			80-120	Pass	
Silver (filtered)	%	99			80-120	Pass	
Strontium (filtered)	%	99			80-120	Pass	
Uranium (filtered)	%	98			80-120	Pass	
Zinc (filtered)	%	100			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	90			80-120	Pass	
Magnesium	%	91			80-120	Pass	
Potassium	%	92			80-120	Pass	
Sodium	%	91			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	M24-My0025801	NCP	%	72			70-130	Pass	
Nitrate & Nitrite (as N)	M24-My0021323	NCP	%	111			70-130	Pass	
Nitrite (as N)	M24-My0021323	NCP	%	100			70-130	Pass	
Sulphate (as SO4)	M24-My0023723	NCP	%	97			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0021329	NCP	%	92			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0021330	NCP	%	96			70-130	Pass	
Phosphate total (as P)	TW24-Ap0029852	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-My0020820	NCP	%	97			75-125	Pass	
Arsenic (filtered)	M24-My0020820	NCP	%	96			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Barium (filtered)	M24-My0020820	NCP	%	91			75-125	Pass	
Beryllium (filtered)	M24-My0020820	NCP	%	88			75-125	Pass	
Cadmium (filtered)	M24-My0020820	NCP	%	83			75-125	Pass	
Chromium (filtered)	M24-My0020820	NCP	%	91			75-125	Pass	
Cobalt (filtered)	M24-My0020820	NCP	%	86			75-125	Pass	
Copper (filtered)	M24-My0020820	NCP	%	83			75-125	Pass	
Iron (filtered)	M24-My0020820	NCP	%	86			75-125	Pass	
Lead (filtered)	M24-My0020820	NCP	%	79			75-125	Pass	
Lithium (filtered)	M24-My0020820	NCP	%	81			75-125	Pass	
Manganese (filtered)	M24-My0020820	NCP	%	85			75-125	Pass	
Mercury (filtered)	M24-My0020820	NCP	%	76			75-125	Pass	
Molybdenum (filtered)	M24-My0020820	NCP	%	79			75-125	Pass	
Nickel (filtered)	M24-My0020820	NCP	%	84			75-125	Pass	
Selenium (filtered)	M24-My0020820	NCP	%	88			75-125	Pass	
Silver (filtered)	M24-My0020820	NCP	%	78			75-125	Pass	
Uranium (filtered)	M24-My0020820	NCP	%	88			75-125	Pass	
Vanadium (filtered)	M24-My0020820	NCP	%	81			75-125	Pass	
Zinc (filtered)	M24-My0020820	NCP	%	84			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-My0029290	NCP	%	94			75-125	Pass	
Potassium	M24-My0029290	NCP	%	95			75-125	Pass	
Sodium	M24-My0029290	NCP	%	93			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)	M24-My0026802	NCP	mg/L	58	59	<1	30%	Pass	
Chloride	M24-My0025836	NCP	mg/L	190	200	1.2	30%	Pass	
Conductivity (at 25 °C)	M24-My0020587	CP	uS/cm	13000	13000	<1	30%	Pass	
Fluoride	M24-My0024842	NCP	mg/L	0.9	1.1	24	30%	Pass	
Nitrate & Nitrite (as N)	M24-My0026802	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-My0026802	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-My0020587	CP	pH Units	7.9	8.0	pass	30%	Pass	
Sulphate (as SO4)	M24-My0025836	NCP	mg/L	48	48	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	B24-My0020834	NCP	mg/L	5.5	5.8	4.3	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0019921	NCP	mg/L	40	52	26	30%	Pass	
Phosphate total (as P)	M24-Ap0035048	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-My0020587	CP	mg/L	710	730	2.4	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-My0020587	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-My0020587	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-My0020587	CP	mg/L	710	730	2.4	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-My0020820	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-My0020820	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M24-My0020820	NCP	mg/L	0.06	0.06	2.8	30%	Pass	
Beryllium (filtered)	M24-My0020820	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	M24-My0020820	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-My0020820	NCP	mg/L	0.002	0.002	2.8	30%	Pass	
Cobalt (filtered)	M24-My0020820	NCP	mg/L	0.001	0.001	3.0	30%	Pass	
Copper (filtered)	M24-My0020820	NCP	mg/L	0.002	0.001	10	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron (filtered)	M24-My0020820	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-My0020820	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-My0020820	NCP	mg/L	0.058	0.057	2.6	30%	Pass	
Manganese (filtered)	M24-My0020820	NCP	mg/L	0.11	0.11	3.7	30%	Pass	
Mercury (filtered)	M24-My0020820	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-My0020820	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-My0020820	NCP	mg/L	0.003	0.003	2.4	30%	Pass	
Selenium (filtered)	M24-My0020820	NCP	mg/L	0.006	0.006	11	30%	Pass	
Silver (filtered)	M24-My0020820	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-My0020820	NCP	mg/L	3.6	3.6	1.9	30%	Pass	
Uranium (filtered)	M24-My0020820	NCP	mg/L	0.027	0.025	4.8	30%	Pass	
Vanadium (filtered)	M24-My0020820	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-My0020820	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-My0020035	NCP	mg/L	55	55	<1	30%	Pass	
Magnesium	M24-My0020035	NCP	mg/L	20	20	<1	30%	Pass	
Potassium	M24-My0020035	NCP	mg/L	3.0	2.9	2.3	30%	Pass	
Sodium	M24-My0020035	NCP	mg/L	2.1	2.1	2.4	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

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.

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ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00181

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

Enviro Copper
Suite 4, Level 1,
155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref 00202477

BV Sample ID	142040	142041	142042
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	21-May-2024	21-May-2024	21-May-2024
Sample Type	Water	Water	Water
Date Sampled	15-May-2024	15-May-2024	15-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.8	7.2	7.5
	Measured Temp. ,°C	18.4	18.2	18.3
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	9300	12000	9900
	Resistivity at 25°C ,ohm m	1.08	0.81	1.01
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5900	7900	6400
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	49	63	47
	Sodium as Na ,mg/L	1700	2300	1900
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	160	430	200
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	180	400	240
	Strontium as Sr ,mg/L	2	5	2
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2100	3200	2400
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	2	1
	* Sodium as Na ,meq/L	75	100	81
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	8	21	10
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	15	33	20
	* Strontium as Sr ,meq/L	0.04	0.11	0.05
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	100	160	110
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	10	13	12
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1

Date Issued: 23 May 2024

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Accreditation No 626

BV Sample ID	142040	142041	142042
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	21-May-2024	21-May-2024	21-May-2024
Sample Type	Water	Water	Water
Date Sampled	15-May-2024	15-May-2024	15-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Cations Dissolved P3100-PW-012	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	2	8	<0.2
	Molybdenum as Mo ,mg/L	0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	8	10	9
	Chloride as Cl ,mg/L	2400	3000	2600
	Fluoride as F ,mg/L	0.6	0.6	0.6
	Nitrate as NO_3 ,mg/L	2	0.7	0.4
	Sulphate as SO_4 ,mg/L	1100	2200	1300
Anions APHA 1050A	* Bromide as Br ,meq/L	0.10	0.12	0.11
	* Chloride as Cl ,meq/L	68	85	72
	* Fluoride as F ,meq/L	0.03	0.03	0.03
	* Nitrate as NO_3 ,meq/L	0.03	0.01	<0.01
	* Sulphate as SO_4 ,meq/L	23	46	26
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	380	640	500
	Total Alkalinity ,mg CaCO3/L	380	640	500
APHA 4110	Total Anions ,mg/L	3900	5800	4400
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	8	13	10
	* Total Anions ,meq/L	99	140	110
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	6000	9100	6700
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1200	2700	1500
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	5	2
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	350	720	400
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.003	0.008	0.006
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.004	0.021	0.007
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.006	<0.001	0.002
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.01	0.18	0.057

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BV Sample ID	142043	142044	142045
Customer Sample ID	KPSELTI04	KPSELTI04#2	KPSELTM01
Date Started	21-May-2024	21-May-2024	21-May-2024
Sample Type	Water	Water	Water
Date Sampled	15-May-2024	15-May-2024	15-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.7	7.7	6.9
	Measured Temp. ,°C	18.3	18.4	17.4
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	7700	7700	15000
	Resistivity at 25°C ,ohm m	1.30	1.30	0.69
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	4900	4900	9300
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	38	39	70
	Sodium as Na ,mg/L	1500	1500	2500
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	130	140	400
	Iron as Fe ,mg/L	<0.1	<0.1	0.6
	Magnesium as Mg ,mg/L	170	170	490
	Strontium as Sr ,mg/L	2	2	5
	Aluminum as Al ,mg/L	<0.1	<0.1	0.6
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1800	1800	3500
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.98	0.99	2
	* Sodium as Na ,meq/L	64	64	110
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	7	7	20
	* Iron as Fe ,meq/L	<0.01	<0.01	0.03
	* Magnesium as Mg ,meq/L	14	14	40
	* Strontium as Sr ,meq/L	0.04	0.04	0.12
	* Aluminium as Al ,meq/L	<0.01	<0.01	0.02
	* Total Cations ,meq/L	86	87	170
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	11	11	16
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2	4
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	7	6	11
	Chloride as Cl ,mg/L	1900	1900	3700
	Fluoride as F ,mg/L	0.9	1	0.4
	Nitrate as NO_3 ,mg/L	0.4	0.1	<0.1
	Sulphate as SO_4 ,mg/L	900	890	2600

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BV Sample ID	142043	142044	142045
Customer Sample ID	KPSELTI04	KPSELTI04#2	KPSELTM01
Date Started	21-May-2024	21-May-2024	21-May-2024
Sample Type	Water	Water	Water
Date Sampled	15-May-2024	15-May-2024	15-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Anions APHA 1050A	* Bromide as Br ,meq/L	0.09	0.08	0.14
	* Chloride as Cl ,meq/L	55	54	100
	* Fluoride as F ,meq/L	0.05	0.05	0.02
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	19	19	54
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	450	450	740
	Total Alkalinity ,mg CaCO3/L	450	450	740
APHA 4110	Total Anions ,mg/L	3300	3300	7000
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	9	9	15
	* Total Anions ,meq/L	82	82	170
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5100	5100	10000
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1000	1100	3000
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	3	0
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	260	280	820
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.006	0.006	0.005
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.009	0.01	0.006
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.007	0.008	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.062	0.065	0.04

BV Sample ID	142046	142047
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	21-May-2024	21-May-2024
Sample Type	Water	Water
Date Sampled	15-May-2024	15-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.9	8.6
	Measured Temp. ,°C	17.8	18.0
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	3800	7500

Date Issued: 23 May 2024

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Accreditation No 626

BV Sample ID	142046	142047
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	21-May-2024	21-May-2024
Sample Type	Water	Water
Date Sampled	15-May-2024	15-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Conductivity & Resistivity APHA 2510 A,B	Resistivity at 25°C ,ohm m	2.60	1.34
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	2500	4800
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	20	40
	Sodium as Na ,mg/L	740	1400
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	42	140
	Iron as Fe ,mg/L	<0.1	<0.1
	Magnesium as Mg ,mg/L	52	170
	Strontium as Sr ,mg/L	0.5	2
	Aluminum as Al ,mg/L	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	860	1700
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.52	1
	* Sodium as Na ,meq/L	32	59
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	2	7
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	4	14
	* Strontium as Sr ,meq/L	0.01	0.04
	* Aluminium as Al ,meq/L	<0.01	<0.01
	* Total Cations ,meq/L	40	82
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	1
	Silicon as Si ,mg/L	11	10
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	<0.1	1
	Chloride as Cl ,mg/L	800	1800
	Fluoride as F ,mg/L	0.7	0.7
	Nitrate as NO_3 ,mg/L	<0.1	1
	Sulphate as SO_4 ,mg/L	430	900
Anions APHA 1050A	* Bromide as Br ,meq/L	<0.01	0.01
	* Chloride as Cl ,meq/L	22	52
	* Fluoride as F ,meq/L	0.04	0.04

Date Issued: 23 May 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240

ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00181

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

BV Sample ID	142046	142047
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	21-May-2024	21-May-2024
Sample Type	Water	Water
Date Sampled	15-May-2024	15-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Anions APHA 1050A	* Nitrate as NO_3 ,meq/L	<0.01	0.02
	* Sulphate as SO_4 ,meq/L	9	19
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	340	450
	Total Alkalinity ,mg CaCO3/L	340	450
APHA 4110	Total Anions ,mg/L	1600	3200
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	7	9
	* Total Anions ,meq/L	38	79
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	2400	4900
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	320	1000
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	2
	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	140	280
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.009	0.023
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.01	0.016
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	0.002	0.015
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.046	0.019

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1098169-W

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Date Issued: 23 May 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00181

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory.

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Date Issued: 23 May 2024

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1097817-W**
Project name KAPUNDA
Project ID 2
Received Date May 16, 2024

Client Sample ID			**KPSELTI04_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0046199**
Date Sampled			**May 15, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	< 0.01
Bromide	1	mg/L	< 1
Chloride	1	mg/L	1800
Conductivity (at 25 °C)	10	uS/cm	7100
Fluoride	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	1
pH (at 25 °C)	0.1	pH Units	7.8
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	3400
Sulphate (as SO4)	5	mg/L	840
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0
Total Nitrogen (as N)*	0.2	mg/L	1.0
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	36
Phosphate total (as P)	0.01	mg/L	< 0.01
Silicon (filtered)	0.5	mg/L	11
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	480
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	480
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic (filtered)	0.001	mg/L	0.005
Barium (filtered)	0.02	mg/L	0.04
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	1.5
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.010
Copper (filtered)	0.001	mg/L	0.051
Iron (filtered)	0.05	mg/L	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			KPSELTI04_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0046199**
Date Sampled			**May 15, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	0.025
Manganese (filtered)	0.005	mg/L	0.075
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.017
Selenium (filtered)	0.001	mg/L	0.010
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	1.6
Uranium (filtered)	0.005	mg/L	0.065
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.048
Alkali Metals			
Calcium	0.5	mg/L	120
Magnesium	0.5	mg/L	160
Potassium	0.5	mg/L	33
Sodium	0.5	mg/L	1300

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	May 17, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	May 17, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	May 16, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	May 17, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 17, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	May 17, 2024	N/A
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	May 17, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 17, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	May 24, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	May 17, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	May 17, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	May 17, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	May 17, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	May 17, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	May 17, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1097817
Phone: 08 7127 1110
Fax:

Received: May 16, 2024 4:02 PM
Due: May 23, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTI04_EF	May 15, 2024		Water	M24-My0046199	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	96			70-130	Pass	
Bromide	%	123			70-130	Pass	
Chloride	%	98			70-130	Pass	
Conductivity (at 25 °C)	%	97			70-130	Pass	
Fluoride	%	118			70-130	Pass	
Nitrate & Nitrite (as N)	%	97			70-130	Pass	
Nitrite (as N)	%	95			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)	%	113			70-130	Pass	
Sulphate (as SO4)	%	106			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	107			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	101			70-130	Pass	
Phosphate total (as P)	%	108			70-130	Pass	
Silicon (filtered)	%	99			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	90			70-130	Pass	
Total Alkalinity (as CaCO3)	%	94			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	94			80-120	Pass	
Magnesium	%	91			80-120	Pass	
Potassium	%	92			80-120	Pass	
Sodium	%	96			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Bromide	M24-My0046199	CP	%	116			70-130	Pass	
Chloride	M24-My0044865	NCP	%	91			70-130	Pass	
Fluoride	M24-My0046199	CP	%	116			70-130	Pass	
Nitrate & Nitrite (as N)	M24-My0045801	NCP	%	99			70-130	Pass	
Sulphate (as SO4)	M24-My0050809	NCP	%	113			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0045806	NCP	%	124			70-130	Pass	
Phosphate total (as P)	M24-My0046195	NCP	%	112			70-130	Pass	
Silicon (filtered)	M24-My0046199	CP	%	94			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-My0046199	CP	%	93			75-125	Pass	
Arsenic (filtered)	M24-My0046199	CP	%	94			75-125	Pass	
Barium (filtered)	M24-My0046199	CP	%	89			75-125	Pass	
Beryllium (filtered)	M24-My0046199	CP	%	91			75-125	Pass	
Cadmium (filtered)	M24-My0046199	CP	%	88			75-125	Pass	
Chromium (filtered)	M24-My0046199	CP	%	91			75-125	Pass	
Cobalt (filtered)	M24-My0046199	CP	%	88			75-125	Pass	
Copper (filtered)	M24-My0046199	CP	%	80			75-125	Pass	
Iron (filtered)	M24-My0046199	CP	%	91			75-125	Pass	
Lead (filtered)	M24-My0046199	CP	%	85			75-125	Pass	
Lithium (filtered)	M24-My0046199	CP	%	87			75-125	Pass	
Manganese (filtered)	M24-My0046199	CP	%	83			75-125	Pass	
Mercury (filtered)	M24-My0046199	CP	%	103			75-125	Pass	
Molybdenum (filtered)	M24-My0046199	CP	%	81			75-125	Pass	
Nickel (filtered)	M24-My0046199	CP	%	87			75-125	Pass	
Selenium (filtered)	M24-My0046199	CP	%	89			75-125	Pass	
Silver (filtered)	M24-My0046242	NCP	%	86			75-125	Pass	
Uranium (filtered)	M24-My0046199	CP	%	90			75-125	Pass	
Vanadium (filtered)	M24-My0046199	CP	%	93			75-125	Pass	
Zinc (filtered)	M24-My0046199	CP	%	91			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-My0044849	NCP	%	88			75-125	Pass	
Magnesium	M24-My0044849	NCP	%	86			75-125	Pass	
Potassium	M24-My0044849	NCP	%	88			75-125	Pass	
Sodium	M24-My0044849	NCP	%	78			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)	M24-My0050481	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chloride	M24-My0051304	NCP	mg/L	1500	1500	1.4	30%	Pass	
Conductivity (at 25 °C)	M24-My0052808	NCP	uS/cm	1100	1100	<1	30%	Pass	
Fluoride	M24-My0052216	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M24-My0040780	NCP	mg/L	0.14	0.14	2.2	30%	Pass	
Nitrite (as N)	M24-My0040780	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-My0052808	NCP	pH Units	8.0	8.0	pass	30%	Pass	
Sulphate (as SO4)	M24-My0050687	NCP	mg/L	9.1	8.9	2.2	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0047923	NCP	mg/L	27	31	13	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0041772	NCP	mg/L	32	24	29	30%	Pass	
Phosphate total (as P)	M24-My0046199	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silicon (filtered)	M24-My0046199	CP	mg/L	11	10	6.1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-My0050089	NCP	mg/L	100	100	2.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-My0050089	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-My0050089	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-My0050089	NCP	mg/L	100	100	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-My0046199	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-My0046199	CP	mg/L	0.005	0.005	<1	30%	Pass	
Barium (filtered)	M24-My0046199	CP	mg/L	0.04	0.04	3.8	30%	Pass	
Beryllium (filtered)	M24-My0046199	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-My0046199	CP	mg/L	1.5	1.6	2.9	30%	Pass	
Cadmium (filtered)	M24-My0046199	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-My0046199	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-My0046199	CP	mg/L	0.010	0.010	<1	30%	Pass	
Copper (filtered)	M24-My0046199	CP	mg/L	0.051	0.050	1.6	30%	Pass	
Iron (filtered)	M24-My0046199	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-My0046199	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-My0046199	CP	mg/L	0.025	0.024	1.8	30%	Pass	
Manganese (filtered)	M24-My0046199	CP	mg/L	0.075	0.075	<1	30%	Pass	
Mercury (filtered)	M24-My0046199	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-My0046199	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-My0046199	CP	mg/L	0.017	0.017	1.4	30%	Pass	
Selenium (filtered)	M24-My0046199	CP	mg/L	0.010	0.010	1.1	30%	Pass	
Silver (filtered)	M24-My0046199	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-My0046199	CP	mg/L	1.6	1.6	1.6	30%	Pass	
Uranium (filtered)	M24-My0046199	CP	mg/L	0.065	0.063	3.6	30%	Pass	
Vanadium (filtered)	M24-My0046199	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-My0046199	CP	mg/L	0.048	0.048	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-My0044849	NCP	mg/L	25	26	2.6	30%	Pass	
Magnesium	M24-My0044849	NCP	mg/L	110	110	<1	30%	Pass	
Potassium	M24-My0044849	NCP	mg/L	5.0	5.1	2.1	30%	Pass	
Sodium	M24-My0044849	NCP	mg/L	950	950	<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

Authorised by:

Catherine Wilson	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.

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ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00193

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

Enviro Copper
Suite 4, Level 1,
155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref PO 00202477

BV Sample ID	144123	144124	144125
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	27-May-2024	27-May-2024	27-May-2024
Sample Type	Water	Water	Water
Date Sampled	21-May-2024	21-May-2024	21-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	8.3	8.1	8.3
	Measured Temp. ,°C	16.6	17.4	17.2
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	8900	11000	9100
	Resistivity at 25°C ,ohm m	1.13	0.87	1.10
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5700	7300	5800
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	47	59	44
	Sodium as Na ,mg/L	1600	2100	1700
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	160	360	180
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	180	340	210
	Strontium as Sr ,mg/L	2	4	2
	Aluminum as Al ,mg/L	0.1	0.2	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2000	2900	2100
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	2	1
	* Sodium as Na ,meq/L	70	90	72
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	8	18	9
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	15	28	17
	* Strontium as Sr ,meq/L	0.04	0.09	0.05
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	95	140	100
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	10	12	11
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1

Date Issued: 30 May 2024

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Certificate of Analysis
Final Report

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Accreditation No 626

BV Sample ID	144123	144124	144125
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	27-May-2024	27-May-2024	27-May-2024
Sample Type	Water	Water	Water
Date Sampled	21-May-2024	21-May-2024	21-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Cations Dissolved P3100-PW-012	Manganese as Mn ,mg/L	<0.1	0.2	<0.1
	Tin as Sn ,mg/L	0.5	0.9	0.5
	Phosphorus as P ,mg/L	0.8	2	1
	Molybdenum as Mo ,mg/L	0.2	0.2	0.1
Anions APHA 4110	Bromide as Br ,mg/L	8	9	8
	Chloride as Cl ,mg/L	2400	2900	2400
	Fluoride as F ,mg/L	1	1	1
	Nitrate as NO_3 ,mg/L	2	0.5	0.5
	Sulphate as SO_4 ,mg/L	1200	2100	1200
Anions APHA 1050A	* Bromide as Br ,meq/L	0.10	0.12	0.10
	* Chloride as Cl ,meq/L	68	81	67
	* Fluoride as F ,meq/L	0.06	0.06	0.06
	* Nitrate as NO_3 ,meq/L	0.03	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	25	44	26
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	340	530	380
APHA 4110	Total Anions ,mg/L	3900	5500	4000
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	7	11	8
	* Total Anions ,meq/L	100	140	100
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	6000	8400	6100
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1100	2300	1300
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	1	0
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	370	710	430
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.005	0.009	0.006
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.005	0.021	0.007
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.007	0.003	0.003
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.023	0.18	0.055

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Certificate of Analysis
Final Report

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Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	144126	144127	144128
Customer Sample ID	KPSELTI04	KPSELTM01	KPSELTM03
Date Started	30-May-2024	30-May-2024	30-May-2024
Sample Type	Water	Water	Water
Date Sampled	21-May-2024	21-May-2024	21-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	8.4	7.7	8.4
	Measured Temp. ,°C	17.2	17.3	17.3
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	7500	14000	3900
	Resistivity at 25°C ,ohm m	1.32	0.70	2.58
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	4800	9200	2500
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	36	73	22
	Sodium as Na ,mg/L	1300	2500	710
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	130	410	39
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	160	490	51
	Strontium as Sr ,mg/L	2	5	0.5
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1700	3500	840
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.92	2	0.55
	* Sodium as Na ,meq/L	58	110	31
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	6	21	2
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	13	40	4
	* Strontium as Sr ,meq/L	0.04	0.12	0.01
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	79	170	39
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	3	1
	Silicon as Si ,mg/L	11	16	11
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	0.3	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	0.1	<0.1
	Tin as Sn ,mg/L	0.2	1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	8	12	3
	Chloride as Cl ,mg/L	1900	3700	850
	Fluoride as F ,mg/L	1	0.6	1
	Nitrate as NO_3 ,mg/L	0.5	0.3	<0.1
	Sulphate as SO_4 ,mg/L	860	2600	440

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00193

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Accreditation No 626

BV Sample ID	144126	144127	144128
Customer Sample ID	KPSELTI04	KPSELTM01	KPSELTM03
Date Started	30-May-2024	30-May-2024	30-May-2024
Sample Type	Water	Water	Water
Date Sampled	21-May-2024	21-May-2024	21-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Anions APHA 1050A	* Bromide as Br ,meq/L	0.09	0.16	0.04
	* Chloride as Cl ,meq/L	52	110	24
	* Fluoride as F ,meq/L	0.08	0.03	0.06
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	18	55	9
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	34	<1	34
	Bicarbonate ,mg CaCO3/L	380	740	310
APHA 4110	Total Anions ,mg/L	3100	7100	1600
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	0.02
	* Carbonate as CO_3 ,meq/L	0.68	<0.01	0.69
	* Bicarbonate as HCO_3 ,meq/L	8	15	6
	* Total Anions ,meq/L	79	180	40
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	4800	11000	2500
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	950	3000	310
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	1	2
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	300	930	150
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.005	0.006	0.010
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.009	0.007	0.012
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.008	<0.001	0.002
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.061	0.045	0.050

BV Sample ID	144129	144130
Customer Sample ID	KPSELTM01_EF	KPSELTX01
Date Started	30-May-2024	30-May-2024
Sample Type	Water	Water
Date Sampled	21-May-2024	21-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.5	8.3
	Measured Temp. ,°C	17.3	17.4
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	14000	6900
	Resistivity at 25°C ,ohm m	0.70	1.45

Date Issued: 30 May 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240
ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00193

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	144129	144130
Customer Sample ID	KPSELTM01_EF	KPSELTX01
Date Started	30-May-2024	30-May-2024
Sample Type	Water	Water
Date Sampled	21-May-2024	21-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	9200	4400
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	71	37
	Sodium as Na ,mg/L	2400	1200
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	400	120
	Iron as Fe ,mg/L	0.1	<0.1
	Magnesium as Mg ,mg/L	470	140
	Strontium as Sr ,mg/L	5	2
	Aluminum as Al ,mg/L	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	3400	1500
Total Cations APHA 1050A	* Potassium as K ,meq/L	2	0.96
	* Sodium as Na ,meq/L	110	50
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	20	6
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	39	11
	* Strontium as Sr ,meq/L	0.11	0.03
	* Aluminium as Al ,meq/L	<0.01	<0.01
	* Total Cations ,meq/L	170	70
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	3	1
	Silicon as Si ,mg/L	15	10
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	0.3	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	0.1	<0.1
	Tin as Sn ,mg/L	1	0.1
	Phosphorus as P ,mg/L	<0.2	<0.2
	Molybdenum as Mo ,mg/L	0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	12	6
	Chloride as Cl ,mg/L	3700	1700
	Fluoride as F ,mg/L	0.6	1
	Nitrate as NO_3 ,mg/L	0.1	3
	Sulphate as SO_4 ,mg/L	2600	890
Anions APHA 1050A	* Bromide as Br ,meq/L	0.15	0.07
	* Chloride as Cl ,meq/L	110	48
	* Fluoride as F ,meq/L	0.03	0.06
	* Nitrate as NO_3 ,meq/L	<0.01	0.04

Date Issued: 30 May 2024

33 Cormack Road
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Certificate of Analysis
Final Report

Project Number :AUADE-24-00193

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

BV Sample ID	144129	144130
Customer Sample ID	KPSELTM01_EF	KPSELTX01
Date Started	30-May-2024	30-May-2024
Sample Type	Water	Water
Date Sampled	21-May-2024	21-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Anions APHA 1050A	* Sulphate as SO_4 ,meq/L	54	18
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	650	480
APHA 4110	Total Anions ,mg/L	7000	3100
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01
	* Carbonate as CO_3 ,meq/L	<0.01	<0.01
	* Bicarbonate as HCO_3 ,meq/L	13	10
	* Total Anions ,meq/L	170	76
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	10000	4500
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	2900	880
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	1	4
	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	890	280
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.007	0.037
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.007	0.018
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	<0.001	0.015
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.046	0.019

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1100101-W

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

Date Issued: 30 May 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240

ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00193

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory.

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Date Issued: 30 May 2024

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1099648-W**
Project name KAPUNDA
Project ID 2
Received Date May 22, 2024

Client Sample ID			**KPSELTM01_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0060020**
Date Sampled			**May 21, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.46
Bromide	1	mg/L	6.3
Chloride	1	mg/L	3900
Conductivity (at 25 °C)	10	uS/cm	7200
Fluoride	0.5	mg/L	1.3
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	0.44
pH (at 25 °C)	0.1	pH Units	7.0
Phosphorus reactive (as P)	0.01	mg/L	0.01
Salinity (expressed as TDS)*	10	mg/L	7700
Sulphate (as SO4)	5	mg/L	2600
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.9
Total Nitrogen (as N)*	0.2	mg/L	0.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	170
Phosphate total (as P)	0.01	mg/L	0.02
Silicon (filtered)	0.5	mg/L	17
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	580
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	580
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	2.6
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.005
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	< 0.05

Client Sample ID			KPSELTM01_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0060020**
Date Sampled			**May 21, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lead (filtered)	0.001	mg/L	< 0.001
Lithium (filtered)	0.005	mg/L	0.006
Manganese (filtered)	0.005	mg/L	0.14
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.023
Selenium (filtered)	0.001	mg/L	< 0.001
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	5.0
Uranium (filtered)	0.005	mg/L	0.040
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.060
Alkali Metals			
Calcium	0.5	mg/L	380
Magnesium	0.5	mg/L	460
Potassium	0.5	mg/L	65
Sodium	0.5	mg/L	2300

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	May 23, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	May 23, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	May 22, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	May 23, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	May 23, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	May 23, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	May 23, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	May 23, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	May 31, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	May 23, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	May 23, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	May 23, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	May 23, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	May 23, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	May 23, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1099648
Phone: 08 7127 1110
Fax:

Received: May 22, 2024 12:35 PM
Due: May 29, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTM01_EF	May 21, 2024		Water	M24-My0060020	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	99			70-130	Pass	
Bromide	%	94			70-130	Pass	
Chloride	%	112			70-130	Pass	
Conductivity (at 25 °C)	%	92			70-130	Pass	
Fluoride	%	99			70-130	Pass	
Nitrate & Nitrite (as N)	%	104			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrite (as N)	%	97			70-130	Pass	
Sulphate (as SO4)	%	108			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	119			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	103			70-130	Pass	
Phosphate total (as P)	%	96			70-130	Pass	
Silicon (filtered)	%	101			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	106			70-130	Pass	
Total Alkalinity (as CaCO3)	%	109			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	108			80-120	Pass	
Arsenic (filtered)	%	98			80-120	Pass	
Boron (filtered)	%	114			80-120	Pass	
Cadmium (filtered)	%	93			80-120	Pass	
Chromium (filtered)	%	99			80-120	Pass	
Cobalt (filtered)	%	95			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron (filtered)	%	103			80-120	Pass	
Lead (filtered)	%	88			80-120	Pass	
Lithium (filtered)	%	102			80-120	Pass	
Manganese (filtered)	%	103			80-120	Pass	
Mercury (filtered)	%	92			80-120	Pass	
Molybdenum (filtered)	%	95			80-120	Pass	
Nickel (filtered)	%	96			80-120	Pass	
Selenium (filtered)	%	96			80-120	Pass	
Silver (filtered)	%	88			80-120	Pass	
Strontium (filtered)	%	102			80-120	Pass	
Uranium (filtered)	%	92			80-120	Pass	
Zinc (filtered)	%	96			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	92			80-120	Pass	
Magnesium	%	91			80-120	Pass	
Potassium	%	90			80-120	Pass	
Sodium	%	95			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)	M24-My0062244	NCP	%	105			70-130	Pass	
Nitrite (as N)	M24-My0062244	NCP	%	94			70-130	Pass	
Sulphate (as SO4)	M24-My0069216	NCP	%	118			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0060383	NCP	%	116			70-130	Pass	
Phosphate total (as P)	M24-My0064881	NCP	%	103			70-130	Pass	
Silicon (filtered)	M24-My0063992	NCP	%	97			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-My0060020	CP	%	102			75-125	Pass	
Arsenic (filtered)	M24-My0060020	CP	%	97			75-125	Pass	
Barium (filtered)	M24-My0060020	CP	%	97			75-125	Pass	
Beryllium (filtered)	M24-My0060020	CP	%	94			75-125	Pass	
Boron (filtered)	M24-My0062462	NCP	%	98			75-125	Pass	
Cadmium (filtered)	M24-My0060020	CP	%	82			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chromium (filtered)	M24-My0060020	CP	%	94			75-125	Pass	
Cobalt (filtered)	M24-My0060020	CP	%	87			75-125	Pass	
Copper (filtered)	M24-My0060020	CP	%	83			75-125	Pass	
Iron (filtered)	M24-My0060020	CP	%	95			75-125	Pass	
Lead (filtered)	M24-My0060020	CP	%	79			75-125	Pass	
Lithium (filtered)	M24-My0060020	CP	%	92			75-125	Pass	
Manganese (filtered)	M24-My0060020	CP	%	82			75-125	Pass	
Mercury (filtered)	M24-My0060020	CP	%	96			75-125	Pass	
Molybdenum (filtered)	M24-My0060020	CP	%	82			75-125	Pass	
Nickel (filtered)	M24-My0060020	CP	%	83			75-125	Pass	
Selenium (filtered)	M24-My0060020	CP	%	91			75-125	Pass	
Strontium (filtered)	M24-My0062462	NCP	%	108			75-125	Pass	
Uranium (filtered)	M24-My0060020	CP	%	87			75-125	Pass	
Vanadium (filtered)	M24-My0060020	CP	%	78			75-125	Pass	
Zinc (filtered)	M24-My0060020	CP	%	77			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-My0063992	NCP	%	93			75-125	Pass	
Magnesium	M24-My0063992	NCP	%	98			75-125	Pass	
Potassium	M24-My0063992	NCP	%	94			75-125	Pass	
Sodium	M24-My0063992	NCP	%	97			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)	M24-My0061811	NCP	mg/L	0.48	0.50	2.3	30%	Pass	
Bromide	B24-My0052897	NCP	mg/L	< 1	< 1	<1	30%	Pass	
Chloride	M24-My0060020	CP	mg/L	3900	3900	<1	30%	Pass	
Conductivity (at 25 °C)	M24-My0060020	CP	uS/cm	7200	15000	<1	30%	Pass	
Fluoride	M24-My0065244	NCP	mg/L	0.8	1.1	200	30%	Fail	Q15
Nitrate & Nitrite (as N)	M24-My0061811	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-My0061811	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-My0060020	CP	pH Units	7.0	7.1	pass	30%	Pass	
Sulphate (as SO4)	M24-My0060020	CP	mg/L	2600	2600	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0062454	NCP	mg/L	1.9	2.0	2.3	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0060020	CP	mg/L	170	200	17	30%	Pass	
Phosphate total (as P)	B24-My0052892	NCP	mg/L	4.3	4.3	1.4	30%	Pass	
Silicon (filtered)	M24-My0063992	NCP	mg/L	36	36	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-My0060020	CP	mg/L	580	800	5.1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-My0060020	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-My0060020	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-My0060020	CP	mg/L	580	800	5.1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-My0060020	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-My0060020	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M24-My0060020	CP	mg/L	0.03	0.03	1.3	30%	Pass	
Beryllium (filtered)	M24-My0060020	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-My0060020	CP	mg/L	2.6	2.7	3.6	30%	Pass	
Cadmium (filtered)	M24-My0060020	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-My0060020	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-My0060020	CP	mg/L	0.005	0.005	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper (filtered)	M24-My0060020	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M24-My0060020	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-My0060020	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-My0060020	CP	mg/L	0.006	0.006	<1	30%	Pass	
Manganese (filtered)	M24-My0060020	CP	mg/L	0.14	0.15	<1	30%	Pass	
Mercury (filtered)	M24-My0060020	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-My0060020	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-My0060020	CP	mg/L	0.023	0.023	<1	30%	Pass	
Selenium (filtered)	M24-My0060020	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-My0060020	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-My0060020	CP	mg/L	5.0	5.0	<1	30%	Pass	
Uranium (filtered)	M24-My0060020	CP	mg/L	0.040	0.041	1.2	30%	Pass	
Vanadium (filtered)	M24-My0060020	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-My0060020	CP	mg/L	0.060	0.061	1.6	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-My0063992	NCP	mg/L	41	40	1.8	30%	Pass	
Magnesium	M24-My0063992	NCP	mg/L	63	63	1.3	30%	Pass	
Potassium	M24-My0063992	NCP	mg/L	5.7	5.6	1.7	30%	Pass	
Sodium	M24-My0063992	NCP	mg/L	190	190	2.0	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
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
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.

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00208

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

Enviro Copper
Suite 4, Level 1,
155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref 00202477

BV Sample ID	147205	147206	147207
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	04-Jun-2024	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	29-May-2024	29-May-2024	29-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	8.0	7.4	7.7
	Measured Temp. ,°C	18.7	18.3	19.1
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	9000	13000	9300
	Resistivity at 25°C ,ohm m	1.11	0.77	1.08
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5700	8300	6000
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	46	60	42
	Sodium as Na ,mg/L	1700	2200	1700
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	140	430	170
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	160	400	210
	Strontium as Sr ,mg/L	2	3	2
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2000	3100	2100
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	2	1
	* Sodium as Na ,meq/L	72	96	73
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	7	21	8
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	13	33	17
	* Strontium as Sr ,meq/L	0.03	0.08	0.04
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	94	150	100
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	10	15	11
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1

Date Issued: 06 Jun 2024

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Certificate of Analysis
Final Report

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Accreditation No 626

BV Sample ID	147205	147206	147207
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	04-Jun-2024	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	29-May-2024	29-May-2024	29-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Cations Dissolved P3100-PW-012	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	0.5	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	10	13	10
	Chloride as Cl ,mg/L	2400	3200	2500
	Fluoride as F ,mg/L	0.8	0.6	0.8
	Nitrate as NO_3 ,mg/L	2	0.9	0.4
	Sulphate as SO_4 ,mg/L	1100	2300	1200
Anions APHA 1050A	* Bromide as Br ,meq/L	0.13	0.16	0.12
	* Chloride as Cl ,meq/L	68	89	70
	* Fluoride as F ,meq/L	0.04	0.03	0.04
	* Nitrate as NO_3 ,meq/L	0.03	0.01	<0.01
	* Sulphate as SO_4 ,meq/L	24	48	26
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	310	710	450
	Total Alkalinity ,mg CaCO3/L	310	710	450
APHA 4110	Total Anions ,mg/L	3900	6200	4200
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	0.02	0.02	0.02
	* Carbonate as CO3 ,meq/L	0.02	0.02	0.02
	* Bicarbonate as HCO3 ,meq/L	6	14	9
	* Total Anions ,meq/L	98	150	100
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5900	9300	6300
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1000	2700	1300
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	0	2
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	390	850	420
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.004	0.011	0.006
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.003	0.028	0.021
	* Mercury ,mg/L	<0.001	<0.0001	<0.0001
	* Selenium ,mg/L	0.007	0.001	0.002
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.015	0.20	0.054

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Accreditation No 626

BV Sample ID	147208	147209	147210
Customer Sample ID	KPSELTI04	KPSELTMON03 #1	KPSELTMON03 #2
Date Started	04-Jun-2024	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	29-May-2024	29-May-2024	29-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.4	7.5	7.5
	Measured Temp. ,°C	19.8	19.8	19.8
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	7600	3900	3900
	Resistivity at 25°C ,ohm m	1.32	2.55	2.54
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	4800	2500	2500
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	36	20	20
	Sodium as Na ,mg/L	1400	730	750
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	130	42	42
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	160	52	53
	Strontium as Sr ,mg/L	1	0.3	0.3
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1700	840	860
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.92	0.51	0.52
	* Sodium as Na ,meq/L	60	32	33
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	6	2	2
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	13	4	4
	* Strontium as Sr ,meq/L	0.02	<0.01	<0.01
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	81	39	39
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	1	1
	Silicon as Si ,mg/L	11	11	11
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	9	5	5
	Chloride as Cl ,mg/L	2000	890	920
	Fluoride as F ,mg/L	1	0.9	0.9
	Nitrate as NO_3 ,mg/L	0.9	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	940	460	460

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00208

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Accreditation No 626

BV Sample ID	147208	147209	147210
Customer Sample ID	KPSELTI04	KPSELTMON03 #1	KPSELTMON03 #2
Date Started	04-Jun-2024	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	29-May-2024	29-May-2024	29-May-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Anions APHA 1050A	* Bromide as Br ,meq/L	0.11	0.06	0.06
	* Chloride as Cl ,meq/L	56	25	26
	* Fluoride as F ,meq/L	0.06	0.05	0.05
	* Nitrate as NO_3 ,meq/L	0.02	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	20	10	10
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	410	360	340
	Total Alkalinity ,mg CaCO3/L	410	360	340
APHA 4110	Total Anions ,mg/L	3400	1700	1700
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	0.02	0.02	0.02
	* Carbonate as CO3 ,meq/L	0.02	0.02	0.02
	* Bicarbonate as HCO3 ,meq/L	8	7	7
	* Total Anions ,meq/L	84	42	43
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5100	2600	2600
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	980	320	320
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	4	4
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	320	160	160
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.006	0.010	0.011
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.010	0.014	0.013
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.006	0.002	0.002
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.059	0.053	0.053

BV Sample ID	147211	147212
Customer Sample ID	KPSELTMON03 #3	KPSELTX01
Date Started	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water
Date Sampled	29-May-2024	29-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.4	7.5
	Measured Temp. ,°C	19.8	19.8
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	6600	6600

Date Issued: 06 Jun 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
T: +61 8 8416 5240
ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00208

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	147211	147212
Customer Sample ID	KPSELTMON03 #3	KPSELTX01
Date Started	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water
Date Sampled	29-May-2024	29-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Conductivity & Resistivity APHA 2510 A,B	Resistivity at 25°C ,ohm m	1.51	1.51
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	4200	4200
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	22	36
	Sodium as Na ,mg/L	750	1200
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	41	120
	Iron as Fe ,mg/L	<0.1	<0.1
	Magnesium as Mg ,mg/L	54	130
	Strontium as Sr ,mg/L	<0.1	0.6
	Aluminum as Al ,mg/L	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	870	1500
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.56	0.93
	* Sodium as Na ,meq/L	33	51
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	2	6
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	4	11
	* Strontium as Sr ,meq/L	<0.01	0.01
	* Aluminium as Al ,meq/L	<0.01	<0.01
	* Total Cations ,meq/L	40	69
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	1
	Silicon as Si ,mg/L	11	10
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	4	7
	Chloride as Cl ,mg/L	900	1700
	Fluoride as F ,mg/L	1	1
	Nitrate as NO_3 ,mg/L	<0.1	5
	Sulphate as SO_4 ,mg/L	470	890
Anions APHA 1050A	* Bromide as Br ,meq/L	0.06	0.09
	* Chloride as Cl ,meq/L	25	48
	* Fluoride as F ,meq/L	0.05	0.05

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Accreditation No 626

BV Sample ID	147211	147212
Customer Sample ID	KPSELTMON03 #3	KPSELTX01
Date Started	04-Jun-2024	04-Jun-2024
Sample Type	Water	Water
Date Sampled	29-May-2024	29-May-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Anions APHA 1050A	* Nitrate as NO_3 ,meq/L	<0.01	0.08
	* Sulphate as SO_4 ,meq/L	10	18
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	410	410
	Total Alkalinity ,mg CaCO3/L	410	410
APHA 4110	Total Anions ,mg/L	1800	3000
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	0.02	0.02
	* Carbonate as CO3 ,meq/L	0.02	0.02
	* Bicarbonate as HCO3 ,meq/L	8	8
	* Total Anions ,meq/L	43	75
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	2700	4500
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	330	840
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	4	4
	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	160	290
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.010	0.044
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.013	0.039
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	0.002	0.018
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.050	0.020

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1103100-W

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Date Issued: 06 Jun 2024

33 Cormack Road
Wingfield, South Australia, 5013, Australia
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Certificate of Analysis
Final Report

Project Number :AUADE-24-00208

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Accreditation No 626

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory.

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Date Issued: 06 Jun 2024

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1102792-W**
Project name KAPUNDA
Project ID 2
Received Date May 30, 2024

Client Sample ID			**KPSELTM03_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0085560**
Date Sampled			**May 30, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.09
Bromide	1	mg/L	3.4
Chloride	1	mg/L	790
Conductivity (at 25 °C)	10	uS/cm	4000
Fluoride	0.5	mg/L	1.9
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2
pH (at 25 °C)	0.1	pH Units	8.5
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	2000
Sulphate (as SO4)	5	mg/L	450
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	< 0.2
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	36
Phosphate total (as P)	0.01	mg/L	< 0.01
Silicon (filtered)	0.5	mg/L	8.5
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	380
Carbonate Alkalinity (as CaCO3)	10	mg/L	24
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	400
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic (filtered)	0.001	mg/L	0.008
Barium (filtered)	0.02	mg/L	< 0.02
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	0.017
Copper (filtered)	0.001	mg/L	0.022
Iron (filtered)	0.05	mg/L	< 0.05

Client Sample ID			KPSELTM03_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-My0085560**
Date Sampled			**May 30, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lead (filtered)	0.001	mg/L	< 0.001
Lithium (filtered)	0.005	mg/L	< 0.005
Manganese (filtered)	0.005	mg/L	0.025
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.019
Selenium (filtered)	0.001	mg/L	0.001
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	0.63
Uranium (filtered)	0.005	mg/L	0.044
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.082
Alkali Metals			
Calcium	0.5	mg/L	40
Magnesium	0.5	mg/L	49
Potassium	0.5	mg/L	19
Sodium	0.5	mg/L	760

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	Jun 01, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jun 01, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	May 30, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Jun 01, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jun 01, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Jun 01, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Jun 01, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Jun 01, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Jun 07, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Jun 01, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Jun 01, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Jun 01, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Jun 01, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1102792
Phone: 08 7127 1110
Fax:

Received: May 30, 2024 3:01 PM
Due: Jun 6, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																															

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																												
1	KPSELTM03_EF	May 30, 2024		Water	M24-My0085560	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	99			70-130	Pass	
Bromide	%	121			70-130	Pass	
Chloride	%	102			70-130	Pass	
Conductivity (at 25 °C)	%	100			70-130	Pass	
Fluoride	%	109			70-130	Pass	
Nitrate & Nitrite (as N)	%	111			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrite (as N)	%	94			70-130	Pass	
Phosphorus reactive (as P)	%	117			70-130	Pass	
Sulphate (as SO4)	%	108			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	78			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	97			70-130	Pass	
Phosphate total (as P)	%	100			70-130	Pass	
Silicon (filtered)	%	93			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	81			70-130	Pass	
Total Alkalinity (as CaCO3)	%	85			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	108			80-120	Pass	
Arsenic (filtered)	%	96			80-120	Pass	
Boron (filtered)	%	103			80-120	Pass	
Cadmium (filtered)	%	91			80-120	Pass	
Chromium (filtered)	%	97			80-120	Pass	
Cobalt (filtered)	%	96			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron (filtered)	%	100			80-120	Pass	
Lead (filtered)	%	90			80-120	Pass	
Lithium (filtered)	%	100			80-120	Pass	
Manganese (filtered)	%	100			80-120	Pass	
Mercury (filtered)	%	86			80-120	Pass	
Molybdenum (filtered)	%	99			80-120	Pass	
Nickel (filtered)	%	98			80-120	Pass	
Selenium (filtered)	%	96			80-120	Pass	
Silver (filtered)	%	88			80-120	Pass	
Strontium (filtered)	%	100			80-120	Pass	
Uranium (filtered)	%	93			80-120	Pass	
Zinc (filtered)	%	97			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	98			80-120	Pass	
Magnesium	%	95			80-120	Pass	
Potassium	%	97			80-120	Pass	
Sodium	%	100			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Bromide	M24-My0090085	NCP	%	73			70-130	Pass	
Fluoride	M24-My0088461	NCP	%	117			70-130	Pass	
Nitrate & Nitrite (as N)	M24-My0087525	NCP	%	119			70-130	Pass	
Nitrite (as N)	M24-My0087525	NCP	%	105			70-130	Pass	
Sulphate (as SO4)	M24-My0085981	NCP	%	96			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0072358	NCP	%	96			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0085981	NCP	%	99			70-130	Pass	
Phosphate total (as P)	B24-My0085776	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-My0087207	NCP	%	109			75-125	Pass	
Arsenic (filtered)	M24-My0087207	NCP	%	102			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Barium (filtered)	M24-My0087207	NCP	%	101			75-125	Pass	
Beryllium (filtered)	M24-My0087207	NCP	%	100			75-125	Pass	
Cadmium (filtered)	M24-My0087207	NCP	%	90			75-125	Pass	
Chromium (filtered)	M24-My0087207	NCP	%	101			75-125	Pass	
Cobalt (filtered)	M24-My0087207	NCP	%	95			75-125	Pass	
Copper (filtered)	M24-My0087207	NCP	%	92			75-125	Pass	
Iron (filtered)	M24-My0087207	NCP	%	98			75-125	Pass	
Lead (filtered)	M24-My0087207	NCP	%	89			75-125	Pass	
Lithium (filtered)	M24-My0087207	NCP	%	91			75-125	Pass	
Manganese (filtered)	M24-My0087207	NCP	%	92			75-125	Pass	
Mercury (filtered)	M24-My0087207	NCP	%	80			75-125	Pass	
Molybdenum (filtered)	M24-My0087207	NCP	%	91			75-125	Pass	
Nickel (filtered)	M24-My0087207	NCP	%	88			75-125	Pass	
Selenium (filtered)	M24-My0087207	NCP	%	95			75-125	Pass	
Silver (filtered)	M24-My0087207	NCP	%	81			75-125	Pass	
Uranium (filtered)	M24-My0087207	NCP	%	99			75-125	Pass	
Vanadium (filtered)	M24-My0087207	NCP	%	97			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)	M24-My0085877	NCP	mg/L	0.13	0.12	13	30%	Pass	
Bromide	M24-My0090084	NCP	mg/L	7.8	7.3	7.3	30%	Pass	
Chloride	B24-My0073630	NCP	mg/L	620	610	1.8	30%	Pass	
Conductivity (at 25 °C)	M24-My0086300	NCP	uS/cm	1000	990	<1	30%	Pass	
Fluoride	M24-My0090676	NCP	mg/L	10	10	2.6	30%	Pass	
Nitrate & Nitrite (as N)	M24-My0085877	NCP	mg/L	0.15	0.11	31	30%	Fail	Q15
Nitrite (as N)	M24-My0085877	NCP	mg/L	0.03	0.03	4.0	30%	Pass	
pH (at 25 °C)	M24-My0086300	NCP	pH Units	7.5	7.4	pass	30%	Pass	
Sulphate (as SO4)	B24-My0073630	NCP	mg/L	16	16	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-My0085796	NCP	mg/L	51	46	10	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-My0085560	CP	mg/L	36	30	18	30%	Pass	
Phosphate total (as P)	M24-Jn0000838	NCP	mg/L	0.15	0.14	7.5	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-My0086305	NCP	mg/L	120	120	4.2	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-My0086305	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-My0086305	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-My0086305	NCP	mg/L	120	120	4.2	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-My0087207	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-My0087207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M24-My0087207	NCP	mg/L	0.03	0.03	8.4	30%	Pass	
Beryllium (filtered)	M24-My0087207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-My0087207	NCP	mg/L	0.40	0.38	6.7	30%	Pass	
Cadmium (filtered)	M24-My0087207	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-My0087207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-My0087207	NCP	mg/L	0.003	0.002	10	30%	Pass	
Copper (filtered)	M24-My0087207	NCP	mg/L	0.005	0.005	5.7	30%	Pass	
Iron (filtered)	M24-My0087207	NCP	mg/L	0.06	0.05	9.9	30%	Pass	
Lead (filtered)	M24-My0087207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-My0087207	NCP	mg/L	0.090	0.084	6.8	30%	Pass	
Manganese (filtered)	M24-My0087207	NCP	mg/L	0.17	0.16	7.4	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Mercury (filtered)	M24-My0087207	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-My0087207	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-My0087207	NCP	mg/L	0.077	0.071	8.2	30%	Pass	
Selenium (filtered)	M24-My0087207	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-My0087207	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-My0087207	NCP	mg/L	1.6	1.4	8.6	30%	Pass	
Uranium (filtered)	M24-My0087207	NCP	mg/L	0.012	0.011	6.9	30%	Pass	
Vanadium (filtered)	M24-My0087207	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-My0087207	NCP	mg/L	0.26	0.24	8.4	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.
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
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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Certificate of Analysis
Final Report

Project Number :AUADE-24-00222

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

Enviro Copper
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155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref 00202477

BV Sample ID	170121	170122	170123
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	14-Jun-2024	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024	05-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.9	7.3	7.6
	Measured Temp. ,°C	18.3	17.9	17.9
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	8900	13000	9400
	Resistivity at 25°C ,ohm m	1.13	0.78	1.06
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5700	8200	6000
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	48	63	44
	Sodium as Na ,mg/L	1600	2100	1600
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	150	430	180
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	170	390	210
	Strontium as Sr ,mg/L	2	5	2
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2000	3000	2100
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	2	1
	* Sodium as Na ,meq/L	70	93	71
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	7	21	9
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	14	32	17
	* Strontium as Sr ,meq/L	0.04	0.11	0.05
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	92	150	98
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	10	15	12
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1

Date Issued: 14 Jun 2024

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ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00222

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

BV Sample ID	170121	170122	170123
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI03
Date Started	14-Jun-2024	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024	05-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Cations Dissolved P3100-PW-012	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	2	7	2
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	5	6	5
	Chloride as Cl ,mg/L	2200	3000	2400
	Fluoride as F ,mg/L	0.3	0.3	0.5
	Nitrate as NO_3 ,mg/L	<0.1	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	1100	2200	1200
Anions APHA 1050A	* Bromide as Br ,meq/L	0.06	0.08	0.06
	* Chloride as Cl ,meq/L	63	86	67
	* Fluoride as F ,meq/L	0.02	0.01	0.03
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	22	46	25
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	360	690	460
	Total Alkalinity ,mg CaCO3/L	360	690	460
APHA 4110	Total Anions ,mg/L	3700	6000	4100
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	0.02	0.02	0.02
	* Carbonate as CO3 ,meq/L	0.02	0.02	0.02
	* Bicarbonate as HCO3 ,meq/L	7	14	9
	* Total Anions ,meq/L	93	150	100
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5600	9000	6100
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1100	2700	1300
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	1	2
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	370	780	410
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.004	0.006	0.005
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.002	0.021	0.006
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.007	<0.001	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.013	0.15	0.040

Date Issued: 14 Jun 2024

4

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00222

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	170124	170125	170126
Customer Sample ID	KPSELTI04	KPSELTM01	KPSELTM03
Date Started	14-Jun-2024	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024	05-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.7	7.1	7.7
	Measured Temp. ,°C	18.0	18.0	18.0
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	7700	14000	4000
	Resistivity at 25°C ,ohm m	1.30	0.70	2.50
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	4900	9200	2600
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	38	73	21
	Sodium as Na ,mg/L	1300	2400	710
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	130	400	42
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	160	470	52
	Strontium as Sr ,mg/L	2	5	0.6
	Aluminum as Al ,mg/L	<0.1	0.2	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1700	3400	830
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.96	2	0.53
	* Sodium as Na ,meq/L	58	100	31
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	7	20	2
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	13	39	4
	* Strontium as Sr ,meq/L	0.04	0.11	0.01
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	79	170	38
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	3	1
	Silicon as Si ,mg/L	12	15	11
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	3	8	1
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	3	6	2
	Chloride as Cl ,mg/L	2000	3500	890
	Fluoride as F ,mg/L	1	0.7	0.6
	Nitrate as NO_3 ,mg/L	<0.1	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	900	2400	440

Date Issued: 14 Jun 2024

33 Cormack Road
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ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00222

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

BV Sample ID	170124	170125	170126
Customer Sample ID	KPSELTI04	KPSELTM01	KPSELTM03
Date Started	14-Jun-2024	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024	05-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Anions APHA 1050A	* Bromide as Br ,meq/L	0.04	0.08	0.03
	* Chloride as Cl ,meq/L	55	97	25
	* Fluoride as F ,meq/L	0.06	0.04	0.03
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	19	49	9
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	410	720	380
	Total Alkalinity ,mg CaCO3/L	410	720	380
APHA 4110	Total Anions ,mg/L	3300	6600	1700
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	0.02	0.02	0.02
	* Carbonate as CO3 ,meq/L	0.02	0.02	0.02
	* Bicarbonate as HCO3 ,meq/L	8	14	8
	* Total Anions ,meq/L	82	160	42
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	4900	9900	2500
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1000	2900	320
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	1	5
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	290	830	150
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.005	0.010	0.006
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.008	0.009	0.008
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.003	<0.001	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.046	0.063	0.043

BV Sample ID	170127	170128
Customer Sample ID	KPSELTX01 #1	KPSELTX01 #2
Date Started	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	8.1	8.3
	Measured Temp. ,°C	18.0	18.0
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	7700	8400

Date Issued: 14 Jun 2024

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Accreditation No 626

BV Sample ID	170127	170128
Customer Sample ID	KPSELTX01 #1	KPSELTX01 #2
Date Started	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Conductivity & Resistivity APHA 2510 A,B	Resistivity at 25°C ,ohm m	1.30	1.19
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	4900	5400
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	41	42
	Sodium as Na ,mg/L	1300	1400
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	160	180
	Iron as Fe ,mg/L	<0.1	<0.1
	Magnesium as Mg ,mg/L	170	190
	Strontium as Sr ,mg/L	2	2
	Aluminum as Al ,mg/L	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1700	1800
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	1
	* Sodium as Na ,meq/L	58	61
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	8	9
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	14	16
	* Strontium as Sr ,meq/L	0.04	0.04
	* Aluminium as Al ,meq/L	<0.01	<0.01
	* Total Cations ,meq/L	81	87
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2
	Silicon as Si ,mg/L	10	9
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1
	Phosphorus as P ,mg/L	2	2
	Molybdenum as Mo ,mg/L	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	3	4
	Chloride as Cl ,mg/L	1900	2000
	Fluoride as F ,mg/L	1	1
	Nitrate as NO_3 ,mg/L	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	1100	1300
Anions APHA 1050A	* Bromide as Br ,meq/L	0.04	0.05
	* Chloride as Cl ,meq/L	53	57
	* Fluoride as F ,meq/L	0.05	0.06

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00222

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

BV Sample ID	170127	170128
Customer Sample ID	KPSELTX01 #1	KPSELTX01 #2
Date Started	14-Jun-2024	14-Jun-2024
Sample Type	Water	Water
Date Sampled	05-Jun-2024	05-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Anions APHA 1050A	* Nitrate as NO_3 ,meq/L	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	23	26
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	450	460
	Total Alkalinity ,mg CaCO3/L	450	460
APHA 4110	Total Anions ,mg/L	3400	3800
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	0.02	0.02
	* Carbonate as CO3 ,meq/L	0.02	0.02
	* Bicarbonate as HCO3 ,meq/L	9	9
	* Total Anions ,meq/L	85	93
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5100	5600
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1100	1200
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	3
	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	370	430
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.023	0.015
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.014	0.013
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	0.010	0.008
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.048	0.067

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1106167-W

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Date Issued: 14 Jun 2024

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00222

Accredited for compliance with ISO/IEC 17025 - Testing)

Accreditation No 626

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory.

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Date Issued: 14 Jun 2024

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

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: **Leon Faulkner**

Report **1105050-W**
Project name KAPUNDA
Project ID 2
Received Date Jun 06, 2024

Client Sample ID			**KPSELTX01_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Jn0012545**
Date Sampled			**Jun 05, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.36
Bromide	1	mg/L	< 1
Chloride	1	mg/L	1600
Conductivity (at 25 °C)	10	uS/cm	7600
Fluoride	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	1.6
Nitrate (as N)	0.02	mg/L	1.4
Nitrite (as N)	0.02	mg/L	0.19
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2
pH (at 25 °C)	0.1	pH Units	8.2
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	3400
Sulphate (as SO4)	5	mg/L	1200
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4
Total Nitrogen (as N)*	0.2	mg/L	2.0
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	32
Phosphate total (as P)	0.01	mg/L	< 0.01
Silicon (filtered)	0.5	mg/L	9.3
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	460
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	460
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	0.05
Arsenic (filtered)	0.001	mg/L	0.020
Barium (filtered)	0.02	mg/L	0.05
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	1.8
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.016
Copper (filtered)	0.001	mg/L	0.063
Iron (filtered)	0.05	mg/L	< 0.05

Client Sample ID			KPSELTX01_EF
Sample Matrix			Water
Eurofins Sample No.			M24-Jn0012545
Date Sampled			Jun 05, 2024
Test/Reference	LOR	Unit	
Heavy Metals			
Lead (filtered)	0.001	mg/L	< 0.001
Lithium (filtered)	0.005	mg/L	0.016
Manganese (filtered)	0.005	mg/L	0.096
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.031
Selenium (filtered)	0.001	mg/L	0.010
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	2.3
Uranium (filtered)	0.005	mg/L	0.065
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.037
Alkali Metals			
Calcium	0.5	mg/L	140
Magnesium	0.5	mg/L	150
Potassium	0.5	mg/L	36
Sodium	0.5	mg/L	1200

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	Jun 13, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jun 13, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Jun 06, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Jun 13, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jun 13, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Jun 13, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Jun 13, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Jun 13, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Jun 18, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Jun 13, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Jun 13, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Sulphate (as SO4)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Jun 13, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Envirocopper Ltd
Address: Suite 4, Level 1, 155 King William Road
Unley
SA 5061

Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1105050
Phone: 08 7127 1110
Fax:

Received: Jun 6, 2024 2:46 PM
Due: Jun 14, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTX01_EF	Jun 05, 2024		Water	M24-Jn0012545	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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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 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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	97			70-130	Pass	
Bromide	%	72			70-130	Pass	
Chloride	%	114			70-130	Pass	
Conductivity (at 25 °C)	%	100			70-130	Pass	
Fluoride	%	77			70-130	Pass	
Nitrate & Nitrite (as N)	%	100			70-130	Pass	
Nitrite (as N)	%	103			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus reactive (as P)	%	120			70-130	Pass	
Sulphate (as SO4)	%	115			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	100			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	101			70-130	Pass	
Phosphate total (as P)	%	102			70-130	Pass	
Silicon (filtered)	%	92			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	86			70-130	Pass	
Total Alkalinity (as CaCO3)	%	89			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	99			80-120	Pass	
Arsenic (filtered)	%	103			80-120	Pass	
Boron (filtered)	%	99			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Cobalt (filtered)	%	94			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron (filtered)	%	97			80-120	Pass	
Lead (filtered)	%	93			80-120	Pass	
Lithium (filtered)	%	96			80-120	Pass	
Manganese (filtered)	%	96			80-120	Pass	
Mercury (filtered)	%	91			80-120	Pass	
Molybdenum (filtered)	%	95			80-120	Pass	
Nickel (filtered)	%	99			80-120	Pass	
Selenium (filtered)	%	114			80-120	Pass	
Silver (filtered)	%	96			80-120	Pass	
Strontium (filtered)	%	95			80-120	Pass	
Uranium (filtered)	%	93			80-120	Pass	
Zinc (filtered)	%	97			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	98			80-120	Pass	
Magnesium	%	96			80-120	Pass	
Potassium	%	97			80-120	Pass	
Sodium	%	98			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	M24-Jn0015463	NCP	%	86			70-130	Pass	
Nitrate & Nitrite (as N)	M24-Jn0015458	NCP	%	120			70-130	Pass	
Nitrite (as N)	M24-Jn0015458	NCP	%	100			70-130	Pass	
Sulphate (as SO4)	M24-Jn0012897	NCP	%	97			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B24-Jn0019467	NCP	%	102			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0012899	NCP	%	99			70-130	Pass	
Phosphate total (as P)	M24-Jn0026615	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Jn0017504	NCP	%	94			75-125	Pass	
Arsenic (filtered)	M24-Jn0017504	NCP	%	106			75-125	Pass	
Barium (filtered)	M24-Jn0017504	NCP	%	90			75-125	Pass	
Beryllium (filtered)	M24-Jn0017504	NCP	%	91			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium (filtered)	M24-Jn0017504	NCP	%	91			75-125	Pass	
Chromium (filtered)	M24-Jn0017504	NCP	%	99			75-125	Pass	
Cobalt (filtered)	M24-Jn0017504	NCP	%	95			75-125	Pass	
Copper (filtered)	M24-Jn0017504	NCP	%	88			75-125	Pass	
Iron (filtered)	M24-Jn0017504	NCP	%	101			75-125	Pass	
Lead (filtered)	M24-Jn0017504	NCP	%	75			75-125	Pass	
Lithium (filtered)	M24-Jn0020962	NCP	%	90			75-125	Pass	
Manganese (filtered)	M24-Jn0017504	NCP	%	104			75-125	Pass	
Mercury (filtered)	M24-Jn0017504	NCP	%	86			75-125	Pass	
Molybdenum (filtered)	M24-Jn0017504	NCP	%	89			75-125	Pass	
Nickel (filtered)	M24-Jn0017504	NCP	%	94			75-125	Pass	
Selenium (filtered)	M24-Jn0017504	NCP	%	82			75-125	Pass	
Silver (filtered)	M24-Jn0017504	NCP	%	87			75-125	Pass	
Strontium (filtered)	M24-Jn0017437	NCP	%	77			75-125	Pass	
Uranium (filtered)	M24-Jn0017504	NCP	%	84			75-125	Pass	
Vanadium (filtered)	M24-Jn0017504	NCP	%	104			75-125	Pass	
Zinc (filtered)	M24-Jn0017504	NCP	%	91			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)	M24-Jn0017848	NCP	mg/L	11	10	6.1	30%	Pass	
Bromide	M24-Jn0012458	NCP	mg/L	< 1	< 1	<1	30%	Pass	
Chloride	M24-Jn0015162	NCP	mg/L	2000	1900	14	30%	Pass	
Conductivity (at 25 °C)	M24-Jn0016727	NCP	uS/cm	5900	5900	<1	30%	Pass	
Fluoride	M24-Jn0012458	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M24-Jn0017847	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M24-Jn0017847	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M24-Jn0016727	NCP	pH Units	7.3	7.5	pass	30%	Pass	
Sulphate (as SO4)	M24-Jn0015162	NCP	mg/L	410	390	4.6	30%	Pass	
Total Kjeldahl Nitrogen (as N)	B24-Jn0019466	NCP	mg/L	0.3	0.3	15	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0023134	NCP	mg/L	32	36	12	30%	Pass	
Phosphate total (as P)	B24-Jn0015475	NCP	mg/L	0.07	0.05	31	30%	Fail	Q15
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Jn0016727	NCP	mg/L	400	390	4.3	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Jn0016727	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Jn0016727	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Jn0016727	NCP	mg/L	400	390	4.3	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Jn0017504	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-Jn0017504	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M24-Jn0017504	NCP	mg/L	0.02	0.02	5.1	30%	Pass	
Beryllium (filtered)	M24-Jn0017504	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Jn0017504	NCP	mg/L	3.6	3.5	4.1	30%	Pass	
Cadmium (filtered)	M24-Jn0017504	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Jn0017504	NCP	mg/L	0.008	0.007	3.5	30%	Pass	
Cobalt (filtered)	M24-Jn0017504	NCP	mg/L	0.004	0.004	3.9	30%	Pass	
Copper (filtered)	M24-Jn0017504	NCP	mg/L	0.003	< 0.001	150	30%	Fail	Q15
Iron (filtered)	M24-Jn0017504	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-Jn0017504	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Jn0017504	NCP	mg/L	0.21	0.20	4.4	30%	Pass	
Manganese (filtered)	M24-Jn0017504	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Mercury (filtered)	M24-Jn0017504	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Jn0017504	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Jn0017504	NCP	mg/L	0.002	0.002	10	30%	Pass	
Selenium (filtered)	M24-Jn0017504	NCP	mg/L	0.008	0.008	3.5	30%	Pass	
Silver (filtered)	M24-Jn0017504	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-Jn0017504	NCP	mg/L	4.1	3.9	3.7	30%	Pass	
Uranium (filtered)	M24-Jn0017504	NCP	mg/L	0.006	0.006	4.9	30%	Pass	
Vanadium (filtered)	M24-Jn0017504	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Jn0017504	NCP	mg/L	0.010	0.010	2.6	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Jn0009507	NCP	mg/L	3.2	3.5	9.5	30%	Pass	
Magnesium	M24-Jn0009507	NCP	mg/L	3.3	3.5	6.8	30%	Pass	
Potassium	M24-Jn0009507	NCP	mg/L	4.1	4.2	1.00	30%	Pass	
Sodium	M24-Jn0009507	NCP	mg/L	300	310	2.3	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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
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
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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Certificate of Analysis
Final Report

Project Number :AUADE-24-00227

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

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Attention: Philippa Faulkner

Client Ref 00202477

BV Sample ID	**172430**	**172431**	**172432**
Customer Sample ID	**KPSELTI01**	**KPSELTI01 #2**	**KPSELTI02**
Date Started	**17-Jun-2024**	**17-Jun-2024**	**17-Jun-2024**
Sample Type	**Water**	**Water**	**Water**
Date Sampled	**12-Jun-2024**	**12-Jun-2024**	**12-Jun-2024**
Pressure			
Cylinder ID			
Collected By	**Client**	**Client**	**Client**

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	8.3	8.3	7.4
	Measured Temp. ,°C	16.2	16.0	15.6
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	8900	8900	14000
	Resistivity at 25°C ,ohm m	1.12	1.13	0.73
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5700	5700	8800
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	47	48	61
	Sodium as Na ,mg/L	1600	1600	2300
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	140	140	460
	Iron as Fe ,mg/L	<0.1	<0.1	0.5
	Magnesium as Mg ,mg/L	160	160	430
	Strontium as Sr ,mg/L	2	2	5
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2000	2000	3300
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	1	2
	* Sodium as Na ,meq/L	70	70	100
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	7	7	23
	* Iron as Fe ,meq/L	<0.01	<0.01	0.03
	* Magnesium as Mg ,meq/L	13	13	35
	* Strontium as Sr ,meq/L	0.04	0.04	0.12
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	92	92	160
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	10	10	16
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1

Date Issued: 21 Jun 2024

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00227

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BV Sample ID	172430	172431	172432
Customer Sample ID	KPSELTI01	KPSELTI01 #2	KPSELTI02
Date Started	17-Jun-2024	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024	12-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Cations Dissolved P3100-PW-012	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	0.2
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	6	6	14
	Chloride as Cl ,mg/L	2300	2200	3200
	Fluoride as F ,mg/L	0.9	0.8	0.4
	Nitrate as NO_3 ,mg/L	2	<0.1	1
	Sulphate as SO_4 ,mg/L	1000	1000	2400
Anions APHA 1050A	* Bromide as Br ,meq/L	0.08	0.07	0.18
	* Chloride as Cl ,meq/L	64	63	91
	* Fluoride as F ,meq/L	0.05	0.04	0.02
	* Nitrate as NO_3 ,meq/L	0.03	<0.01	0.02
	* Sulphate as SO_4 ,meq/L	21	21	51
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	340	290	740
	Total Alkalinity ,mg CaCO3/L	340	290	740
APHA 4110	Total Anions ,mg/L	3600	3600	6400
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO3 ,meq/L	7	6	15
	* Total Anions ,meq/L	92	90	160
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5600	5500	9700
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1000	1000	2900
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	1	1
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes

Date Issued: 21 Jun 2024

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00227

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	172430	172431	172432
Customer Sample ID	KPSELTI01	KPSELTI01 #2	KPSELTI02
Date Started	17-Jun-2024	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024	12-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	390	390	890
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.004	0.004	0.009
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.002	0.002	0.021
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.006	0.006	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.011	0.011	0.12

BV Sample ID	172433	172434	172435
Customer Sample ID	KPSELTI03	KPSELTI04	KPSELTM01
Date Started	17-Jun-2024	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024	12-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.8	8.0	7.3
	Measured Temp. ,°C	15.6	15.6	15.6
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	9400	7700	15000
	Resistivity at 25°C ,ohm m	1.06	1.29	0.69
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	6000	5000	9300
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	42	36	67
	Sodium as Na ,mg/L	1700	1400	2500
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	180	130	400
	Iron as Fe ,mg/L	<0.1	<0.1	3
	Magnesium as Mg ,mg/L	210	170	490
	Strontium as Sr ,mg/L	2	2	5
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2100	1700	3400
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	0.91	2
	* Sodium as Na ,meq/L	72	59	110

Date Issued: 21 Jun 2024

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BV Sample ID	172433	172434	172435
Customer Sample ID	KPSELTI03	KPSELTI04	KPSELTM01
Date Started	17-Jun-2024	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024	12-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Total Cations APHA 1050A	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	9	6	20
	* Iron as Fe ,meq/L	<0.01	<0.01	0.17
	* Magnesium as Mg ,meq/L	18	14	40
	* Strontium as Sr ,meq/L	0.05	0.04	0.11
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	99	80	170
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	2	1	2
	Silicon as Si ,mg/L	11	11	15
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	0.1	<0.1	0.3
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1	<0.1
	Phosphorus as P ,mg/L	2	<0.2	4
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	11	10	15
	Chloride as Cl ,mg/L	2400	2000	3500
	Fluoride as F ,mg/L	0.6	0.9	0.3
	Nitrate as NO_3 ,mg/L	0.8	0.6	<0.1
	Sulphate as SO_4 ,mg/L	1300	980	2500
Anions APHA 1050A	* Bromide as Br ,meq/L	0.14	0.12	0.19
	* Chloride as Cl ,meq/L	67	56	99
	* Fluoride as F ,meq/L	0.03	0.05	0.02
	* Nitrate as NO_3 ,meq/L	0.01	0.01	<0.01
	* Sulphate as SO_4 ,meq/L	27	20	51
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	480	410	720
	Total Alkalinity ,mg CaCO3/L	480	410	720

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BV Sample ID	172433	172434	172435
Customer Sample ID	KPSELTI03	KPSELTI04	KPSELTM01
Date Started	17-Jun-2024	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024	12-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
APHA 4110	Total Anions ,mg/L	4200	3400	6700
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO3 ,meq/L	10	8	14
	* Total Anions ,meq/L	100	85	160
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	6200	5100	10000
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1300	1000	3000
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	2	3	2
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	440	320	910
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.005	0.007	0.007
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.005	0.008	0.006
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.001	0.003	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.029	0.039	0.043

BV Sample ID	172436	172437
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	8.1	8.0
	Measured Temp. ,°C	15.6	15.6
Conductivity & Resistivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	4000	7300
	Resistivity at 25°C ,ohm m	2.49	1.37
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	2600	4700

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Final Report

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BV Sample ID	172436	172437
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	20	37
	Sodium as Na ,mg/L	740	1300
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	43	140
	Iron as Fe ,mg/L	<0.1	<0.1
	Magnesium as Mg ,mg/L	55	160
	Strontium as Sr ,mg/L	0.6	2
	Aluminum as Al ,mg/L	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	860	1600
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.51	0.96
	* Sodium as Na ,meq/L	32	56
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	2	7
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	5	13
	* Strontium as Sr ,meq/L	0.01	0.04
	* Aluminium as Al ,meq/L	<0.01	<0.01
	* Total Cations ,meq/L	39	77
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	1
	Silicon as Si ,mg/L	11	10
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	4	9
	Chloride as Cl ,mg/L	850	1800
	Fluoride as F ,mg/L	0.7	0.7

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Final Report

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BV Sample ID	172436	172437
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	17-Jun-2024	17-Jun-2024
Sample Type	Water	Water
Date Sampled	12-Jun-2024	12-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Anions APHA 4110	Nitrate as NO_3 ,mg/L	<0.1	2
	Sulphate as SO_4 ,mg/L	480	1100
Anions APHA 1050A	* Bromide as Br ,meq/L	0.05	0.11
	* Chloride as Cl ,meq/L	24	50
	* Fluoride as F ,meq/L	0.04	0.04
	* Nitrate as NO_3 ,meq/L	<0.01	0.02
	* Sulphate as SO_4 ,meq/L	10	22
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	380	430
	Total Alkalinity ,mg CaCO3/L	380	430
APHA 4110	Total Anions ,mg/L	1700	3300
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01
	* Carbonate as CO3 ,meq/L	<0.01	<0.01
	* Bicarbonate as HCO3 ,meq/L	8	9
	* Total Anions ,meq/L	42	81
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	2600	4900
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	330	1000
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	3	2
	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	160	360
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.003	0.035
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.002	0.014
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	<0.001	0.011
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.037	0.031

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1107628-W

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AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory.

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Date Issued: 21 Jun 2024

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

NATA Accredited
Accreditation Number 1261
Site Number 1254

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Attention: **Leon Faulkner**

Report **1107157-W**
Project name KAPUNDA
Project ID 2
Received Date Jun 13, 2024

Client Sample ID			**KPSELTI01_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Jn0028885**
Date Sampled			**Jun 12, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.27
Bromide	1	mg/L	< 1
Chloride	1	mg/L	1900
Conductivity (at 25 °C)	10	uS/cm	8800
Fluoride	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.40
Nitrate (as N)	0.02	mg/L	0.18
Nitrite (as N)	0.02	mg/L	0.23
Organic Nitrogen (as N)*	0.2	mg/L	0.53
pH (at 25 °C)	0.1	pH Units	8.3
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Salinity (expressed as TDS)*	10	mg/L	4600
Sulphate (as SO4)	5	mg/L	1100
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.8
Total Nitrogen (as N)*	0.2	mg/L	1.2
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	52
Phosphate total (as P)	0.01	mg/L	< 0.01
Silicon (filtered)	0.5	mg/L	7.7
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	4400
Carbonate Alkalinity (as CaCO3)	10	mg/L	96
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	4500
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	0.18
Arsenic (filtered)	0.001	mg/L	0.004
Barium (filtered)	0.02	mg/L	0.06
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	1.6
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.003
Copper (filtered)	0.001	mg/L	0.014
Iron (filtered)	0.05	mg/L	< 0.05
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			KPSELTI01_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Jn0028885**
Date Sampled			**Jun 12, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	0.021
Manganese (filtered)	0.005	mg/L	0.083
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.004
Selenium (filtered)	0.001	mg/L	0.008
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	2.1
Uranium (filtered)	0.005	mg/L	0.012
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.020
Alkali Metals			
Calcium	0.5	mg/L	150
Magnesium	0.5	mg/L	170
Potassium	0.5	mg/L	46
Sodium	0.5	mg/L	1700

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	Jun 14, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jun 14, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Organic Nitrogen (as N)*	Melbourne	Jun 13, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Jun 14, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jun 14, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Jun 14, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Jun 14, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Jun 14, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Jun 21, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Jun 14, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Jun 14, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Jun 14, 2024	28 Days
- Method: in-house method LTM-INO-4390 Fluoride by Discrete Analyser			
Sulphate (as SO4)	Melbourne	Jun 14, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Jun 14, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

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Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079 & 25289

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Company Name: Envirocopper Ltd
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Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1107157
Phone: 08 7127 1110
Fax:

Received: Jun 13, 2024 12:27 PM
Due: Jun 20, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTI01_EF	Jun 12, 2024		Water	M24-Jn0028885	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	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	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	92			70-130	Pass	
Bromide	%	77			70-130	Pass	
Chloride	%	111			70-130	Pass	
Conductivity (at 25 °C)	%	96			70-130	Pass	
Fluoride	%	88			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrate & Nitrite (as N)	%	106			70-130	Pass	
Nitrite (as N)	%	96			70-130	Pass	
Phosphorus reactive (as P)	%	90			70-130	Pass	
Sulphate (as SO4)	%	77			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	95			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	100			70-130	Pass	
Phosphate total (as P)	%	102			70-130	Pass	
Silicon (filtered)	%	91			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	88			70-130	Pass	
Total Alkalinity (as CaCO3)	%	94			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	102			80-120	Pass	
Arsenic (filtered)	%	100			80-120	Pass	
Boron (filtered)	%	112			80-120	Pass	
Cadmium (filtered)	%	94			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Cobalt (filtered)	%	96			80-120	Pass	
Copper (filtered)	%	86			80-120	Pass	
Iron (filtered)	%	101			80-120	Pass	
Lead (filtered)	%	84			80-120	Pass	
Lithium (filtered)	%	91			80-120	Pass	
Manganese (filtered)	%	103			80-120	Pass	
Mercury (filtered)	%	92			80-120	Pass	
Molybdenum (filtered)	%	93			80-120	Pass	
Nickel (filtered)	%	94			80-120	Pass	
Selenium (filtered)	%	99			80-120	Pass	
Silver (filtered)	%	90			80-120	Pass	
Strontium (filtered)	%	98			80-120	Pass	
Uranium (filtered)	%	94			80-120	Pass	
Zinc (filtered)	%	97			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	106			80-120	Pass	
Magnesium	%	106			80-120	Pass	
Potassium	%	103			80-120	Pass	
Sodium	%	107			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M24-Jn0031347	NCP	%	112			70-130	Pass	
Nitrate & Nitrite (as N)	M24-Jn0025170	NCP	%	113			70-130	Pass	
Nitrite (as N)	M24-Jn0025170	NCP	%	101			70-130	Pass	
Sulphate (as SO4)	M24-Jn0034654	NCP	%	96			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	W24-Jn0025277	NCP	%	95			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0025169	NCP	%	74			70-130	Pass	
Phosphate total (as P)	M24-Jn0035918	NCP	%	106			70-130	Pass	
Silicon (filtered)	M24-Jn0026088	NCP	%	87			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Jn0028885	CP	%	115			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic (filtered)	M24-Jn0028885	CP	%	118			75-125	Pass	
Barium (filtered)	M24-Jn0028885	CP	%	114			75-125	Pass	
Beryllium (filtered)	M24-Jn0028885	CP	%	101			75-125	Pass	
Boron (filtered)	M24-Jn0031349	NCP	%	88			75-125	Pass	
Cadmium (filtered)	M24-Jn0028885	CP	%	99			75-125	Pass	
Chromium (filtered)	M24-Jn0028885	CP	%	110			75-125	Pass	
Cobalt (filtered)	M24-Jn0028885	CP	%	103			75-125	Pass	
Copper (filtered)	M24-Jn0028885	CP	%	95			75-125	Pass	
Iron (filtered)	M24-Jn0028885	CP	%	108			75-125	Pass	
Lead (filtered)	M24-Jn0028885	CP	%	88			75-125	Pass	
Lithium (filtered)	M24-Jn0028885	CP	%	99			75-125	Pass	
Manganese (filtered)	M24-Jn0028885	CP	%	107			75-125	Pass	
Mercury (filtered)	M24-Jn0028885	CP	%	114			75-125	Pass	
Molybdenum (filtered)	M24-Jn0028885	CP	%	90			75-125	Pass	
Nickel (filtered)	M24-Jn0028885	CP	%	99			75-125	Pass	
Selenium (filtered)	M24-Jn0028885	CP	%	111			75-125	Pass	
Silver (filtered)	M24-Jn0028885	CP	%	76			75-125	Pass	
Strontium (filtered)	M24-Jn0031349	NCP	%	116			75-125	Pass	
Uranium (filtered)	M24-Jn0028885	CP	%	104			75-125	Pass	
Vanadium (filtered)	M24-Jn0028885	CP	%	113			75-125	Pass	
Zinc (filtered)	M24-Jn0028885	CP	%	103			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)	M24-Jn0033632	NCP	mg/L	0.02	0.06	90	30%	Fail	Q15
Chloride	M24-Jn0026468	NCP	mg/L	23	24	<1	30%	Pass	
Nitrate & Nitrite (as N)	M24-Jn0033632	NCP	mg/L	0.25	0.24	3.8	30%	Pass	
Nitrite (as N)	M24-Jn0033632	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Sulphate (as SO4)	M24-Jn0026468	NCP	mg/L	88	96	9.2	30%	Pass	
Total Kjeldahl Nitrogen (as N)	W24-Jn0025276	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0028885	CP	mg/L	52	40	26	30%	Pass	
Phosphate total (as P)	M24-Jn0035926	NCP	mg/L	0.03	0.03	13	30%	Pass	
Silicon (filtered)	M24-Jn0026088	NCP	mg/L	18	18	1.3	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Jn0028885	CP	mg/L	0.18	0.15	13	30%	Pass	
Arsenic (filtered)	M24-Jn0028885	CP	mg/L	0.004	0.004	1.8	30%	Pass	
Barium (filtered)	M24-Jn0028885	CP	mg/L	0.06	0.06	5.0	30%	Pass	
Beryllium (filtered)	M24-Jn0028885	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Jn0028885	CP	mg/L	1.6	1.6	1.3	30%	Pass	
Cadmium (filtered)	M24-Jn0028885	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Jn0028885	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-Jn0028885	CP	mg/L	0.003	0.003	5.6	30%	Pass	
Copper (filtered)	M24-Jn0028885	CP	mg/L	0.014	0.014	4.2	30%	Pass	
Iron (filtered)	M24-Jn0028885	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-Jn0028885	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Jn0028885	CP	mg/L	0.021	0.020	1.7	30%	Pass	
Manganese (filtered)	M24-Jn0028885	CP	mg/L	0.083	0.087	4.9	30%	Pass	
Mercury (filtered)	M24-Jn0028885	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Jn0028885	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M24-Jn0028885	CP	mg/L	0.004	0.005	5.6	30%	Pass	
Selenium (filtered)	M24-Jn0028885	CP	mg/L	0.008	0.008	4.1	30%	Pass	
Silver (filtered)	M24-Jn0028885	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Strontium (filtered)	M24-Jn0028885	CP	mg/L	2.1	2.2	5.1	30%	Pass	
Uranium (filtered)	M24-Jn0028885	CP	mg/L	0.012	0.012	<1	30%	Pass	
Vanadium (filtered)	M24-Jn0028885	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Jn0028885	CP	mg/L	0.020	0.021	5.7	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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
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
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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ABN: 30 008 127 802

Certificate of Analysis
Final Report

Project Number :AUADE-24-00261

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

Enviro Copper
Suite 4, Level 1,
155 King William Rd.,
Unley, SA, 5061, AUSTRALIA
T: 08 71271110

Attention: Philippa Faulkner

Client Ref 00202477

BV Sample ID	175654	175655	175656
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI02 #2
Date Started	26-Jun-2024	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024	24-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.6	6.7	6.7
	Measured Temp. ,°C	13.4	13.4	13.1
Conductivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	8700	14000	14000
	Resistivity at 25°C ,ohm m	1.15	0.73	0.73
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	5600	8800	8800
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	45	63	62
	Sodium as Na ,mg/L	1600	2300	2300
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	140	460	460
	Iron as Fe ,mg/L	<0.1	<0.1	<0.1
	Magnesium as Mg ,mg/L	160	430	430
	Strontium as Sr ,mg/L	2	5	5
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	1900	3300	3300
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	2	2
	* Sodium as Na ,meq/L	68	100	100
	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	7	23	23
	* Iron as Fe ,meq/L	<0.01	<0.01	<0.01
	* Magnesium as Mg ,meq/L	13	35	35
	* Strontium as Sr ,meq/L	0.04	0.12	0.12
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	89	160	160
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	2	2
	Silicon as Si ,mg/L	10	16	16
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1

Date Issued: 02 Jul 2024

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00261

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	175654	175655	175656
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI02 #2
Date Started	26-Jun-2024	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024	24-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Cations Dissolved P3100-PW-012	Chromium as Cr ,mg/L	<0.1	<0.1	0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	0.2	0.2
	Tin as Sn ,mg/L	0.2	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	5	7	7
	Chloride as Cl ,mg/L	2200	3300	3300
	Fluoride as F ,mg/L	0.6	0.4	0.4
	Nitrate as NO_3 ,mg/L	<0.1	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	980	2300	2300
Anions APHA 1050A	* Bromide as Br ,meq/L	0.06	0.09	0.09
	* Chloride as Cl ,meq/L	63	93	94
	* Fluoride as F ,meq/L	0.03	0.02	0.02
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	21	47	47
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	360	760	670
	Total Alkalinity ,mg CaCO3/L	360	760	670
APHA 4110	Total Anions ,mg/L	3600	6300	6300
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO3 ,meq/L	7	15	13
	* Total Anions ,meq/L	91	160	150
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	5500	9600	9500
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1000	2900	2900
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	1	2	2
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes

Date Issued: 02 Jul 2024

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Certificate of Analysis
Final Report

Project Number :AUADE-24-00261

Accredited for compliance with ISO/IEC 17025 - Testing)
Accreditation No 626

BV Sample ID	175654	175655	175656
Customer Sample ID	KPSELTI01	KPSELTI02	KPSELTI02 #2
Date Started	26-Jun-2024	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024	24-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	430	950	970
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.004	0.028	0.035
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.002	0.027	0.028
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	0.007	<0.001	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.011	0.11	0.12

BV Sample ID	175657	175658	175659
Customer Sample ID	KPSELTI03	KPSELTI04	KPSELTM01
Date Started	26-Jun-2024	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024	24-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.0	7.7	6.7
	Measured Temp. ,°C	13.0	13.0	13.0
Conductivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	10000	7600	14000
	Resistivity at 25°C ,ohm m	0.96	1.32	0.70
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	6700	4800	9200
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	46	35	69
	Sodium as Na ,mg/L	1800	1300	2500
	Barium as Ba ,mg/L	<0.1	<0.1	<0.1
	Calcium as Ca ,mg/L	210	130	400
	Iron as Fe ,mg/L	0.3	<0.1	2
	Magnesium as Mg ,mg/L	250	160	480
	Strontium as Sr ,mg/L	3	2	5
	Aluminum as Al ,mg/L	<0.1	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	2400	1700	3400
Total Cations APHA 1050A	* Potassium as K ,meq/L	1	0.88	2
	* Sodium as Na ,meq/L	80	59	110

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BV Sample ID	175657	175658	175659
Customer Sample ID	KPSELTI03	KPSELTI04	KPSELTM01
Date Started	26-Jun-2024	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024	24-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
Total Cations APHA 1050A	* Barium as Ba ,meq/L	<0.01	<0.01	<0.01
	* Calcium as Ca ,meq/L	11	6	20
	* Iron as Fe ,meq/L	0.02	<0.01	0.09
	* Magnesium as Mg ,meq/L	21	13	40
	* Strontium as Sr ,meq/L	0.06	0.04	0.11
	* Aluminium as Al ,meq/L	<0.01	<0.01	<0.01
	* Total Cations ,meq/L	110	79	170
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	2	1	3
	Silicon as Si ,mg/L	12	11	15
	Lithium as Li ,mg/L	<0.1	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1	0.1
	Tin as Sn ,mg/L	0.2	<0.1	<0.1
	Phosphorus as P ,mg/L	<0.2	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	6	4	8
	Chloride as Cl ,mg/L	2700	1900	3500
	Fluoride as F ,mg/L	0.5	0.9	0.4
	Nitrate as NO_3 ,mg/L	<0.1	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	1200	830	2300
Anions APHA 1050A	* Bromide as Br ,meq/L	0.07	0.05	0.10
	* Chloride as Cl ,meq/L	76	53	98
	* Fluoride as F ,meq/L	0.03	0.05	0.02
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	25	17	48
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1	<1
	Bicarbonate ,mg CaCO3/L	600	410	710
	Total Alkalinity ,mg CaCO3/L	600	410	710

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BV Sample ID	175657	175658	175659
Customer Sample ID	KPSELTI03	KPSELTI04	KPSELTM01
Date Started	26-Jun-2024	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024	24-Jun-2024
Pressure			
Cylinder ID			
Collected By	Client	Client	Client

Method	Test/Units	Results	Results	Results
APHA 4110	Total Anions ,mg/L	4500	3100	6500
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01	<0.01
	* Carbonate as CO3 ,meq/L	<0.01	<0.01	<0.01
	* Bicarbonate as HCO3 ,meq/L	12	8	14
	* Total Anions ,meq/L	110	78	160
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	6900	4800	9900
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	1600	970	3000
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	0	3
	Acceptance Criteria ,%	5	5	5
	Satisfactory ,-	Yes	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	560	350	970
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.009	0.01	0.013
	* Beryllium ,mg/L	<0.001	<0.001	<0.001
	* Cobalt ,mg/L	0.006	0.009	0.01
	* Mercury ,mg/L	<0.0001	<0.0001	<0.0001
	* Selenium ,mg/L	<0.001	0.002	<0.001
	* Silver ,mg/L	<0.005	<0.005	<0.005
	* Uranium ,mg/L	0.029	0.04	0.046

BV Sample ID	175660	175661
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
pH APHA-H+ A,B	pH at Measured Temp. ,-	7.7	7.4
	Measured Temp. ,°C	12.9	13.1
Conductivity APHA 2510 A,B	Conductivity at 25°C ,µS/cm	3900	7200
	Resistivity at 25°C ,ohm m	2.56	1.38
Total Dissolved Solids APHA 2540 A,B,C,D	Calculated Total Dissolved Solids ,mg/L	2500	4600

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BV Sample ID	175660	175661
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Cations Dissolved in House P3100-PW-012	Potassium as K ,mg/L	19	37
	Sodium as Na ,mg/L	740	1200
	Barium as Ba ,mg/L	<0.1	<0.1
	Calcium as Ca ,mg/L	40	130
	Iron as Fe ,mg/L	<0.1	<0.1
	Magnesium as Mg ,mg/L	51	150
	Strontium as Sr ,mg/L	0.5	2
	Aluminum as Al ,mg/L	<0.1	<0.1
Total Cations in House P3100-PW-012	Total Cations ,mg/L	850	1600
Total Cations APHA 1050A	* Potassium as K ,meq/L	0.49	0.95
	* Sodium as Na ,meq/L	32	54
	* Barium as Ba ,meq/L	<0.01	<0.01
	* Calcium as Ca ,meq/L	2	7
	* Iron as Fe ,meq/L	<0.01	<0.01
	* Magnesium as Mg ,meq/L	4	12
	* Strontium as Sr ,meq/L	0.01	0.04
	* Aluminium as Al ,meq/L	<0.01	<0.01
	* Total Cations ,meq/L	39	74
Cations Dissolved P3100-PW-012	Boron as B ,mg/L	1	1
	Silicon as Si ,mg/L	11	10
	Lithium as Li ,mg/L	<0.1	<0.1
	Cadmium as Cd ,mg/L	<0.1	<0.1
	Chromium as Cr ,mg/L	<0.1	<0.1
	Vanadium as V ,mg/L	<0.1	<0.1
	Nickel as Ni ,mg/L	<0.1	<0.1
	Zinc as Zn ,mg/L	<0.1	<0.1
	Lead as Pb ,mg/L	<0.1	<0.1
	Copper as Cu ,mg/L	<0.1	<0.1
	Manganese as Mn ,mg/L	<0.1	<0.1
	Tin as Sn ,mg/L	<0.1	0.1
	Phosphorus as P ,mg/L	<0.2	<0.2
	Molybdenum as Mo ,mg/L	<0.1	<0.1
Anions APHA 4110	Bromide as Br ,mg/L	2	<0.1
	Chloride as Cl ,mg/L	850	1700
	Fluoride as F ,mg/L	0.8	0.8

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Final Report

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Accreditation No 626

BV Sample ID	175660	175661
Customer Sample ID	KPSELTM03	KPSELTX01
Date Started	26-Jun-2024	26-Jun-2024
Sample Type	Water	Water
Date Sampled	24-Jun-2024	24-Jun-2024
Pressure		
Cylinder ID		
Collected By	Client	Client

Method	Test/Units	Results	Results
Anions APHA 4110	Nitrate as NO_3 ,mg/L	<0.1	<0.1
	Sulphate as SO_4 ,mg/L	400	890
Anions APHA 1050A	* Bromide as Br ,meq/L	0.03	<0.01
	* Chloride as Cl ,meq/L	24	47
	* Fluoride as F ,meq/L	0.04	0.04
	* Nitrate as NO_3 ,meq/L	<0.01	<0.01
	* Sulphate as SO_4 ,meq/L	8	18
Alkalinity APHA 2320 A,B	Hydroxide ,mg CaCO3/L	<1	<1
	Carbonate ,mg CaCO3/L	<1	<1
	Bicarbonate ,mg CaCO3/L	310	570
	Total Alkalinity ,mg CaCO3/L	310	570
APHA 4110	Total Anions ,mg/L	1600	3100
Total Anions APHA 1050A	* Hydroxide as OH ,meq/L	<0.01	<0.01
	* Carbonate as CO3 ,meq/L	<0.01	<0.01
	* Bicarbonate as HCO3 ,meq/L	6	11
	* Total Anions ,meq/L	39	77
APHA 4110 & P3100-PW-012	Total Cations + Anions ,mg/L	2400	4700
Hardness APHA 2340B	* Hardness (calc as CaCO3) ,mg CaCO3/L	310	950
[1] APHA 1030E	Ion balance (Diff * 100/Sum) ,%	0	2
	Acceptance Criteria ,%	5	5
	Satisfactory ,-	Yes	Yes
[2] Total Oxidised Sulphur	* Total Oxidised Sulphur (as S) ,mg/L	170	380
[2] Heavy metals LTM-MET-3040 by ICP-MS	* Arsenic ,mg/L	0.004	0.039
	* Beryllium ,mg/L	<0.001	<0.001
	* Cobalt ,mg/L	0.002	0.013
	* Mercury ,mg/L	<0.0001	<0.0001
	* Selenium ,mg/L	<0.001	0.012
	* Silver ,mg/L	<0.005	<0.005
	* Uranium ,mg/L	0.035	0.024

Comments

[1] If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

[2] Eurofins, Accreditation: 1261, Report No: 1111686-W

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Accreditation No 626

AUTHORIZED SIGNATURE

Valentina Pavlovic

Manager - Chemist

Accreditation No 626

Final Report

- Indicates Not Requested * Indicates NATA Accreditation does not cover the performance of this service - Sample will be discarded after 30 days unless otherwise notified.

Sample Digestion: Please note, samples were analysed without digestion

Sample Preservation: Please note, samples received were not preserved as per APHA water handbook requirements .

Bureau Veritas shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretaton given in this report. In no case shall Bureau Veritas be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received. Meaurement of uncertainty for all tests performed is available from the laboratory. For access to this information please contact the laboratory.

The samples were not collected by Laboratory staff. The submitted samples were supplied by the client or associated third party.

Date Issued: 02 Jul 2024

Envirocopper Ltd
Suite 4, Level 1, 155 King William Road
Unley
SA 5061

NATA Accredited
Accreditation Number 1261
Site Number 1254

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Attention: **Leon Faulkner**

Report **1111150-W**
Project name KAPUNDA
Project ID 2
Received Date Jun 25, 2024

Client Sample ID			**KPSELTI02_EF**
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Jn0061948**
Date Sampled			**Jun 24, 2024**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.35
Bromide	1	mg/L	< 1
Chloride	1	mg/L	2800
Conductivity (at 25 °C)	10	uS/cm	12000
Fluoride	0.5	mg/L	1.5
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Organic Nitrogen (as N)*	0.2	mg/L	< 0.2
pH (at 25 °C)	0.1	pH Units	7.1
Phosphorus reactive (as P)	0.01	mg/L	0.01
Salinity (expressed as TDS)*	10	mg/L	5900
Sulphate (as SO4)	5	mg/L	2700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.5
Total Nitrogen (as N)*	0.2	mg/L	0.5
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	160
Phosphate total (as P)	0.01	mg/L	0.02
Silicon (filtered)	0.5	mg/L	16
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	760
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	760
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic (filtered)	0.001	mg/L	0.005
Barium (filtered)	0.02	mg/L	0.02
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	2.3
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.023
Copper (filtered)	0.001	mg/L	0.008
Iron (filtered)	0.05	mg/L	0.09
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			KPSELTI02_EF
Sample Matrix			**Water**
Eurofins Sample No.			**M24-Jn0061948**
Date Sampled			**Jun 24, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Lithium (filtered)	0.005	mg/L	0.020
Manganese (filtered)	0.005	mg/L	0.17
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.028
Selenium (filtered)	0.001	mg/L	< 0.001
Silver (filtered)	0.005	mg/L	< 0.005
Strontium (filtered)	0.005	mg/L	4.8
Uranium (filtered)	0.005	mg/L	0.11
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.010
Alkali Metals			
Calcium	0.5	mg/L	420
Magnesium	0.5	mg/L	400
Potassium	0.5	mg/L	59
Sodium	0.5	mg/L	2200

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	Jun 26, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate & Nitrite (as N)	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jun 26, 2024	2 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Organic Nitrogen (as N)*	Melbourne	Jun 25, 2024	7 Days
- Method: APHA 4500 Organic Nitrogen (N)			
Phosphorus reactive (as P)	Melbourne	Jun 26, 2024	2 Days
- Method: APHA 4500-P			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jun 26, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Bromide	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (at 25 °C)	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Melbourne	Jun 26, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Salinity (expressed as TDS)*	Melbourne	Jun 26, 2024	7 Days
- Method: LTM-INO-4030			
Total Suspended Solids Dried at 103 °C to 105 °C	Melbourne	Jun 26, 2024	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Phosphate total (as P)	Melbourne	Jul 01, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Silicon (filtered)	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Jun 26, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Jun 26, 2024	180 Days
- Method: LTM-MET-3040 METALS IN WATERS, SOLIDS,			
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Fluoride	Melbourne	Jun 26, 2024	28 Days
- Method: in-house method LTM-INO-4390 Fluoride by Discrete Analyser			
Sulphate (as SO4)	Melbourne	Jun 26, 2024	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Alkalinity (speciated)	Melbourne	Jun 26, 2024	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			

eurofins

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Eurofins Environment Testing Australia Pty Ltd
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Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079 & 25289

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Project Name: KAPUNDA
Project ID: 2

Order No.: 202525
Report #: 1111150
Phone: 08 7127 1110
Fax:

Received: Jun 25, 2024 11:20 AM
Due: Jul 2, 2024
Priority: 5 Day
Contact Name: Leon Faulkner

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail	Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Beryllium (filtered)	Boron (filtered)	Bromide	Cadmium (filtered)	Chromium (filtered)	Cobalt (filtered)	Conductivity (at 25 °C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Lithium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH (at 25 °C)	Phosphate total (as P)	Salinity (expressed as TDS)*	Selenium (filtered)	Silicon (filtered)	Silver (filtered)	Strontium (filtered)	Total Suspended Solids Dried at 103 °C to 105 °C	Uranium (filtered)	Vanadium (filtered)	Zinc (filtered)	Eurofins Suite B19E: Total N, TKN, NOx, NO2, NO3, NH3, Total P, Reactive P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Eurofins Suite B11C: Na/K/Ca/Mg
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	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	KPSELTI02_EF	Jun 24, 2024		Water	M24-Jn0061948	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
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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	
Bromide	mg/L	< 1			1	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25 °C)	uS/cm	< 10			10	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Salinity (expressed as TDS)*	mg/L	< 10			10	Pass	
Sulphate (as SO4)	mg/L	< 5			5	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	
Silicon (filtered)	mg/L	< 0.5			0.5	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	
Lithium (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	
Molybdenum (filtered)	mg/L	< 0.005			0.005	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	
Strontium (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	106			70-130	Pass	
Bromide	%	77			70-130	Pass	
Chloride	%	125			70-130	Pass	
Conductivity (at 25 °C)	%	97			70-130	Pass	
Nitrate & Nitrite (as N)	%	112			70-130	Pass	
Nitrite (as N)	%	102			70-130	Pass	
Phosphorus reactive (as P)	%	128			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sulphate (as SO4)	%	129			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	105			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	95			70-130	Pass	
Phosphate total (as P)	%	96			70-130	Pass	
Silicon (filtered)	%	101			80-120	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	90			70-130	Pass	
Total Alkalinity (as CaCO3)	%	94			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	103			80-120	Pass	
Arsenic (filtered)	%	100			80-120	Pass	
Boron (filtered)	%	112			80-120	Pass	
Cadmium (filtered)	%	95			80-120	Pass	
Chromium (filtered)	%	109			80-120	Pass	
Cobalt (filtered)	%	100			80-120	Pass	
Copper (filtered)	%	96			80-120	Pass	
Iron (filtered)	%	107			80-120	Pass	
Lead (filtered)	%	92			80-120	Pass	
Lithium (filtered)	%	90			80-120	Pass	
Manganese (filtered)	%	103			80-120	Pass	
Mercury (filtered)	%	93			80-120	Pass	
Molybdenum (filtered)	%	96			80-120	Pass	
Nickel (filtered)	%	107			80-120	Pass	
Selenium (filtered)	%	96			80-120	Pass	
Silver (filtered)	%	90			80-120	Pass	
Strontium (filtered)	%	102			80-120	Pass	
Uranium (filtered)	%	104			80-120	Pass	
Zinc (filtered)	%	98			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	92			80-120	Pass	
Magnesium	%	91			80-120	Pass	
Potassium	%	94			80-120	Pass	
Sodium	%	98			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	M24-Jn0067673	NCP	%	101			70-130	Pass	
Sulphate (as SO4)	M24-Jn0067741	NCP	%	117			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	R24-Jn0052938	NCP	%	109			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0067405	NCP	%	96			70-130	Pass	
Phosphate total (as P)	M24-Jn0067157	NCP	%	101			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	M24-Jn0059397	NCP	%	120			75-125	Pass	
Arsenic (filtered)	M24-Jn0059397	NCP	%	117			75-125	Pass	
Barium (filtered)	M24-Jn0059397	NCP	%	116			75-125	Pass	
Beryllium (filtered)	M24-Jn0059397	NCP	%	116			75-125	Pass	
Boron (filtered)	M24-Jn0069735	NCP	%	84			75-125	Pass	
Cadmium (filtered)	M24-Jn0059397	NCP	%	115			75-125	Pass	
Chromium (filtered)	M24-Jn0059397	NCP	%	128			75-125	Fail	Q08

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cobalt (filtered)	M24-Jn0059397	NCP	%	119			75-125	Pass	
Copper (filtered)	M24-Jn0059397	NCP	%	115			75-125	Pass	
Iron (filtered)	M24-Jn0059397	NCP	%	123			75-125	Pass	
Lead (filtered)	M24-Jn0059397	NCP	%	115			75-125	Pass	
Lithium (filtered)	M24-Jn0059397	NCP	%	113			75-125	Pass	
Manganese (filtered)	M24-Jn0059397	NCP	%	119			75-125	Pass	
Mercury (filtered)	M24-Jn0059397	NCP	%	113			75-125	Pass	
Molybdenum (filtered)	M24-Jn0059397	NCP	%	100			75-125	Pass	
Nickel (filtered)	M24-Jn0063699	NCP	%	93			75-125	Pass	
Selenium (filtered)	M24-Jn0059397	NCP	%	113			75-125	Pass	
Silver (filtered)	M24-Jn0059397	NCP	%	100			75-125	Pass	
Strontium (filtered)	M24-Jn0059397	NCP	%	115			75-125	Pass	
Uranium (filtered)	M24-Jn0063699	NCP	%	96			75-125	Pass	
Vanadium (filtered)	M24-Jn0063699	NCP	%	73			75-125	Fail	Q08
Zinc (filtered)	M24-Jn0059397	NCP	%	117			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M24-Jn0065690	NCP	%	89			75-125	Pass	
Magnesium	M24-Jn0065690	NCP	%	94			75-125	Pass	
Potassium	M24-Jn0068912	NCP	%	90			75-125	Pass	
Sodium	M24-Jn0065690	NCP	%	89			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)	M24-Jn0067530	NCP	mg/L	1.1	1.1	1.00	30%	Pass	
Chloride	M24-Jn0067672	NCP	mg/L	430	430	<1	30%	Pass	
Conductivity (at 25 °C)	M24-Jn0062981	NCP	uS/cm	7200	6200	<1	30%	Pass	
Fluoride	M24-Jn0067340	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M24-Jn0067530	NCP	mg/L	0.18	0.20	6.0	30%	Pass	
Nitrite (as N)	M24-Jn0067530	NCP	mg/L	0.05	0.05	4.8	30%	Pass	
pH (at 25 °C)	M24-Jn0062981	NCP	pH Units	7.2	7.3	pass	30%	Pass	
Sulphate (as SO4)	M24-Jn0061948	CP	mg/L	2700	2700	2.5	30%	Pass	
Total Kjeldahl Nitrogen (as N)	S24-Jn0062350	NCP	mg/L	1.1	1.1	2.7	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	M24-Jn0069204	NCP	mg/L	81	100	24	30%	Pass	
Phosphate total (as P)	B24-Jn0060802	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Silicon (filtered)	M24-Jn0056953	NCP	mg/L	4.0	4.0	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M24-Jn0062981	NCP	mg/L	680	590	15	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M24-Jn0062981	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M24-Jn0062981	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M24-Jn0062981	NCP	mg/L	680	590	15	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	M24-Jn0063699	NCP	mg/L	0.007	0.007	4.5	30%	Pass	
Barium (filtered)	M24-Jn0063699	NCP	mg/L	0.05	0.05	1.5	30%	Pass	
Beryllium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M24-Jn0063699	NCP	mg/L	3.5	3.4	<1	30%	Pass	
Cadmium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M24-Jn0063699	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M24-Jn0063699	NCP	mg/L	0.010	0.010	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron (filtered)	M24-Jn0063699	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M24-Jn0063699	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lithium (filtered)	M24-Jn0063699	NCP	mg/L	0.12	0.11	2.2	30%	Pass	
Manganese (filtered)	M24-Jn0063699	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury (filtered)	M24-Jn0063699	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M24-Jn0063699	NCP	mg/L	0.007	0.007	<1	30%	Pass	
Nickel (filtered)	M24-Jn0063699	NCP	mg/L	0.005	0.005	1.2	30%	Pass	
Selenium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver (filtered)	M24-Jn0063699	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Strontium (filtered)	M24-Jn0062193	NCP	mg/L	1.7	1.7	2.4	30%	Pass	
Uranium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium (filtered)	M24-Jn0063699	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M24-Jn0063699	NCP	mg/L	0.015	0.015	1.1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M24-Jn0065690	NCP	mg/L	11	11	2.0	30%	Pass	
Magnesium	M24-Jn0065690	NCP	mg/L	5.8	5.8	<1	30%	Pass	
Potassium	M24-Jn0068912	NCP	mg/L	27	28	2.2	30%	Pass	
Sodium	M24-Jn0065690	NCP	mg/L	260	260	<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
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
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.

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APPENDIX D PERCENTILES (LIMITS A/B)

EXTRACTION WELL X01 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	14	0	0	14	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	14	0	14	0	0.00%	N/A	N/A	155.7	949.5	30.81	0.198
Iron as Fe mg/L	14	0	0	14	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	14	0	14	0	0.00%	N/A	N/A	183.6	1902	43.61	0.238
Strontium as Sr mg/L	14	0	14	0	0.00%	N/A	N/A	1.9	0.294	0.542	0.285
Aluminum as Al mg/L	14	0	2	12	85.71%	0.01	0.1	0.0907	0.0649	0.255	2.808
Boron as B mg/L	14	0	14	0	0.00%	N/A	N/A	1.143	0.132	0.363	0.318
Silicon as Si mg/L	14	0	14	0	0.00%	N/A	N/A	10.29	0.835	0.914	0.0888
Lithium as Li mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Lead as Pb mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	14	0	0	14	100.00%	0.1	0.2	N/A	N/A	N/A	N/A
Tin as Sn mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Phosphorus as P mg/L	14	0	0	14	100.00%	0.2	19	N/A	N/A	N/A	N/A
Molybdenum as Mo mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Bromide as Br mg/L	12	2	11	1	8.33%	0.1	0.1	5.842	8.709	2.951	0.505
Chloride as Cl mg/L	14	0	14	0	0.00%	N/A	N/A	2043	227253	476.7	0.233
Nitrate as NO2 mg/L	14	0	10	4	28.57%	0.1	0.1	1.736	1.977	1.406	0.81
Sulphate as SO2 mg/L	14	0	14	0	0.00%	N/A	N/A	983.6	22917	151.4	0.154
Hydroxide CaCO3 mg/L	14	0	14	0	0.00%	N/A	N/A	1	0	0	N/A
Carbonate CaCO3 mg/L	14	0	14	0	0.00%	N/A	N/A	1	0	0	N/A
Bicarbonate CaCO3 mg/L	14	0	14	0	0.00%	N/A	N/A	456.4	2117	46.01	0.101
Total Oxidised Sulphur (as S) n	14	0	14	0	0.00%	N/A	N/A	320	2169	46.58	0.146
Arsenic mg/L	14	0	14	0	0.00%	N/A	N/A	0.0293	4.3130E-4	0.0208	0.709
Beryllium mg/L	14	0	0	14	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Mercury mg/L	14	0	0	14	100.00%	1.0000E-4	1.0000E-4	N/A	N/A	N/A	N/A
Silver mg/L	14	0	0	14	100.00%	0.005	0.005	N/A	N/A	N/A	N/A
Uranium mg/L	14	0	14	0	0.00%	N/A	N/A	0.027	1.5323E-4	0.0124	0.458

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	14	0	120	210	155.7	150	949.5	30.81	29.65	0.545	0.198
Iron as Fe mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	14	0	130	270	183.6	170	1902	43.61	37.06	1.056	0.238
Strontium as Sr mg/L	14	0	0.6	3	1.9	2	0.294	0.542	0	-0.892	0.285
Aluminum as Al mg/L	2	0	0.15	1	0.575	0.575	0.361	0.601	0.63	N/A	1.045
Boron as B mg/L	14	0	1	2	1.143	1	0.132	0.363	0	2.295	0.318
Silicon as Si mg/L	14	0	9	12	10.29	10	0.835	0.914	0	0.749	0.0888
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin as Sn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phosphorus as P mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum as Mo mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bromide as Br mg/L	11	2	1	10	6.364	7	6.855	2.618	1.483	-0.813	0.411
Chloride as Cl mg/L	14	0	1500	3200	2043	1850	227253	476.7	296.5	1.185	0.233
Nitrate as NO2 mg/L	10	0	0.9	5	2.39	2	1.41	1.187	1.483	1.015	0.497
Sulphate as SO2 mg/L	14	0	740	1200	983.6	955	22917	151.4	215	-0.0983	0.154
Hydroxide CaCO3 mg/L	14	0	1	1	1	1	0	0	0	N/A	N/A
Carbonate CaCO3 mg/L	14	0	1	1	1	1	0	0	0	N/A	N/A
Bicarbonate CaCO3 mg/L	14	0	380	570	456.4	450	2117	46.01	44.48	0.848	0.101
Total Oxidised Sulphur (as S) n	14	0	230	390	320	310	2169	46.58	44.48	-0.101	0.146
Arsenic mg/L	14	0	0.007	0.089	0.0293	0.023	4.3130E-4	0.0208	0.017	1.891	0.709
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	14	0	0.019	0.061	0.027	0.023	1.5323E-4	0.0124	0.00445	2.176	0.458

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	14	0	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1
Calcium as Ca mg/L	14	0	120	126	132.5	150	170	174	201	210	210
Iron as Fe mg/L	14	0	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1
Magnesium as Mg mg/L	14	0	143	150	152.5	170	200	204	252	270	270
Strontium as Sr mg/L	14	0	1.3	2	2	2	2	2	2	2.35	2.87
Aluminum as Al mg/L	14	0	0.01	0.01	0.0325	0.1	0.1	0.1	0.135	0.448	0.889
Boron as B mg/L	14	0	1	1	1	1	1	1	1.7	2	2
Silicon as Si mg/L	14	0	9.3	10	10	10	10.75	11	11.7	12	12
Lithium as Li mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nickel as Ni mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lead as Pb mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.135	0.187
Tin as Sn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Phosphorus as P mg/L	14	0	0.2	0.2	0.2	0.2	1.7	2	6.2	11.85	17.57
Molybdenum as Mo mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bromide as Br mg/L	12	2	1.2	3.4	4.5	6.5	8	8	8.9	9.45	9.89
Chloride as Cl mg/L	14	0	1630	1700	1700	1850	2375	2400	2540	2810	3122
Nitrate as NO2 mg/L	14	0	0.1	0.1	0.3	2	2.75	3	3	3.7	4.74
Sulphate as SO2 mg/L	14	0	792	890	890	955	1100	1100	1170	1200	1200
Hydroxide CaCO3 mg/L	14	0	1	1	1	1	1	1	1	1	1
Carbonate CaCO3 mg/L	14	0	1	1	1	1	1	1	1	1	1
Bicarbonate CaCO3 mg/L	14	0	410	422	435	450	480	480	494	524.5	560.9
Total Oxidised Sulphur (as S) n	14	0	280	286	290	310	360	364	377	383.5	388.7
Arsenic mg/L	14	0	0.0099	0.0138	0.0163	0.023	0.0365	0.0378	0.0425	0.0598	0.0832
Beryllium mg/L	14	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mercury mg/L	14	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Silver mg/L	14	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Uranium mg/L	14	0	0.019	0.0196	0.02	0.023	0.0255	0.028	0.0429	0.0526	0.0593

EXTRACTION WELL X01 SHEET B

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
pH at Measured Temp	14	0	7.2	8.6	7.679	7.667	0.441	0.118	0.519	0.765	0.0574
Measured Temp. °C	14	0	12.8	22.7	18.52	18.27	3.015	0.806	1.927	-0.711	0.163
Conductivity at 25°C µS/cm	14	0	6600	11000	8064	7970	1330	355.4	1038	0.995	0.165
Resistivity at 25°C ohm m	14	0	0.91	1.51	1.268	1.254	0.187	0.05	0.193	-0.579	0.148
Calculated Total Dissolved Solids mg/L	14	0	4200	7200	5179	5111	904.8	241.8	667.2	1.089	0.175
Potassium as K mg/L	14	0	33	47	39.36	39.18	3.915	1.046	2.965	0.827	0.0995
Sodium as Na mg/L	14	0	1100	1800	1393	1378	216.5	57.86	222.4	0.85	0.155

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
pH at Measured Temp	14	0	7.2	7.26	7.325	7.6	7.975	8.04	8.24	8.405	8.561
Measured Temp. °C	14	0	13.85	16.68	17.55	19.3	20.18	20.28	21.87	22.57	22.67
Conductivity at 25°C µS/cm	14	0	6900	6900	6975	7600	8850	9060	9790	10350	10870
Resistivity at 25°C ohm m	14	0	1.024	1.104	1.128	1.32	1.425	1.444	1.45	1.471	1.502
Calculated Total Dissolved Solids mg/L	14	0	4400	4400	4450	4850	5675	5780	6390	6810	7122
Potassium as K mg/L	14	0	36.3	37	37	39	40.75	41	45.2	47	47
Sodium as Na mg/L	14	0	1200	1200	1225	1350	1475	1540	1740	1800	1800

INJECTION WELL I01 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	14	0	1	13	92.86%	0.01	0.1	0.0264	0.00351	0.0592	2.241
Calcium as Ca mg/L	14	0	14	0	0.00%	N/A	N/A	180	2677	51.74	0.287
Iron as Fe mg/L	14	0	2	12	85.71%	0.01	0.1	0.0364	0.00419	0.0648	1.778
Magnesium as Mg mg/L	14	0	14	0	0.00%	N/A	N/A	202.9	7646	87.44	0.431
Strontium as Sr mg/L	14	0	14	0	0.00%	N/A	N/A	2.286	0.527	0.726	0.318
Aluminum as Al mg/L	14	0	4	10	71.43%	0.01	0.1	0.207	0.263	0.513	2.476
Boron as B mg/L	14	0	14	0	0.00%	N/A	N/A	1.029	0.104	0.322	0.313
Silicon as Si mg/L	14	0	14	0	0.00%	N/A	N/A	9.357	3.94	1.985	0.212
Lithium as Li mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Lead as Pb mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	14	0	1	13	92.86%	0.1	0.1	0.1	0	0	N/A
Tin as Sn mg/L	14	0	4	10	71.43%	0.1	0.1	0.164	0.0137	0.117	0.713
Phosphorus as P mg/L	14	0	8	6	42.86%	0.2	0.2	1.607	3.784	1.945	1.21
Molybdenum as Mo mg/L	14	0	6	8	57.14%	0.1	0.1	0.136	0.00372	0.061	0.45
Bromide as Br mg/L	12	2	12	0	0.00%	N/A	N/A	8.583	6.811	2.61	0.304
Chloride as Cl mg/L	14	0	14	0	0.00%	N/A	N/A	2605	896042	946.6	0.363
Fluoride as F mg/L	12	2	12	0	0.00%	N/A	N/A	0.675	0.0457	0.214	0.317
Nitrate as NO2 mg/L	14	0	10	4	28.57%	0.1	0.1	3.571	58.92	7.676	2.149
Sulphate as SO2 mg/L	14	0	14	0	0.00%	N/A	N/A	1089	123177	351	0.322
Hydroxide CaCO3 mg/L	14	0	1	13	92.86%	1	1	35.21	15218	123.4	3.503
Carbonate CaCO3 mg/L	14	0	1	13	92.86%	1	1	8.071	650.1	25.5	3.159
Bicarbonate CaCO3 mg/L	14	0	14	0	0.00%	N/A	N/A	379.3	2007	44.8	0.118
Total Alkalinity CaCO3 mg/L	14	0	14	0	0.00%	N/A	N/A	645	882565	939.4	1.457
Total Oxidised Sulphur (as S) mg/L	14	0	14	0	0.00%	N/A	N/A	372.4	11584	107.6	0.289
Arsenic mg/L	14	0	14	0	0.00%	N/A	N/A	0.0134	5.3642E-4	0.0232	1.725
Beryllium mg/L	14	0	0	14	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Cobalt mg/L	14	0	13	1	7.14%	0.001	0.001	0.00993	1.8449E-4	0.0136	1.368
Mercury mg/L	14	0	0	14	100.00%	1.0000E-4	0.001	N/A	N/A	N/A	N/A
Selenium mg/L	14	0	14	0	0.00%	N/A	N/A	0.00586	2.1319E-6	0.00146	0.249
Silver mg/L	14	0	0	14	100.00%	0	0	N/A	N/A	N/A	N/A
Uranium mg/L	14	0	13	1	7.14%	0.005	0.005	0.0169	7.3923E-5	0.0086	0.508

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	1	0	0.24	0.24	0.24	0.24	N/A	N/A	0	N/A	N/A
Calcium as Ca mg/L	14	0	140	300	180	160	2677	51.74	29.65	1.392	0.287
Iron as Fe mg/L	2	0	0.19	0.2	0.195	0.195	5.0000E-5	0.00707	0.00741	N/A	0.0363
Magnesium as Mg mg/L	14	0	0.21	370	202.9	180	7646	87.44	44.48	-0.274	0.431
Strontium as Sr mg/L	14	0	1	4	2.286	2	0.527	0.726	0	0.889	0.318
Aluminum as Al mg/L	4	0	0.1	2	0.7	0.35	0.775	0.88	0.274	1.824	1.257
Boron as B mg/L	14	0	0.4	2	1.029	1	0.104	0.322	0	1.794	0.313
Silicon as Si mg/L	14	0	3	11	9.357	10	3.94	1.985	0	-2.852	0.212
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	1	0	0.1	0.1	0.1	0.1	N/A	N/A	0	N/A	N/A
Tin as Sn mg/L	4	0	0.2	0.5	0.325	0.3	0.0158	0.126	0.0741	1.129	0.387
Phosphorus as P mg/L	8	0	0.5	6	2.663	2	4.597	2.144	0.89	1.094	0.805
Molybdenum as Mo mg/L	6	0	0.1	0.3	0.183	0.2	0.00567	0.0753	0.0741	0.313	0.411
Bromide as Br mg/L	12	2	5	13	8.583	8.5	6.811	2.61	2.965	0.181	0.304
Chloride as Cl mg/L	14	0	270	4300	2605	2400	896042	946.6	296.5	-0.53	0.363
Fluoride as F mg/L	12	2	0.3	1	0.675	0.6	0.0457	0.214	0.148	0.189	0.317
Nitrate as NO2 mg/L	10	0	0.6	31	4.96	2	84.15	9.173	0	3.131	1.849
Sulphate as SO2 mg/L	14	0	92	1600	1089	1100	123177	351	148.3	-1.717	0.322
Hydroxide CaCO3 mg/L	1	0	480	480	480	480	N/A	N/A	0	N/A	N/A
Carbonate CaCO3 mg/L	1	0	100	100	100	100	N/A	N/A	0	N/A	N/A
Bicarbonate CaCO3 mg/L	14	0	310	460	379.3	370	2007	44.8	44.48	0.33	0.118
Total Alkalinity CaCO3 mg/L	14	0	310	3900	645	380	882565	939.4	66.72	3.706	1.457
Total Oxidised Sulphur (as S) mg/L	14	0	33	500	372.4	380	11584	107.6	37.06	-2.568	0.289
Arsenic mg/L	14	0	0.003	0.084	0.0134	0.004	5.3642E-4	0.0232	0.00148	2.726	1.725
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt mg/L	13	0	0.002	0.052	0.0106	0.005	2.0809E-4	0.0144	0.00445	2.414	1.359
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium mg/L	14	0	0.002	0.008	0.00586	0.006	2.1319E-6	0.00146	0.00148	-1.271	0.249
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	13	0	0.01	0.038	0.0178	0.014	7.3474E-5	0.00857	0.00445	1.353	0.48

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	14	0	0.01	0.01	0.0325	0.1	0.1	0.1	0.1	0.149	0.222
Calcium as Ca mg/L	14	0	140	140	142.5	160	200	222	254	274	294.8
Iron as Fe mg/L	14	0	0.01	0.01	0.0325	0.1	0.1	0.1	0.163	0.194	0.199
Magnesium as Mg mg/L	14	0	160	160	162.5	180	242.5	270	300	324.5	360.9
Strontium as Sr mg/L	14	0	2	2	2	2	2.75	3	3	3.35	3.87
Aluminum as Al mg/L	14	0	0.01	0.064	0.1	0.1	0.1	0.152	0.398	1.006	1.801
Boron as B mg/L	14	0	1	1	1	1	1	1	1	1.35	1.87
Silicon as Si mg/L	14	0	8.3	9	9.25	10	10	10	10.7	11	11
Lithium as Li mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nickel as Ni mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lead as Pb mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tin as Sn mg/L	14	0	0.1	0.1	0.1	0.1	0.175	0.24	0.3	0.37	0.474
Phosphorus as P mg/L	14	0	0.2	0.2	0.2	0.65	2	2	4.8	6	6
Molybdenum as Mo mg/L	14	0	0.1	0.1	0.1	0.1	0.175	0.2	0.2	0.235	0.287
Bromide as Br mg/L	12	2	5.1	6.2	6.75	8.5	10.25	10.8	11.9	12.45	12.89
Chloride as Cl mg/L	14	0	2200	2260	2325	2400	2850	3220	3770	3975	4235
Fluoride as F mg/L	12	2	0.5	0.52	0.575	0.6	0.825	0.88	0.99	1	1
Nitrate as NO2 mg/L	14	0	0.1	0.1	0.225	2	2	2.4	3	12.8	27.36
Sulphate as SO2 mg/L	14	0	840	992	1025	1100	1200	1280	1400	1470	1574
Hydroxide CaCO3 mg/L	14	0	1	1	1	1	1	1	1	168.7	417.7
Carbonate CaCO3 mg/L	14	0	1	1	1	1	1	1	1	35.65	87.13
Bicarbonate CaCO3 mg/L	14	0	333	340	345	370	422.5	430	430	440.5	456.1
Total Alkalinity CaCO3 mg/L	14	0	333	352	360	380	430	442	551	1749	3470
Total Oxidised Sulphur (as S) mg/L	14	0	350	356	362.5	380	420	438	457	474	494.8
Arsenic mg/L	14	0	0.0033	0.004	0.004	0.004	0.008	0.009	0.0349	0.0593	0.0791
Beryllium mg/L	14	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cobalt mg/L	14	0	0.002	0.002	0.002	0.0045	0.00975	0.0104	0.0236	0.0371	0.049
Mercury mg/L	14	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	4.1500E-4	8.8300E-4
Selenium mg/L	14	0	0.005	0.005	0.005	0.006	0.007	0.007	0.007	0.00735	0.00787
Silver mg/L	14	0	0	0	0	0	0	0	0	0	0
Uranium mg/L	14	0	0.0103	0.011	0.011	0.014	0.0218	0.0234	0.0282	0.0328	0.037

INJECTION WELL I01 SHEET B

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
pH at Measured Temp	14	0	6.8	12.1	8.021	7.949	1.245	0.333	0.371	3.018	0.155
Measured Temp	14	0	13.4	22.7	18.57	18.36	2.781	0.743	1.927	-0.529	0.15
Conductivity	14	0	3400	14000	9743	9327	2592	692.7	1260	-0.584	0.266
Resistivity	14	0	0.71	2.94	1.143	1.07	0.542	0.145	0.141	3.157	0.474
Calculated Total Dissolv	14	0	2200	9100	6286	6009	1719	459.3	815.4	-0.433	0.273
Potassium as K mg/L	14	0	45	65	50.43	50.2	5.199	1.39	2.965	1.875	0.103
Sodium as Na mg/L	14	0	270	2600	1734	1591	518.8	138.7	148.3	-1.45	0.299

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
pH at Measured Temp	14	0	7.23	7.42	7.525	7.8	8	8.12	8.3	9.63	11.61
Measured Temp	14	0	14.52	16.44	17.03	18.9	20.18	20.2	21.74	22.51	22.66
Conductivity	14	0	8420	8820	8900	9150	10750	11800	13000	13350	13870
Resistivity	14	0	0.756	0.854	0.933	1.095	1.13	1.138	1.185	1.809	2.714
Calculated Total Dissolv	14	0	5390	5660	5700	5800	6850	7540	8570	8775	9035
Potassium as K mg/L	14	0	46.3	47	47.25	49	52.25	53.8	55	58.5	63.7
Sodium as Na mg/L	14	0	1600	1600	1600	1700	1900	1980	2240	2405	2561

INJECTION WELL I02 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	10	0	0	10	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	10	0	10	0	0.00%	N/A	N/A	422	1307	36.15	0.0857
Iron as Fe mg/L	10	0	0	10	100.00%	0.01	0.5	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	10	0	10	0	0.00%	N/A	N/A	401	987.8	31.43	0.0784
Strontium as Sr mg/L	10	0	0	10	100.00%	1	1	N/A	N/A	N/A	N/A
Aluminum as Al mg/L	10	0	0	10	100.00%	0.1	2	N/A	N/A	N/A	N/A
Boron as B mg/L	10	0	10	0	0.00%	N/A	N/A	2	0	0	N/A
Silicon as Si mg/L	10	0	10	0	0.00%	N/A	N/A	14.4	3.822	1.955	0.136
Lithium as Li mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	10	0	1	9	90.00%	0.1	0.1	0.11	9.0000E-4	0.03	0.273
Nickel as Ni mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Lead as Pb mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	10	0	3	7	70.00%	0.1	0.1	0.12	0.0016	0.04	0.333
Tin as Sn mg/L	10	0	1	9	90.00%	0.1	0.1	0.18	0.0576	0.24	1.333
Phosphorus as P mg/L	10	0	5	5	50.00%	0.2	0.2	2.22	8.396	2.898	1.305
Molybdenum as Mo mg/L	10	0	3	7	70.00%	0.1	0.1	0.12	0.0016	0.04	0.333
Nitrate as NO2 mg/L	10	0	7	3	30.00%	0.1	0.1	1.7	11.9	3.45	2.03
Bicarbonate CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	683	4579	67.67	0.0991
Total Alkalinity CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	1177	2309179	1520	1.291
Total Oxidised Sulphur (as S) mg/L	10	0	0	10	100.00%	1	1	N/A	N/A	N/A	N/A
Arsenic mg/L	10	0	10	0	0.00%	N/A	N/A	0.013	6.1333E-5	0.00783	0.602
Beryllium mg/L	10	0	0	10	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Cobalt mg/L	10	0	10	0	0.00%	N/A	N/A	0.0246	1.0267E-5	0.0032	0.13
Mercury mg/L	10	0	0	10	100.00%	1.0000E-4	1.0000E-4	N/A	N/A	N/A	N/A
Selenium mg/L	10	0	6	4	40.00%	0.001	0.001	0.0021	1.8900E-6	0.00137	0.655
Silver mg/L	10	0	0	10	100.00%	0.005	0.005	N/A	N/A	N/A	N/A
Uranium mg/L	10	0	10	0	0.00%	N/A	N/A	0.178	0.00277	0.0527	0.296

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	10	0	360	460	422	430	1307	36.15	29.65	-1.013	0.0857
Iron as Fe mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	10	0	340	430	401	400	987.8	31.43	44.48	-0.893	0.0784
Strontium as Sr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aluminum as Al mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boron as B mg/L	10	0	2	2	2	2	0	0	0	N/A	N/A
Silicon as Si mg/L	10	0	12	18	14.4	14.5	3.822	1.955	2.224	0.41	0.136
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	1	0	0.2	0.2	0.2	0.2	N/A	N/A	0	N/A	N/A
Nickel as Ni mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	3	0	0.1	0.2	0.167	0.2	0.00333	0.0577	0	-1.732	0.346
Tin as Sn mg/L	1	0	0.9	0.9	0.9	0.9	N/A	N/A	0	N/A	N/A
Phosphorus as P mg/L	5	0	0.2	8	4.24	4	10.79	3.285	4.448	-0.0354	0.775
Molybdenum as Mo mg/L	3	0	0.1	0.2	0.167	0.2	0.00333	0.0577	0	-1.732	0.346
Nitrate as NO2 mg/L	7	0	0.5	12	2.386	0.9	18.01	4.244	0.297	2.634	1.779
Bicarbonate CaCO3 mg/L	10	0	530	760	683	700	4579	67.67	59.3	-1.289	0.0991
Total Alkalinity CaCO3 mg/L	10	0	640	5500	1177	710	2309179	1520	59.3	3.157	1.291
Total Oxidised Sulphur (as S) mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic mg/L	10	0	0.006	0.028	0.013	0.01	6.1333E-5	0.00783	0.00222	1.574	0.602
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt mg/L	10	0	0.021	0.028	0.0246	0.026	1.0267E-5	0.0032	0.00297	-0.281	0.13
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium mg/L	6	0	0.001	0.005	0.00283	0.0025	2.1667E-6	0.00147	0.00148	0.418	0.52
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	10	0	0.11	0.26	0.178	0.18	0.00277	0.0527	0.0741	0.141	0.296

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	10	0	0.091	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Calcium as Ca mg/L	10	0	360	400	415	430	445	452	460	460	460
Iron as Fe mg/L	10	0	0.091	0.1	0.1	0.1	0.1	0.12	0.23	0.365	0.473
Magnesium as Mg mg/L	10	0	358	384	392.5	400	430	430	430	430	430
Strontium as Sr mg/L	10	0	1	1	1	1	1	1	1	1	1
Aluminum as Al mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.12	0.38	1.19	1.838
Boron as B mg/L	10	0	2	2	2	2	2	2	2	2	2
Silicon as Si mg/L	10	0	12	12.8	13	14.5	15.75	16	16.2	17.1	17.82
Lithium as Li mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.11	0.155	0.191
Nickel as Ni mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lead as Pb mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.12	0.2	0.2	0.2
Tin as Sn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.18	0.54	0.828
Phosphorus as P mg/L	10	0	0.2	0.2	0.2	0.2	3.5	4.6	7.1	7.55	7.91
Molybdenum as Mo mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.12	0.2	0.2	0.2
Nitrate as NO2 mg/L	10	0	0.1	0.1	0.2	0.65	0.975	1	2.1	7.05	11.01
Bicarbonate CaCO3 mg/L	10	0	629	640	647.5	700	732.5	740	742	751	758.2
Total Alkalinity CaCO3 mg/L	10	0	640	640	652.5	710	740	744	1234	3367	5073
Total Oxidised Sulphur (as S) mg/L	10	0	1	1	1	1	1	1	1	1	1
Arsenic mg/L	10	0	0.0078	0.0088	0.009	0.01	0.0118	0.015	0.0271	0.0276	0.0279
Beryllium mg/L	10	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cobalt mg/L	10	0	0.021	0.021	0.021	0.026	0.027	0.0272	0.028	0.028	0.028
Mercury mg/L	10	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Selenium mg/L	10	0	0.001	0.001	0.001	0.0015	0.00275	0.0032	0.0041	0.00455	0.00491
Silver mg/L	10	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Uranium mg/L	10	0	0.119	0.12	0.128	0.18	0.215	0.224	0.242	0.251	0.258

INJECTION WELL I02 SHEET B

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
pH at Measured Temp	10	0	6.5	8.1	7.22	7.208	0.434	0.137	0.222	0.309	0.0601
Measured Temp. °C	10	0	13.4	20.1	17.31	17.15	2.419	0.765	2.001	-0.781	0.14
Conductivity at 25°C µS/cm	10	0	11000	14000	12900	12864	994.4	314.5	1483	-0.61	0.0771
Resistivity at 25°C ohm m	10	0	0.73	0.87	0.776	0.775	0.0479	0.0151	0.0593	0.87	0.0617
Calculated Total Dissolved Soli	10	0	7300	8800	8270	8256	501.2	158.5	593	-0.646	0.0606
Potassium as K mg/L	10	0	54	63	60.7	60.63	3.02	0.955	1.483	-1.335	0.0498
Sodium as Na mg/L	10	0	2000	2400	2220	2217	122.9	38.87	74.13	-0.467	0.0554

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
pH at Measured Temp	10	0	6.68	7.02	7.1	7.25	7.4	7.4	7.47	7.785	8.037
Measured Temp. °C	10	0	13.4	15.16	16.05	18.05	18.75	19.1	19.92	20.01	20.08
Conductivity at 25°C µS/cm	10	0	11900	12000	12250	13000	13750	14000	14000	14000	14000
Resistivity at 25°C ohm m	10	0	0.73	0.73	0.733	0.77	0.803	0.814	0.834	0.852	0.866
Calculated Total Dissolved Soli	10	0	7750	7880	7975	8250	8750	8800	8800	8800	8800
Potassium as K mg/L	10	0	57.6	58.8	59.25	62	63	63	63	63	63
Sodium as Na mg/L	10	0	2090	2100	2125	2250	2300	2300	2310	2355	2391

INJECTION WELL I03 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	10	0	0	10	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	10	0	10	0	0.00%	N/A	N/A	189	321.1	17.92	0.0948
Iron as Fe mg/L	10	0	2	8	80.00%	0.01	0.1	0.058	0.00972	0.0986	1.699
Magnesium as Mg mg/L	10	0	10	0	0.00%	N/A	N/A	234	804.4	28.36	0.121
Strontium as Sr mg/L	10	0	10	0	0.00%	N/A	N/A	2.3	0.233	0.483	0.21
Aluminum as Al mg/L	10	0	2	8	80.00%	0.1	0.1	0.198	0.072	0.268	1.356
Boron as B mg/L	10	0	10	0	0.00%	N/A	N/A	1.9	0.1	0.316	0.166
Silicon as Si mg/L	10	0	10	0	0.00%	N/A	N/A	11.6	0.267	0.516	0.0445
Lithium as Li mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	10	0	2	8	80.00%	0.1	0.1	0.1	0	0	N/A
Nickel as Ni mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Lead as Pb mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Tin as Sn mg/L	10	0	2	8	80.00%	0.1	0.1	0.15	0.0145	0.12	0.803
Phosphorus as P mg/L	10	0	4	6	60.00%	0.2	0.2	0.65	0.511	0.714	1.099
Molybdenum as Mo mg/L	10	0	1	9	90.00%	0.1	0.1	0.1	0	0	N/A
Bromide as Br mg/L	10	0	10	0	0.00%	N/A	N/A	8	3.333	1.826	0.228
Chloride as Cl mg/L	10	0	10	0	0.00%	N/A	N/A	2550	62778	250.6	0.0983
Fluoride as F mg/L	10	0	10	0	0.00%	N/A	N/A	0.69	0.0232	0.152	0.221
Nitrate as NO2 mg/L	10	0	7	3	30.00%	0.1	0.1	1.06	3.99	1.998	1.885
Sulphate as SO2 mg/L	10	0	10	0	0.00%	N/A	N/A	1225	11806	108.7	0.0887
Hydroxide CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	1	0	0	N/A
Carbonate CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	1	0	0	N/A
Bicarbonate CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	489	3121	55.87	0.114
Total Alkalinity CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	851	1225877	1107	1.301
Total Oxidised Sulphur (as S) mg/L	10	0	10	0	0.00%	N/A	N/A	426	2516	50.16	0.118
Arsenic mg/L	10	0	10	0	0.00%	N/A	N/A	0.0063	2.4556E-6	0.00157	0.249
Beryllium mg/L	10	0	0	10	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Cobalt mg/L	10	0	10	0	0.00%	N/A	N/A	0.0092	2.6178E-5	0.00512	0.556
Mercury mg/L	10	0	0	10	100.00%	1.0000E-4	1.0000E-4	N/A	N/A	N/A	N/A
Selenium mg/L	10	0	7	3	30.00%	0.001	0.001	0.0023	1.8100E-6	0.00135	0.585
Silver mg/L	10	0	0	10	100.00%	0.005	0.005	N/A	N/A	N/A	N/A
Uranium mg/L	10	0	10	0	0.00%	N/A	N/A	0.0559	7.6077E-4	0.0276	0.493

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	10	0	160	210	189	185	321.1	17.92	22.24	-0.104	0.0948
Iron as Fe mg/L	2	0	0.2	0.3	0.25	0.25	0.005	0.0707	0.0741	N/A	0.283
Magnesium as Mg mg/L	10	0	210	290	234	225	804.4	28.36	22.24	1.026	0.121
Strontium as Sr mg/L	10	0	2	3	2.3	2	0.233	0.483	0	1.035	0.21
Aluminum as Al mg/L	2	0	0.18	1	0.59	0.59	0.336	0.58	0.608	N/A	0.983
Boron as B mg/L	10	0	1	2	1.9	2	0.1	0.316	0	-3.162	0.166
Silicon as Si mg/L	10	0	11	12	11.6	12	0.267	0.516	0	-0.484	0.0445
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	2	0	0.1	0.1	0.1	0.1	0	0	0	N/A	N/A
Nickel as Ni mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin as Sn mg/L	2	0	0.2	0.5	0.35	0.35	0.045	0.212	0.222	N/A	0.606
Phosphorus as P mg/L	4	0	0.3	2	1.325	1.5	0.689	0.83	0.741	-0.578	0.627
Molybdenum as Mo mg/L	1	0	0.1	0.1	0.1	0.1	N/A	N/A	0	N/A	N/A
Bromide as Br mg/L	10	0	5	11	8	8	3.333	1.826	1.483	0	0.228
Chloride as Cl mg/L	10	0	2100	3000	2550	2550	62778	250.6	222.4	0.0795	0.0983
Fluoride as F mg/L	10	0	0.5	1	0.69	0.7	0.0232	0.152	0.148	0.678	0.221
Nitrate as NO2 mg/L	7	0	0.3	7	1.471	0.5	5.992	2.448	0.297	2.601	1.664
Sulphate as SO2 mg/L	10	0	950	1300	1225	1250	11806	108.7	74.13	-2.03	0.0887
Hydroxide CaCO3 mg/L	10	0	1	1	1	1	0	0	0	N/A	N/A
Carbonate CaCO3 mg/L	10	0	1	1	1	1	0	0	0	N/A	N/A
Bicarbonate CaCO3 mg/L	10	0	380	600	489	500	3121	55.87	29.65	0.0185	0.114
Total Alkalinity CaCO3 mg/L	10	0	450	4000	851	500	1225877	1107	29.65	3.154	1.301
Total Oxidised Sulphur (as S) mg/L	10	0	380	560	426	415	2516	50.16	22.24	2.482	0.118
Arsenic mg/L	10	0	0.005	0.009	0.0063	0.006	2.4556E-6	0.00157	0.00148	1.113	0.249
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt mg/L	10	0	0.005	0.021	0.0092	0.007	2.6178E-5	0.00512	0.00148	1.71	0.556
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium mg/L	7	0	0.001	0.005	0.00286	0.003	1.8095E-6	0.00135	0.00148	0.352	0.471
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	10	0	0.025	0.11	0.0559	0.0545	7.6077E-4	0.0276	0.0326	0.801	0.493

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	10	0	0.091	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Calcium as Ca mg/L	10	0	169	178	180	185	207.5	210	210	210	210
Iron as Fe mg/L	10	0	0.091	0.1	0.1	0.1	0.1	0.12	0.21	0.255	0.291
Magnesium as Mg mg/L	10	0	210	210	210	225	247.5	254	272	281	288.2
Strontium as Sr mg/L	10	0	2	2	2	2	2.75	3	3	3	3
Aluminum as Al mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.116	0.262	0.631	0.926
Boron as B mg/L	10	0	1.9	2	2	2	2	2	2	2	2
Silicon as Si mg/L	10	0	11	11	11	12	12	12	12	12	12
Lithium as Li mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nickel as Ni mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lead as Pb mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tin as Sn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.12	0.23	0.365	0.473
Phosphorus as P mg/L	10	0	0.2	0.2	0.2	0.2	0.825	1.2	2	2	2
Molybdenum as Mo mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bromide as Br mg/L	10	0	5.9	6.8	7	8	9	9.2	10.1	10.55	10.91
Chloride as Cl mg/L	10	0	2370	2400	2400	2550	2675	2720	2820	2910	2982
Fluoride as F mg/L	10	0	0.5	0.58	0.6	0.7	0.775	0.8	0.82	0.91	0.982
Nitrate as NO2 mg/L	10	0	0.1	0.1	0.15	0.4	0.725	0.82	1.51	4.255	6.451
Sulphate as SO2 mg/L	10	0	1175	1200	1200	1250	1300	1300	1300	1300	1300
Hydroxide CaCO3 mg/L	10	0	1	1	1	1	1	1	1	1	1
Carbonate CaCO3 mg/L	10	0	1	1	1	1	1	1	1	1	1
Bicarbonate CaCO3 mg/L	10	0	443	458	465	500	500	504	528	564	592.8
Total Alkalinity CaCO3 mg/L	10	0	459	476	485	500	515	536	940	2470	3694
Total Oxidised Sulphur (as S) mg/L	10	0	398	400	400	415	427.5	432	452	506	549.2
Arsenic mg/L	10	0	0.005	0.005	0.005	0.006	0.00675	0.0074	0.009	0.009	0.009
Beryllium mg/L	10	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cobalt mg/L	10	0	0.0059	0.006	0.006	0.007	0.0103	0.0118	0.0156	0.0183	0.0205
Mercury mg/L	10	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Selenium mg/L	10	0	0.001	0.001	0.001	0.002	0.003	0.0032	0.0041	0.00455	0.00491
Silver mg/L	10	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Uranium mg/L	10	0	0.0286	0.029	0.0318	0.0545	0.069	0.0758	0.0893	0.0997	0.108

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2	**INJECTION WELL I03 SHEET B**												
3													
4	**General Statistics for Uncensored Data Sets**												
5													
6	**Variable**		**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**
7	pH at Measured Temp		10	0	7	8.3	7.52	7.511	0.379	0.12	0.222	0.554	0.0505
8	Measured Temp. °C		10	0	13	20.2	17.5	17.35	2.317	0.733	2.076	-0.818	0.132
9	Conductivity at 25°C µS/cm		10	0	9100	11000	9830	9808	697.7	220.6	518.9	0.927	0.071
10	Resistivity at 25°C ohm m		10	0	0.91	1.1	1.014	1.012	0.074	0.0234	0.089	-0.346	0.0729
11	Calculated Total Dissolved Solids mg/L		10	0	5800	7200	6370	6353	501.2	158.5	518.9	0.499	0.0787
12	Potassium as K mg/L		10	0	42	49	45.1	45.04	2.378	0.752	2.965	0.286	0.0527
13	Sodium as Na mg/L		10	0	1600	2100	1780	1774	154.9	48.99	148.3	0.861	0.087
14													
15	**Percentiles for Uncensored Data Sets**												
16													
17	**Variable**		**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**
18	pH at Measured Temp		10	0	7	7.32	7.4	7.5	7.675	7.72	7.85	8.075	8.255
19	Measured Temp. °C		10	0	14.8	15.48	16	18.1	19.03	19.26	19.93	20.07	20.17
20	Conductivity at 25°C µS/cm		10	0	9190	9280	9325	9650	10000	10200	11000	11000	11000
21	Resistivity at 25°C ohm m		10	0	0.91	0.95	0.96	1.035	1.075	1.082	1.091	1.096	1.099
22	Calculated Total Dissolved Solids mg/L		10	0	5890	5980	6000	6200	6700	6760	7020	7110	7182
23	Potassium as K mg/L		10	0	42	43.6	44	44.5	46.75	47.2	48.1	48.55	48.91
24	Sodium as Na mg/L		10	0	1600	1680	1700	1750	1875	1900	1920	2010	2082

INJECTION WELL I04 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	10	0	0	10	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	10	0	10	0	0.00%	N/A	N/A	127.8	390.6	19.76	0.155
Iron as Fe mg/L	10	0	0	10	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	10	0	10	0	0.00%	N/A	N/A	162.5	895.8	29.93	0.184
Strontium as Sr mg/L	10	0	10	0	0.00%	N/A	N/A	1.8	0.178	0.422	0.234
Aluminum as Al mg/L	10	0	2	8	80.00%	0.1	0.1	0.194	0.0723	0.269	1.386
Boron as B mg/L	10	0	10	0	0.00%	N/A	N/A	1.1	0.1	0.316	0.287
Silicon as Si mg/L	10	0	10	0	0.00%	N/A	N/A	11.5	1.167	1.08	0.0939
Lithium as Li mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Lead as Pb mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Tin as Sn mg/L	10	0	1	9	90.00%	0.1	0.1	0.11	9.0000E-4	0.03	0.273
Phosphorus as P mg/L	10	0	2	8	80.00%	0.2	0.2	0.66	0.896	0.947	1.435
Molybdenum as Mo mg/L	10	0	0	10	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Bromide as Br mg/L	10	0	10	0	0.00%	N/A	N/A	6.1	6.544	2.558	0.419
Chloride as Cl mg/L	10	0	10	0	0.00%	N/A	N/A	1825	205139	452.9	0.248
Fluoride as F mg/L	10	0	10	0	0.00%	N/A	N/A	1.17	0.193	0.44	0.376
Nitrate as NO2 mg/L	10	0	7	3	30.00%	0.1	0.1	2.21	13.39	3.66	1.656
Bicarbonate CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	452	8818	93.9	0.208
Total Alkalinity CaCO3 mg/L	10	0	10	0	0.00%	N/A	N/A	736	699538	836.4	1.136
Total Oxidised Sulphur (as S) mg/L	10	0	10	0	0.00%	N/A	N/A	294	1116	33.4	0.114
Arsenic mg/L	10	0	10	0	0.00%	N/A	N/A	0.0081	1.4322E-5	0.00378	0.467
Beryllium mg/L	10	0	0	10	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Cobalt mg/L	10	0	10	0	0.00%	N/A	N/A	0.009	7.5556E-6	0.00275	0.305
Mercury mg/L	10	0	0	10	100.00%	1.0000E-4	1.0000E-4	N/A	N/A	N/A	N/A
Selenium mg/L	10	0	10	0	0.00%	N/A	N/A	0.006	1.0667E-5	0.00327	0.544
Silver mg/L	10	0	0	10	100.00%	0.005	0.005	N/A	N/A	N/A	N/A
Uranium mg/L	10	0	10	0	0.00%	N/A	N/A	0.0535	4.8917E-4	0.0221	0.413

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	10	0	88	170	127.8	130	390.6	19.76	0	0.202	0.155
Iron as Fe mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	10	0	95	220	162.5	160	895.8	29.93	7.413	-0.602	0.184
Strontium as Sr mg/L	10	0	1	2	1.8	2	0.178	0.422	0	-1.779	0.234
Aluminum as Al mg/L	2	0	0.14	1	0.57	0.57	0.37	0.608	0.638	N/A	1.067
Boron as B mg/L	10	0	1	2	1.1	1	0.1	0.316	0	3.162	0.287
Silicon as Si mg/L	10	0	10	14	11.5	11	1.167	1.08	0.741	1.323	0.0939
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin as Sn mg/L	1	0	0.2	0.2	0.2	0.2	N/A	N/A	0	N/A	N/A
Phosphorus as P mg/L	2	0	2	3	2.5	2.5	0.5	0.707	0.741	N/A	0.283
Molybdenum as Mo mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bromide as Br mg/L	10	0	2	10	6.1	6	6.544	2.558	2.965	-0.138	0.419
Chloride as Cl mg/L	10	0	550	2100	1825	1950	205139	452.9	74.13	-3.033	0.248
Fluoride as F mg/L	10	0	0.9	2	1.17	1	0.193	0.44	0.0741	1.73	0.376
Nitrate as NO2 mg/L	7	0	0.4	10	3.114	0.6	19.14	4.375	0.297	1.242	1.405
Bicarbonate CaCO3 mg/L	10	0	380	710	452	420	8818	93.9	29.65	2.767	0.208
Total Alkalinity CaCO3 mg/L	10	0	410	3100	736	440	699538	836.4	44.48	3.084	1.136
Total Oxidised Sulphur (as S) mg/L	10	0	230	350	294	295	1116	33.4	29.65	-0.347	0.114
Arsenic mg/L	10	0	0.005	0.016	0.0081	0.0065	1.4322E-5	0.00378	0.00222	1.303	0.467
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt mg/L	10	0	0.003	0.014	0.009	0.009	7.5556E-6	0.00275	0.00148	-0.562	0.305
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium mg/L	10	0	0.002	0.01	0.006	0.0065	1.0667E-5	0.00327	0.00519	-0.0718	0.544
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	10	0	0.018	0.093	0.0535	0.0525	4.8917E-4	0.0221	0.0193	0.337	0.413

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	10	0	0.091	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Calcium as Ca mg/L	10	0	116.8	120	122.5	130	130	130	134	152	166.4
Iron as Fe mg/L	10	0	0.091	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Magnesium as Mg mg/L	10	0	153.5	160	160	160	170	170	175	197.5	215.5
Strontium as Sr mg/L	10	0	1	1.8	2	2	2	2	2	2	2
Aluminum as Al mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.108	0.226	0.613	0.923
Boron as B mg/L	10	0	1	1	1	1	1	1	1.1	1.55	1.91
Silicon as Si mg/L	10	0	10.9	11	11	11	12	12	12.2	13.1	13.82
Lithium as Li mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nickel as Ni mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lead as Pb mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tin as Sn mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.11	0.155	0.191
Phosphorus as P mg/L	10	0	0.2	0.2	0.2	0.2	0.2	0.56	2.1	2.55	2.91
Molybdenum as Mo mg/L	10	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bromide as Br mg/L	10	0	2.9	3.8	4.5	6	7.75	8.2	9.1	9.55	9.91
Chloride as Cl mg/L	10	0	1765	1900	1900	1950	2000	2000	2010	2055	2091
Fluoride as F mg/L	10	0	0.9	0.9	0.925	1	1	1.2	2	2	2
Nitrate as NO2 mg/L	10	0	0.1	0.1	0.175	0.45	0.825	2.52	9.1	9.55	9.91
Bicarbonate CaCO3 mg/L	10	0	407	410	410	420	450	452	485	597.5	687.5
Total Alkalinity CaCO3 mg/L	10	0	410	410	410	440	547.5	606	949	2025	2885
Total Oxidised Sulphur (as S) mg/L	10	0	257	276	282.5	295	315	320	323	336.5	347.3
Arsenic mg/L	10	0	0.005	0.005	0.00525	0.0065	0.0095	0.0106	0.0133	0.0147	0.0157
Beryllium mg/L	10	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cobalt mg/L	10	0	0.0075	0.008	0.00825	0.009	0.00975	0.0102	0.0113	0.0127	0.0137
Mercury mg/L	10	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Selenium mg/L	10	0	0.002	0.0028	0.003	0.0065	0.00875	0.0092	0.01	0.01	0.01
Silver mg/L	10	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Uranium mg/L	10	0	0.0351	0.0386	0.0393	0.0525	0.0618	0.0656	0.0813	0.0872	0.0918

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2	**INJECTION WELL I04 SHEET A**												
3													
4	**General Statistics for Uncensored Data Sets**												
5													
6	**Variable**		**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**
7	pH at Measured Temp		10	0	7.2	8.4	7.71	7.704	0.325	0.103	0.148	0.765	0.0421
8	Measured Temp. °C		10	0	13	20.2	17.7	17.56	2.265	0.716	2.52	-0.95	0.128
9	Conductivity at 25°C µS/cm		10	0	4000	8500	7400	7273	1232	389.6	74.13	-2.787	0.166
10	Resistivity at 25°C ohm m		10	0	1.18	2.5	1.409	1.375	0.386	0.122	0.0148	3.078	0.274
11	Calculated Total Dissolved Solids mg/L		10	0	2600	5400	4730	4652	773.2	244.5	148.3	-2.771	0.163
12	Potassium as K mg/L		10	0	24	46	35.9	35.5	5.405	1.709	2.224	-0.581	0.151
13	Sodium as Na mg/L		10	0	720	1800	1342	1313	266.4	84.25	74.13	-1.031	0.199
14													
15	**Percentiles for Uncensored Data Sets**												
16													
17	**Variable**		**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**
18	pH at Measured Temp		10	0	7.38	7.56	7.6	7.7	7.775	7.84	8.04	8.22	8.364
19	Measured Temp. °C		10	0	15.34	16.08	16.45	18.15	19.55	19.82	19.93	20.07	20.17
20	Conductivity at 25°C µS/cm		10	0	7150	7580	7600	7650	7700	7780	8140	8320	8464
21	Resistivity at 25°C ohm m		10	0	1.234	1.28	1.293	1.31	1.32	1.32	1.438	1.969	2.394
22	Calculated Total Dissolved Solids mg/L		10	0	4580	4800	4800	4900	4975	5040	5220	5310	5382
23	Potassium as K mg/L		10	0	32.1	34.6	35.25	36	37.75	38	38.8	42.4	45.28
24	Sodium as Na mg/L		10	0	1242	1300	1300	1350	1400	1420	1530	1665	1773

MONITORING WELL M01 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	13	0	0	13	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	13	0	0	13	100.00%	1	1	N/A	N/A	N/A	N/A
Iron as Fe mg/L	13	0	5	8	61.54%	0.01	0.1	0.668	0.967	0.983	1.472
Magnesium as Mg mg/L	13	0	0	13	100.00%	1	1	N/A	N/A	N/A	N/A
Strontium as Sr mg/L	13	0	0	13	100.00%	1	1	N/A	N/A	N/A	N/A
Aluminum as Al mg/L	13	0	4	9	69.23%	0.01	0.1	0.299	0.326	0.571	1.908
Boron as B mg/L	13	0	4	9	69.23%	1	1	1	0	0	N/A
Silicon as Si mg/L	13	0	13	0	0.00%	N/A	N/A	12.85	12.64	3.555	0.277
Lithium as Li mg/L	13	0	0	13	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	13	0	0	13	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	13	0	0	13	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	13	0	2	11	84.62%	0.1	0.1	0.131	0.00521	0.0722	0.552
Nickel as Ni mg/L	13	0	1	12	92.31%	0.1	0.1	0.1	0	0	N/A
Zinc as Zn mg/L	13	0	1	12	92.31%	0.1	0.1	0.115	0.00284	0.0533	0.462
Lead as Pb mg/L	13	0	0	13	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	13	0	0	13	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	13	0	7	6	46.15%	0.1	0.1	0.123	0.00178	0.0421	0.342
Tin as Sn mg/L	13	0	2	11	84.62%	0.1	0.1	0.185	0.0582	0.241	1.307
Phosphorus as P mg/L	13	0	7	6	46.15%	0.2	0.2	1.638	5.153	2.27	1.385
Molybdenum as Mo mg/L	13	0	3	10	76.92%	0.1	0.1	0.131	0.00367	0.0606	0.463
Bromide as Br mg/L	11	2	11	0	0.00%	N/A	N/A	10	5.8	2.408	0.241
Chloride as Cl mg/L	13	0	13	0	0.00%	N/A	N/A	3162	480897	693.5	0.219
Fluoride as F mg/L	11	2	11	0	0.00%	N/A	N/A	0.527	0.0462	0.215	0.408
Sulphate as SO2 mg/L	13	0	13	0	0.00%	N/A	N/A	2123	208590	456.7	0.215
Hydroxide CaCO3 mg/L	13	0	13	0	0.00%	N/A	N/A	1	0	0	N/A
Carbonate CaCO3 mg/L	13	0	13	0	0.00%	N/A	N/A	1	0	0	N/A
Bicarbonate CaCO3 mg/L	13	0	13	0	0.00%	N/A	N/A	599.2	32758	181	0.302
Total Alkalinity CaCO3 mg/L	13	0	13	0	0.00%	N/A	N/A	1079	3310974	1820	1.686
Total Oxidised Sulphur (as S) mg/L	13	0	13	0	0.00%	N/A	N/A	733.1	30840	175.6	0.24
Arsenic mg/L	13	0	13	0	0.00%	N/A	N/A	0.00823	2.6526E-5	0.00515	0.626
Beryllium mg/L	13	0	0	13	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Cobalt mg/L	13	0	13	0	0.00%	N/A	N/A	0.0126	3.5256E-5	0.00594	0.471
Mercury mg/L	13	0	0	13	100.00%	1.0000E-4	1.0000E-4	N/A	N/A	N/A	N/A
Selenium mg/L	13	0	5	8	61.54%	1.0000E-4	0.001	8.3077E-4	1.0083E-6	0.001	1.209
Silver mg/L	13	0	0	13	100.00%	0.005	0.005	N/A	N/A	N/A	N/A
Uranium mg/L	13	0	13	0	0.00%	N/A	N/A	0.0718	0.00171	0.0414	0.576

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron as Fe mg/L	5	0	0.6	3	1.72	2	0.892	0.944	1.483	0.179	0.549
Magnesium as Mg mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Strontium as Sr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aluminum as Al mg/L	4	0	0.2	2	0.95	0.8	0.597	0.772	0.593	1.002	0.813
Boron as B mg/L	4	0	1	1	1	1	0	0	0	N/A	N/A
Silicon as Si mg/L	13	0	7	16	12.85	15	12.64	3.555	1.483	-0.719	0.277
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	2	0	0.3	0.3	0.3	0.3	0	0	0	N/A	N/A
Nickel as Ni mg/L	1	0	0.1	0.1	0.1	0.1	N/A	N/A	0	N/A	N/A
Zinc as Zn mg/L	1	0	0.3	0.3	0.3	0.3	N/A	N/A	0	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	7	0	0.1	0.2	0.143	0.1	0.00286	0.0535	0	0.374	0.374
Tin as Sn mg/L	2	0	0.3	1	0.65	0.65	0.245	0.495	0.519	N/A	0.761
Phosphorus as P mg/L	7	0	0.4	8	2.871	2	7.322	2.706	2.372	1.239	0.942
Molybdenum as Mo mg/L	3	0	0.2	0.3	0.233	0.2	0.00333	0.0577	0	1.732	0.247
Bromide as Br mg/L	11	2	6	15	10	10	5.8	2.408	1.483	0.473	0.241
Chloride as Cl mg/L	13	0	1700	3800	3162	3500	480897	693.5	296.5	-1.066	0.219
Fluoride as F mg/L	11	2	0.3	1	0.527	0.4	0.0462	0.215	0.148	1.047	0.408
Sulphate as SO2 mg/L	13	0	1400	2600	2123	2300	208590	456.7	444.8	-0.406	0.215
Hydroxide CaCO3 mg/L	13	0	1	1	1	1	0	0	0	N/A	N/A
Carbonate CaCO3 mg/L	13	0	1	1	1	1	0	0	0	N/A	N/A
Bicarbonate CaCO3 mg/L	13	0	310	770	599.2	720	32758	181	29.65	-0.682	0.302
Total Alkalinity CaCO3 mg/L	13	0	170	7100	1079	720	3310974	1820	74.13	3.531	1.686
Total Oxidised Sulphur (as S) mg/L	13	0	480	970	733.1	820	30840	175.6	192.7	-0.255	0.24
Arsenic mg/L	13	0	0.002	0.021	0.00823	0.007	2.6526E-5	0.00515	0.00445	1.21	0.626
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt mg/L	13	0	0.006	0.023	0.0126	0.01	3.5256E-5	0.00594	0.00593	0.708	0.471
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium mg/L	5	0	0.001	0.003	0.002	0.002	5.0000E-7	7.0711E-4	0	-2.92E-15	0.354
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	13	0	0.012	0.14	0.0718	0.059	0.00171	0.0414	0.0237	0.668	0.576

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	13	0	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1
Calcium as Ca mg/L	13	0	1	1	1	1	1	1	1	1	1
Iron as Fe mg/L	13	0	0.01	0.01	0.01	0.1	1	1.6	2	2.4	2.88
Magnesium as Mg mg/L	13	0	1	1	1	1	1	1	1	1	1
Strontium as Sr mg/L	13	0	1	1	1	1	1	1	1	1	1
Aluminum as Al mg/L	13	0	0.01	0.01	0.01	0.1	0.2	0.44	0.92	1.4	1.88
Boron as B mg/L	13	0	1	1	1	1	1	1	1	1	1
Silicon as Si mg/L	13	0	8	8.4	9	15	16	16	16	16	16
Lithium as Li mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.26	0.3	0.3
Nickel as Ni mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.18	0.276
Lead as Pb mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.16	0.2	0.2	0.2
Tin as Sn mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.1	0.26	0.58	0.916
Phosphorus as P mg/L	13	0	0.2	0.2	0.2	0.4	2	3.2	4	5.6	7.52
Molybdenum as Mo mg/L	13	0	0.1	0.1	0.1	0.1	0.1	0.16	0.2	0.24	0.288
Bromide as Br mg/L	11	2	8	8	8.5	10	11	11	12	13.5	14.7
Chloride as Cl mg/L	13	0	2200	2640	2700	3500	3700	3700	3700	3740	3788
Fluoride as F mg/L	11	2	0.3	0.4	0.4	0.4	0.65	0.7	0.7	0.85	0.97
Sulphate as SO2 mg/L	13	0	1520	1640	1700	2300	2500	2560	2600	2600	2600
Hydroxide CaCO3 mg/L	13	0	1	1	1	1	1	1	1	1	1
Carbonate CaCO3 mg/L	13	0	1	1	1	1	1	1	1	1	1
Bicarbonate CaCO3 mg/L	13	0	348	388	400	720	740	740	740	752	766.4
Total Alkalinity CaCO3 mg/L	13	0	356	388	400	720	740	740	764	3302	6340
Total Oxidised Sulphur (as S) mg/L	13	0	510	530	560	820	840	882	926	946	965.2
Arsenic mg/L	13	0	0.003	0.0038	0.005	0.007	0.01	0.0112	0.0128	0.0162	0.02
Beryllium mg/L	13	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cobalt mg/L	13	0	0.0062	0.0078	0.009	0.01	0.016	0.0184	0.0216	0.0224	0.0229
Mercury mg/L	13	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Selenium mg/L	13	0	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.0024	0.00288
Silver mg/L	13	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Uranium mg/L	13	0	0.0406	0.0438	0.045	0.059	0.11	0.116	0.136	0.14	0.14

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2	**MONITORING WELL M01 SHEET B**												
3													
4	**General Statistics for Uncensored Data Sets**												
5													
6	**Variable**		**NumObs**	**# Missing**	**Minimum**	**Maximum**	**Mean**	**Geo-Mean**	**SD**	**SEM**	**MAD/0.675**	**Skewness**	**CV**
7	pH at Measured Temp		13	0	6.5	7.7	7.062	7.055	0.318	0.0881	0.297	0.0475	0.045
8	Measured Temp. °C		13	0	13	22.9	18.54	18.3	2.99	0.829	2.224	-0.314	0.161
9	Conductivity at 25°C µS/cm		13	0	9500	15000	12938	12729	2329	645.9	1483	-0.614	0.18
10	Resistivity at 25°C ohm m		13	0	0.65	1.05	0.799	0.786	0.159	0.0442	0.0445	0.77	0.199
11	Calculated Total Dissolved Solids mg/L		13	0	6100	9900	8331	8195	1510	418.8	1038	-0.589	0.181
12	Potassium as K mg/L		13	0	42	74	67.46	66.89	8.12	2.252	2.965	-2.904	0.12
13	Sodium as Na mg/L		13	0	1400	2700	2162	2107	480.5	133.3	296.5	-0.604	0.222
14													
15	**Percentiles for Uncensored Data Sets**												
16													
17	**Variable**		**NumObs**	**# Missing**	**10%ile**	**20%ile**	**25%ile(Q1)**	**50%ile(Q2)**	**75%ile(Q3)**	**80%ile**	**90%ile**	**95%ile**	**99%ile**
18	pH at Measured Temp		13	0	6.7	6.78	6.9	7.1	7.2	7.26	7.3	7.46	7.652
19	Measured Temp. °C		13	0	14.72	16.28	17.3	18.8	20	20.66	22.38	22.78	22.88
20	Conductivity at 25°C µS/cm		13	0	9760	10000	10000	14000	15000	15000	15000	15000	15000
21	Resistivity at 25°C ohm m		13	0	0.672	0.684	0.69	0.7	1	1	1.024	1.038	1.048
22	Calculated Total Dissolved Solids mg/L		13	0	6240	6480	6600	9200	9300	9420	9820	9900	9900
23	Potassium as K mg/L		13	0	66	66.4	67	69	71	72.2	73	73.4	73.88
24	Sodium as Na mg/L		13	0	1520	1600	1600	2400	2500	2500	2580	2640	2688

MONITORING WELL M03 SHEET A

General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Barium as Ba mg/L	14	0	0	14	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	14	0	14	0	0.00%	N/A	N/A	52.21	975.4	31.23	0.598
Iron as Fe mg/L	14	0	0	14	100.00%	0.01	0.1	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	14	0	14	0	0.00%	N/A	N/A	65.14	1309	36.18	0.555
Strontium as Sr mg/L	14	0	14	0	0.00%	N/A	N/A	0.66	0.157	0.396	0.6
Aluminum as Al mg/L	14	0	2	12	85.71%	0.01	0.1	0.0993	0.0669	0.259	2.604
Boron as B mg/L	14	0	14	0	0.00%	N/A	N/A	1	0	0	N/A
Silicon as Si mg/L	14	0	14	0	0.00%	N/A	N/A	10.71	0.681	0.825	0.077
Lithium as Li mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Vanadium as V mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Lead as Pb mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Copper as Cu mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Tin as Sn mg/L	14	0	0	14	100.00%	0.1	0.1	N/A	N/A	N/A	N/A
Phosphorus as P mg/L	14	0	0	14	100.00%	0.2	13	N/A	N/A	N/A	N/A
Bromide as Br mg/L	12	2	12	0	0.00%	N/A	N/A	2.925	1.486	1.219	0.417
Chloride as Cl mg/L	14	0	14	0	0.00%	N/A	N/A	952.9	153514	391.8	0.411
Fluoride as F mg/L	12	2	12	0	0.00%	N/A	N/A	0.867	0.0206	0.144	0.166
Nitrate as NO2 mg/L	14	0	6	8	57.14%	0.1	0.1	0.571	0.443	0.666	1.165
Sulphate as SO2 mg/L	14	0	14	0	0.00%	N/A	N/A	428.6	1213	34.83	0.0813
Hydroxide CaCO3 mg/L	14	0	0	14	100.00%	1	1	N/A	N/A	N/A	N/A
Carbonate CaCO3 mg/L	14	0	1	13	92.86%	1	1	3.357	72.23	8.499	2.532
Bicarbonate CaCO3 mg/L	14	0	0	14	100.00%	1	1	N/A	N/A	N/A	N/A
Total Alkalinity CaCO3 mg/L	14	0	14	0	0.00%	N/A	N/A	435	113904	337.5	0.776
Total Oxidised Sulphur (as S) mg/L	14	0	14	0	0.00%	N/A	N/A	145.7	164.8	12.84	0.0881
Arsenic mg/L	14	0	14	0	0.00%	N/A	N/A	0.0109	6.5610E-5	0.0081	0.741
Beryllium mg/L	14	0	0	14	100.00%	0.001	0.01	N/A	N/A	N/A	N/A
Cobalt mg/L	14	0	14	0	0.00%	N/A	N/A	0.00957	2.3802E-5	0.00488	0.51
Mercury mg/L	14	0	0	14	100.00%	1.0000E-4	1.0000E-4	N/A	N/A	N/A	N/A
Selenium mg/L	14	0	10	4	28.57%	0.001	0.001	0.00264	2.3724E-6	0.00154	0.583
Silver mg/L	14	0	0	14	100.00%	0.005	0.005	N/A	N/A	N/A	N/A
Uranium mg/L	14	0	14	0	0.00%	N/A	N/A	0.0658	0.001	0.0316	0.481

General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Barium as Ba mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium as Ca mg/L	14	0	39	160	52.21	42.5	975.4	31.23	3.706	3.656	0.598
Iron as Fe mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium as Mg mg/L	14	0	51	190	65.14	54.5	1309	36.18	4.448	3.655	0.555
Strontium as Sr mg/L	14	0	0.3	2	0.66	0.6	0.157	0.396	0.0593	3.384	0.6
Aluminum as Al mg/L	2	0	0.27	1	0.635	0.635	0.266	0.516	0.541	N/A	0.813
Boron as B mg/L	14	0	1	1	1	1	0	0	0	N/A	N/A
Silicon as Si mg/L	14	0	9	12	10.71	11	0.681	0.825	0.741	-0.332	0.077
Lithium as Li mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium as Cd mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium as Cr mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium as V mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel as Ni mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc as Zn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead as Pb mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper as Cu mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese as Mn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin as Sn mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phosphorus as P mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bromide as Br mg/L	12	2	0.1	5	2.925	3	1.486	1.219	0.741	-0.765	0.417
Chloride as Cl mg/L	14	0	780	2300	952.9	850	153514	391.8	59.3	3.611	0.411
Fluoride as F mg/L	12	2	0.6	1	0.867	0.9	0.0206	0.144	0.148	-0.623	0.166
Nitrate as NO2 mg/L	6	0	0.5	2	1.2	0.95	0.412	0.642	0.445	0.66	0.535
Sulphate as SO2 mg/L	14	0	350	480	428.6	440	1213	34.83	29.65	-0.816	0.0813
Hydroxide CaCO3 mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Carbonate CaCO3 mg/L	1	0	34	34	34	34	N/A	N/A	0	N/A	N/A
Bicarbonate CaCO3 mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Alkalinity CaCO3 mg/L	14	0	260	1600	435	360	113904	337.5	29.65	3.656	0.776
Total Oxidised Sulphur (as S) mg/L	14	0	120	170	145.7	145	164.8	12.84	7.413	-0.0571	0.0881
Arsenic mg/L	14	0	0.003	0.031	0.0109	0.0095	6.5610E-5	0.0081	0.00445	1.716	0.741
Beryllium mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt mg/L	14	0	0.002	0.016	0.00957	0.01	2.3802E-5	0.00488	0.00519	-0.489	0.51
Mercury mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium mg/L	10	0	0.002	0.005	0.0033	0.003	2.0111E-6	0.00142	0.00148	0.216	0.43
Silver mg/L	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium mg/L	14	0	0.028	0.13	0.0658	0.052	0.001	0.0316	0.0237	0.781	0.481

Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Barium as Ba mg/L	14	0	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1
Calcium as Ca mg/L	14	0	40.3	41.6	42	42.5	48.25	49.4	50	88.5	145.7
Iron as Fe mg/L	14	0	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1
Magnesium as Mg mg/L	14	0	51.3	52	52	54.5	60.5	61.4	62.7	107.5	173.5
Strontium as Sr mg/L	14	0	0.5	0.5	0.513	0.6	0.615	0.62	0.662	1.142	1.828
Aluminum as Al mg/L	14	0	0.01	0.01	0.0325	0.1	0.1	0.1	0.219	0.526	0.905
Boron as B mg/L	14	0	1	1	1	1	1	1	1	1	1
Silicon as Si mg/L	14	0	10	10	10	11	11	11	11.7	12	12
Lithium as Li mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium as Cd mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium as Cr mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium as V mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nickel as Ni mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc as Zn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lead as Pb mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper as Cu mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese as Mn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tin as Sn mg/L	14	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Phosphorus as P mg/L	14	0	0.2	0.2	0.2	0.2	0.2	0.52	1.7	5.85	11.57
Bromide as Br mg/L	12	2	2	2.2	2.75	3	3.25	3.8	4	4.45	4.89
Chloride as Cl mg/L	14	0	800	806	810	850	890	890	967	1455	2131
Fluoride as F mg/L	12	2	0.7	0.72	0.775	0.9	1	1	1	1	1
Nitrate as NO2 mg/L	14	0	0.1	0.1	0.1	0.1	0.875	0.94	1.7	2	2
Sulphate as SO2 mg/L	14	0	386	406	412.5	440	440	448	467	473.5	478.7
Hydroxide CaCO3 mg/L	14	0	1	1	1	1	1	1	1	1	1
Carbonate CaCO3 mg/L	14	0	1	1	1	1	1	1	1	12.55	29.71
Bicarbonate CaCO3 mg/L	14	0	1	1	1	1	1	1	1	1	1
Total Alkalinity CaCO3 mg/L	14	0	296	322	332.5	360	380	380	394	820	1444
Total Oxidised Sulphur (as S) mg/L	14	0	133	140	140	145	150	154	160	163.5	168.7
Arsenic mg/L	14	0	0.004	0.0052	0.00625	0.0095	0.0108	0.0122	0.0224	0.0278	0.0304
Beryllium mg/L	14	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00415	0.00883
Cobalt mg/L	14	0	0.002	0.005	0.00725	0.01	0.0135	0.0144	0.015	0.0154	0.0159
Mercury mg/L	14	0	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4
Selenium mg/L	14	0	0.001	0.001	0.00125	0.002	0.004	0.0044	0.005	0.005	0.005
Silver mg/L	14	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Uranium mg/L	14	0	0.0356	0.0406	0.0438	0.052	0.0915	0.0946	0.106	0.117	0.127

MONITORING WELL M03 SHEET B

General Statistics for Uncensored Data Sets

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
pH at Measured Temp	14	0	7.2	8.4	7.721	7.717	0.281	0.075	0.148	0.865	0.0363
Measured Temp. °C	14	0	12.9	22.7	18.64	18.4	2.936	0.785	2.446	-0.545	0.158
Conductivity at 25°C µS/cm	14	0	3800	8000	4286	4199	1087	290.5	148.3	3.544	0.254
Resistivity at 25°C ohm m	14	0	1.25	2.63	2.41	2.376	0.352	0.0941	0.089	-3.168	0.146
Calculated Total Dissolved Solids mg/L	14	0	2500	5100	2750	2695	689.2	184.2	0	3.524	0.251
Potassium as K mg/L	14	0	19	41	22.29	21.82	5.608	1.499	1.483	3.276	0.252
Sodium as Na mg/L	14	0	700	1400	783.6	770.1	180.5	48.23	37.06	3.535	0.23

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
pH at Measured Temp	14	0	7.53	7.6	7.6	7.7	7.775	7.84	8.04	8.205	8.361
Measured Temp. °C	14	0	14.55	16.62	17.43	19.3	20.23	20.62	22.22	22.7	22.7
Conductivity at 25°C µS/cm	14	0	3830	3900	3900	4000	4075	4100	4450	5790	7558
Resistivity at 25°C ohm m	14	0	2.244	2.44	2.453	2.5	2.558	2.568	2.594	2.611	2.626
Calculated Total Dissolved Solids mg/L	14	0	2500	2500	2500	2500	2600	2600	2880	3735	4827
Potassium as K mg/L	14	0	19.3	20	20	20.5	22	22	24.1	30.6	38.92
Sodium as Na mg/L	14	0	710	710	710	735	740	760	811	1023	1325

APPENDIX E GROUNDWATER MONITORING AND SAMPLING METHODOLOGY

GROUNDWATER MONITORING AND SAMPLING METHODOLOGY

The methodology to be used for groundwater monitoring is prescribed in E-1-1 whereas the analytical program is detailed in E-2.

E-1 1 Groundwater monitoring methodology

Activity/ Item	Details
Monitoring Parameters	Monitoring will include the following, with respect to each of the operational monitoring wells located on the Site and within the surrounding area: ▪ measurement of groundwater elevation (to AHD) and base of well; ▪ gauging for the presence of light non-aqueous phase liquid (LNAPL), with the presence and thickness to be recorded (if present – although not expected); and ▪ measurement of field parameters, including redox potential, pH, EC, dissolved oxygen (DO) and temperature. ▪ Field alkalinity must be measured in the field at the time of sampling.
Water Level & LNAPL Gauging	During sampling, monitoring wells will be gauged for water level elevations using a calibrated interface level probe and product detection paste (for confirmation of presence of LNAPL and thickness, if identified). Water levels will be gauged from the surveyed point on the top of the well casing. Details of the gauging dates and depths recorded are to be provided as part of reporting requirements. Water levels will be continuously monitored in all wells during the trial by data logger at minimum 1 hour frequency. Manual gaugign results will be compared to logger results to check (calibrate) logger accuracy/ perfomance.
Well Surveying	All groundwater monitoring well casing heights must be surveyed to AHD. If any Site development works necessitate a change to the monitoring well surface levels, a licensed surveyor is to be engaged to resurvey the location and elevation of the groundwater monitoring wells.

Activity/ Item	Details
Well Purging Process	Consistent with SA EPA (2019b), groundwater will be sampled using low-flow techniques. The method includes placement of the pump inlet at the midpoint of the standing water column and pumping at the lowest flow rate (in the first instance). During purging and sampling, the groundwater level will be gauged to ensure that its elevation does not decline significantly (e.g. greater than 10 cm). This will be required to ensure groundwater extracted from the well comprises fresh groundwater obtained from the adjacent formation and not stagnant water contained in the well water column. The measurement of field water parameters will be undertaken every five minutes until at least three stable sets of stable field quality parameters have been obtained (i.e. within 3% EC, 0.05 pH units, 10% DO, 10 mV redox and 0.5°C temperature). Field parameters will be recorded on a suitable groundwater purge sheet after each bore volume has been removed to ensure stable geochemical conditions exist prior to the collection of the groundwater sample. The water quality meter/s will be calibrated prior to the commencement of purging – i.e. at the start of each day of purging/ sampling. Note that, if LNAPL is identified in a monitoring well as either a sheen or a measurable apparent thickness on the surface of groundwater purged from a bore, sampling will not proceed at that location/s.

Activity/ Item	Details
Well Sampling, Storage and Transport Processes	Following stabilisation of field parameters, samples will be collected into laboratory-supplied bottles containing appropriate preservatives for the selected analytes to be tested. Samples for dissolved metals will be field filtered using a dedicated (disposable) 0.45 µm filter prior to bottling (i.e. filtrate is added to laboratory supplied sampling bottle designed for purpoes of filtered metal content and that contains appropriate preservative). Sample labelling will include: ▪ date and time; ▪ location and name of sampling site; ▪ job or project number; ▪ name of sampler; ▪ container pre-treatment and preservatives added (if applicable); and ▪ any other specific observations that may affect the method or results of the analysis. Sampling nomenclature must be consistent with the previous monitoring well nomenclature. The above information shall also be recorded on a sampling record sheet and retained as a permanent record. Samples will be immediately chilled and stored at a temperature of 4°C or less (as far as possible) prior totransport to the analytical laboratory. Sample containers shall be sealed, carefully packed (with appropriate packing material) to avoid breakage and cross-contamination, chilled and transported in an appropriate cooler (esky) or fridge. It is sometimes necessary to take further action to prevent cross-contamination, either between samples or from ice, during transport – this may include placing sample containers in snap-lock bags or airtight, plastic tubes with screw caps before transport. Samples will be submitted to the designated laboratories ensuring sufficient time to avoid expiration of relevant holding times. The sampler shall complete the chain of custody (COC) form/s prior to packing the samples. The original form shall remain with the samples at all times to enable the completion of custody details at each stage of progression through transportation, analysis and reporting. Copies of signed COC form/s are to be retained and presented as part of the reporting preocess.

Activity/ Item	Details
Recording Information	The following information will be recorded on the groundwater sampling record sheets: ▪ location and well identification; ▪ time and date of sampling; ▪ weather conditions; ▪ standing water level (SWL) and well depth prior to sampling; ▪ calculations of well volume (if applicable); ▪ purging and sampling method used; ▪ pump inlet depth; ▪ field measurements and relevant stabilisation criteria; ▪ physical properties of the groundwater – turbidity, odour and colour; ▪ flow rate during purging and volumes purged (with corresponding purging times); ▪ SWLs after each volume purged and immediately preopr to sampling ▪ well construction details; and ▪ sample identification code/s.
Decontamination Procedure	All monitoring and sampling equipment (water level probe, pump housing) shall be decontaminated according to the following procedure: ▪ wash with Decon90™ or similar decontaminant/ water solution and rinse; and ▪ triple wash with laboratory-supplied clean deionised water.
Quality Assurance/ Quality Control (QA/QC)	Quality Assurance procedures will include the collection and analysis of field QC samples, in accordance with SA EPA (2019b) and the ASC NEPM (1999) – this will include the following during each round of groundwater sampling: ▪ 1:20 intra-laboratory field duplicate samples; ▪ 1:20 inter-laboratory field duplicate samples; and ▪ one equipment rinsate blank sample per day.

E-1 2 Groundwater analytical program

	Activity/ Item	Details
Baseline and Continuous Period	**Analytical Laboratories**	Both the primary and secondary analytical laboratory shall be accredited by the National Association of Testing authorities (NATA) for the analyses to be undertaken.
	Sample Analysis	All relevant primary and associated intra- and inter-laboratory duplicate samples are to be analysed for the following: ▪ major anions and cations (including Ca, Mg, Na, Cl, SO_4^{2-}, HCO_3^-); ▪ TDS, pH, acidity and alkalinity; ▪ metals (dissolved): aluminium, antimony, barium, beryllium, boron, bromide (*see below*), cadmium, chromium (total), chromium (hexavalent), cobalt, copper, iron, ferrous iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silicon, silver, strontium, uranium, vanadium, zinc; and ▪ metalloids (dissolved): arsenic. The rinsate blank samples shall be analysed for metals/metalloids (total): arsenic, bromide, cadmium, chromium (total), copper, lead, mercury, nickel, zinc.
Tracer Test	**Sample Analysis**	Bromide (Br) used in barren lixiviant solution (analyse Br in suite above)

Groundwater quality data for all monitoring bores must include:

- dates of sampling;
- number of samples;
- assigned duplicates; and
- summary statistics (e.g. 5th, 20th, 50th, 80th and 95th percentiles as well as minimum and maximum concentrations at each location and outlier assessment).

KAPUNDA SITE ENVIRONMENT LIXIVIANT TRIAL (SELT) EPEPR –

Hydrogeological Description of the Environment

Document number: ECR-20-2-R001a

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Contents

1 Introduction 4
1.1 Context 4
1.2 Scope 4

2 Methodology 6

3 Stratigraphy, Hydro-stratigraphy and Structure; 6

4 Aquifer Properties 11
4.1 Hydraulic conductivity, Transmissivity, Storativity and Specific Yield 11
4.2 Fracture and bedding orientation 12
4.3 Porosity 13
4.4 Properties of confining strata 14
4.5 Connectivity of aquifers 14

5 Static Water Levels. 15
5.1 Potentiometric surface 15
5.2 Seasonal Fluctuation 16

6 Conceptual Model 16
6.1 Recharge 16
6.2 Discharge 16
6.3 Groundwater Flow 16

7 Environmental Value of Groundwater 18
7.1 FRT Site 18
7.2 Broader Catchment 18

8 Groundwater Receptors 23
8.1 Groundwater Dependent Ecosystems 23
8.2 Third Party Groundwater Users 25
8.3 Prescription of water Resources 25

9 Numerical Groundwater Flow Model 27
9.1 Model Grid 27
9.2 Layer Properties 27
9.3 Boundary Conditions 27
9.4 Time Steps 28
9.5 Calibration 28

10 References 29

List of Figures

Figure 3.1: Geological Cross Section (per 1:250K Geological Map) 8
Figure 3.2: Site Geology 9
Figure 3.3: Cross Section 10
Figure 3.4: Block Diagram 10
Figure 4.1: Fracture and bedding orientation 12

Figure 4-2: Fracture (Effective) Porosity 13
Figure 4-3: Large Fractures – infill detail – 21.35 m depth 14
Figure 4-4: Large Fractures – infill detail – 31.67 m depth 14
Figure 6-1: Groundwater Elevation and Inferred Flow ..... **Error! Bookmark not defined.**
Figure 7-1: Baseline Groundwater Chemistry Monitoring Sites 20
Figure 7-2: Salinity Data 21
Figure 8-1: Groundwater Dependent Ecosystems 24
Figure 8-2: Third Party Bore Records in proximity to the site 26

List of Tables

Table 1.1: Hydrogeological Information requirements 5
Table 2.1: Drillhole details 6
Table 2.2: Well construction details 6
Table 3.1: Stratigraphy and hydrostratigraphy 7
Table 4.1: Summary of hydraulic testing and aquifer properties. 11
Table 4.2: Fracture and bedding orientation 12
Table 5.1: Relative Standing Water Level Data 15
Table 7.1: KPFRT001 Metals Concentrations Compared to Beneficial Use Limits (mg/L) 18
Table 7.2: Baseline groundwater chemistry - broader catchment (mg/L). 19
Table 7.3: Broader Catchment Salinity 22
Table 8.1: Third Party Bore Records in proximity to the site 25
Table 9.1: Model Layer Properties 27

List of Appendices

No table of contents entries found.

1 Introduction

1.1 Context

This document collates the hydrogeological information requirements for the Exploration Program for Environmental Management and Protection (EPEPR) for the Kapunda Copper & Gold ISR Project planned by Environmental Copper Recovery (ECR)

ECR is exploring the potential for In-Situ Recovery (ISR) of Copper and Gold. This exploration program is focussed on conducting a Site Environmental Lixiviant Trial (SELT) to assess the extent of the ISR mineral deposit through in-ground test work.

1.2 Scope

The information requirements for a EPEPR or exploration in-situ recovery (ISR) operations on an exploration licence (EL) were published under the Mining Act in the South Australian Government Gazette (22/10/2020). The information requirements pertaining to groundwater are summarised in Table 1.1 and the relevant report sections are cross referenced.

Table 1.1: Hydrogeological Information requirements

Information Requirement	Report Section
a description of the local and regional hydrogeology, detailing both the stratigraphy and hydrostratigraphy;	2
a detailed baseline description of the groundwater characteristics and flow dynamics which includes:	
baseline groundwater hydrochemistry, including any seasonal fluctuations and spatial variability	7
aquifer properties for each aquifer that may be affected by the proposed operations, including waste disposal and water supply, that includes, aquifer thickness, , , and.	
hydraulic conductivity, transmissivity, storage coefficient	4.1
total porosity, effective porosity,	4.3
piezometric pressures	5.1
mineralogy	2
chemical composition range for natural groundwaters	7
static water levels for each aquifer including seasonal fluctuations	5
hydrogeological characteristics of confining strata, including hydraulic conductivity and thickness	4.4
connectivity between the proposed exploration ISR test aquifer and lateral overlying, or underlying aquifers and surface water	4.5
conceptualisation of groundwater flow regime	6
a numerical model of groundwater flow dynamics, including recharge, discharge areas and processes.	9
the environmental value of each aquifer present determined according to the current Environment Protection (Water Quality) Policy;	7
a description of the existence, location and value of all Groundwater Dependent Ecosystems (GDEs) within the application area and within and immediately surrounding the extent of predicted hydrogeological impact of the proposed operations;	8.1
an assessment of any current or historical use of local groundwater by the landowner(s) and other users which includes a baseline survey of bores, including water level, groundwater quality, bore construction details, status and purpose and collar/ground elevations;	8.2
a statement describing if the application area is within an area where the water resources are prescribed under the Landscape South Australia Act 2019, and provide details on the current availability of water resources within the prescribed area;	8.3
a plan, to scale, identifying the application area, all drillholes and boreholes relevant to the identification of hydrogeology, GDEs, direction of groundwater flow, any potential paleochannels and recharge zones;	• • Figure 3.2 **Error! Reference source not found.** Figure 8-1
a diagram of the potentiometric groundwater elevation contours for each aquifer system that occurs within the application area and include the location of all drillholes and boreholes and supporting tabulated data used in developing the contours;	**Error! Reference source not found.** Table 5.1
a diagram of the location of all drillholes and boreholes used to determine the baseline groundwater quality, and supporting tabulated data and calculations used to define baseline groundwater quality and/or ranges; and	Figure 7-1

Information Requirement	Report Section
cross-section(s) of the interpreted hydrostratigraphy showing the known and inferred groundwater levels, and groundwater flow direction, recharge, and discharge mechanisms (if applicable), application area, proposed mining operations, and relevant drillholes and boreholes used in developing the cross-section(s).	Figure 3.3

2 Methodology

The hydrogeological investigations at the site have comprised the following work

Desktop review (GWS, 2017) of

- Publicly available groundwater data from the WaterConnect database
- Exploration drilling reports of water cuts and water production during drilling
- Historic mine dewatering reports

Pilot hole drilling and logging of a single drillhole (KPFRT001) (GWS, 2020). Drilling data, and in particular fracture logging and downhole logs indicate a zone of increased permeability at the trial site in the interval from 17m to 29 m.

Table 2.1: Drillhole details

Hole ID	Permit No	Easting	Northing	RL	Total Depth (m)	Well type	Date started
KPFRT01	Not Cased	308641	6196660	217.51	66	Pilot hole	14/11/2019
KPFRT02	355077	308640	6196669	217.51	29	7" 2 Stage	16/11/2019
KPFRT03	355078	308639	6196660	217.51	29	7" 2 Stage	17/11/2019

Table 2.2: Well construction details

Hole ID	Cased to (mBGL)	Screen Riser (mBGL)	Screen From (mBGL)	Screen to (mBGL)	SWL (mBGL)	Airlift Yield (L/s)
KPFRT02	22	18.6	21.5	28.6	11.82	0.05
KPFRT03	21	18.5	21	29	11.66	0.05

Investigation drilling of two bores (KPFRT002 and KPFRT003) at the trial site (GWS, 2020). A constant rate pumping test, pumping from KPFRT003 at 5.5 m^3/day was undertaken. Analysis of the data provided estimates of Transmissivity ranging from 0.36 to 0.93.

A tracer test was undertaken with the aim of determining the connectivity of fractures between the two investigation bores KPFRT02 and KPFRT03 (GWS, 2020). The test comprised injection of a sodium bromide tracer into well KPFRT03 and simultaneous extraction of groundwater from KPFRT02. Breakthrough of the bromide tracer occurred, commencing at approximately 150 minutes with the inflection point at approximately 315 minutes. The inflection point equates to injection of 1.4 m^3 tracer and extraction of 1.3 m^3.

3 Stratigraphy, Hydro-stratigraphy and Structure;

Kapunda is located within the Adelaide Geosyncline, a major geological province in central South Australia. The local geology is dominated by Neoproterozoic aged formations (Lambert, Donnelly, & Rowlands, 1980).

The main geological formations in the study area include the Tapley Hill Formation which covers the SELT site, and the Brighton Limestone to the east. The Tapley Hill Formation primarily consists of blue-grey laminated siltstone and slate.

The site is positioned within a synform with northwest-southeast axis folded into the Tapley hill formation. There are a sequence of parallel antiforms and synforms from west to east across the site as shown on

Figure 3.2

The Eudunda Arkose member of the Tapley Hill formation is present on both sides of the syncline. The formation dips steeply to the west at the project site, and steeply to the east at the location of Mantina quarry some 1000 m to the east on the other side of the synform.

Table 3.1: Stratigraphy and hydrostratigraphy

Stratigraphy	Hydrostratigraphy
Tapley Hill Formation. Laminated Siltstone	Unconfined Fractured Rock Aquifer. Likely lower permeability where weathered due to finer matrix grainsize.
Eudunda Arkose Member of Tapley Hill Formation.	Unconfined Fractured Rock Aquifer. Likely higher permeability where weathered due to coarser matrix grainsize.

The groundwater system comprises an unconfined fractured rock aquifer. Groundwater will move through fractures in the host rock. Pilot hole drilling, and logging indicates that a weathered zone near the surface is be a zone of increased permeability where saturated.

Fracturing will be controlled by structures in the host rock. The structure comprises beds steeply dipping to the west on the western side of the axis of the antiform. In this area, the Eudunda Arkose member will likely weather into slightly more permeable than the Tapley Hill Formation siltone material due to the coarser matrix grainsize.

In general the structure indicates that groundwater can expected to move preferentially from northwest to south east toward the light river and this interpretation is supported by the potentiometric surface.

The structure is shown in block diagram in Figure 3.4, and in a north-south cross section in Figure 3.3.

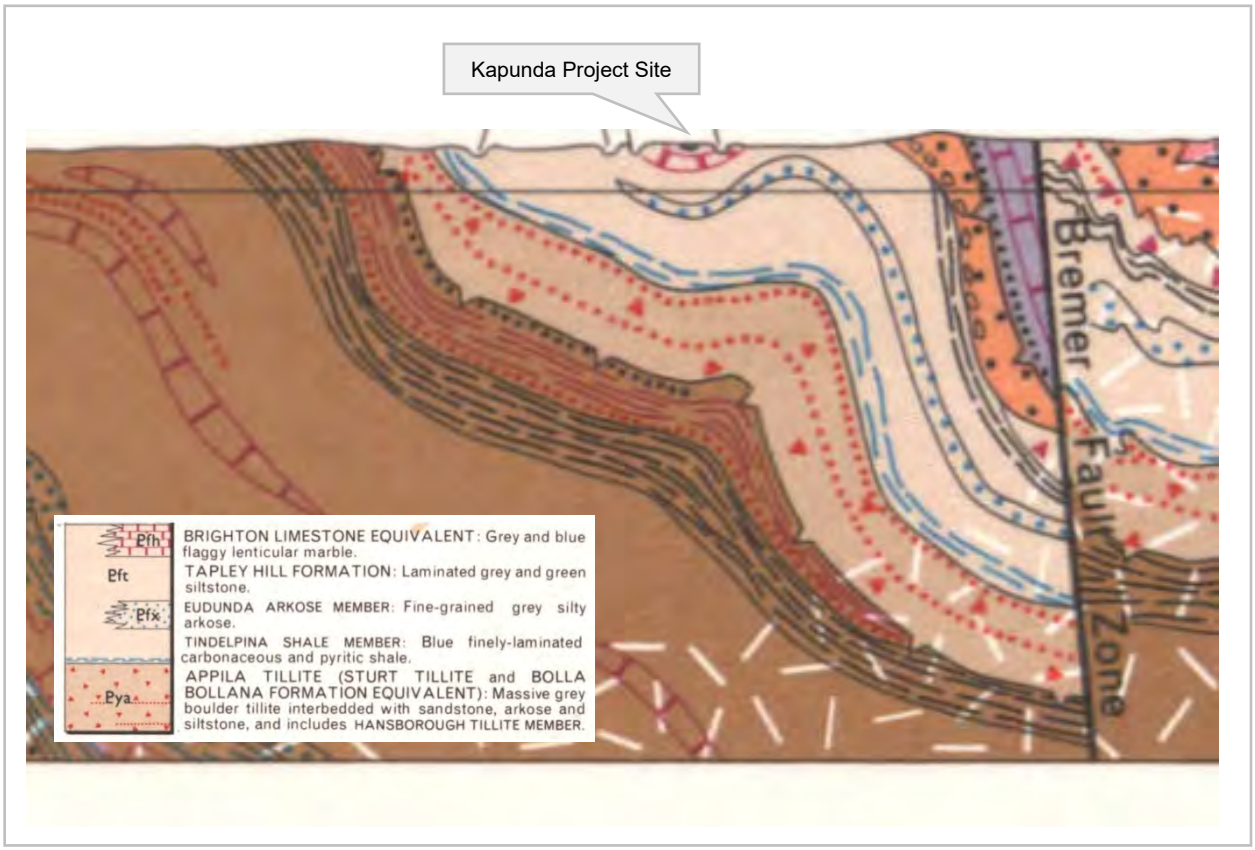


Figure 3.1: Geological Cross Section (per 1:250K Geological Map)

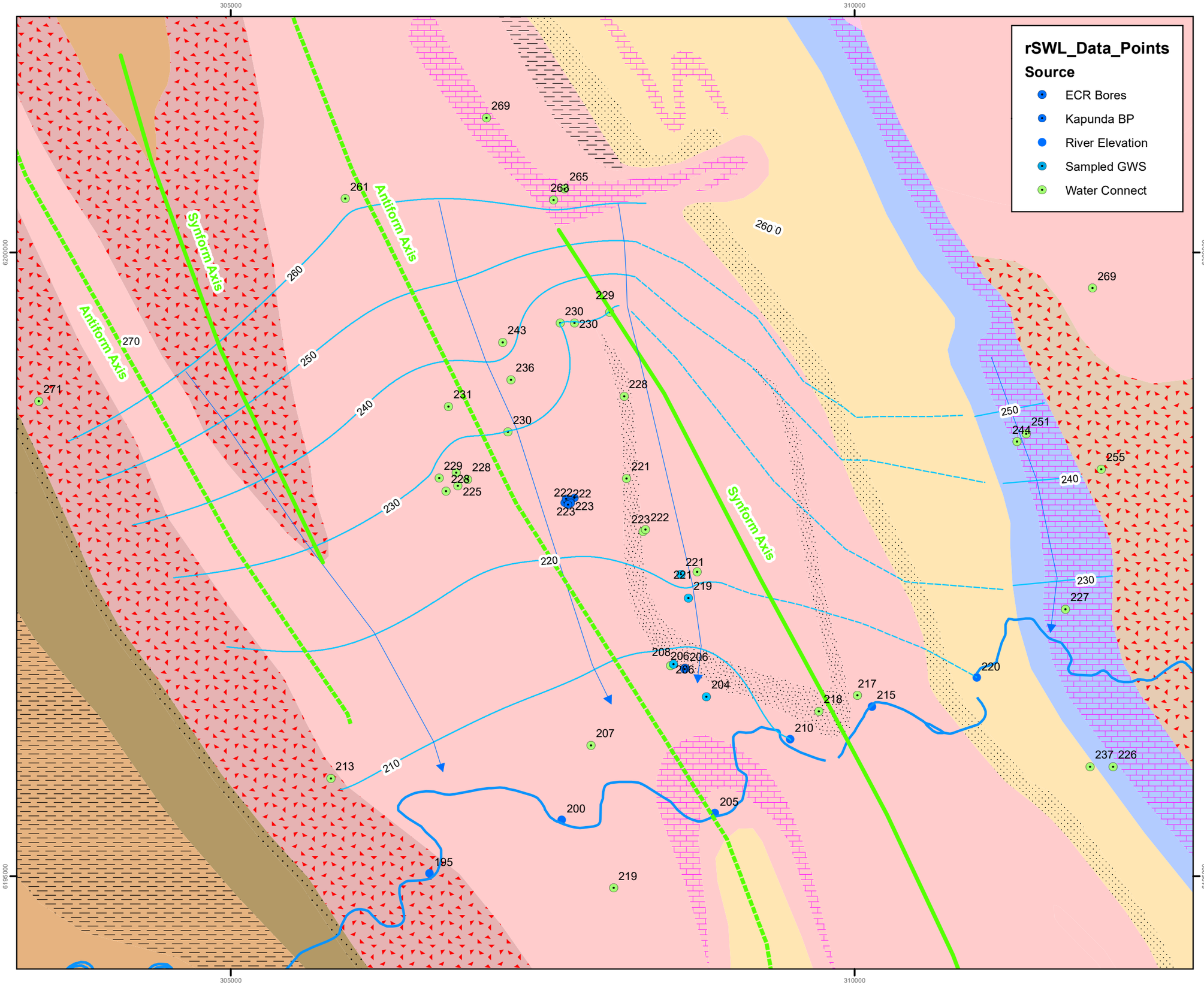


Figure 2.2 Geology and Inferred Groundwater Flow

Note: Water level data are a composite of measurements from different times and bores of varying depth.

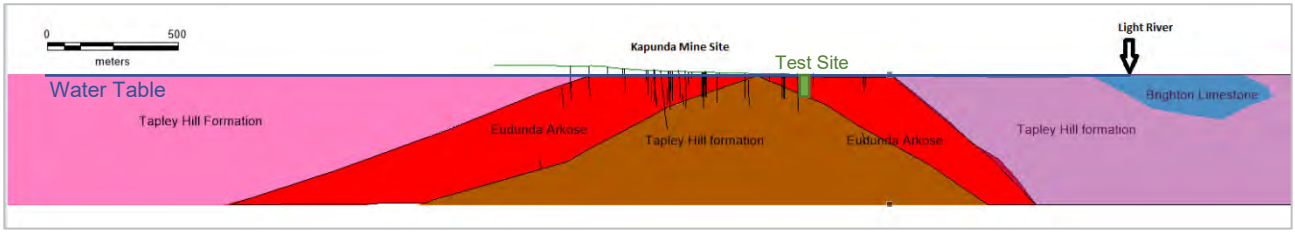


Figure 3.3: Cross Section

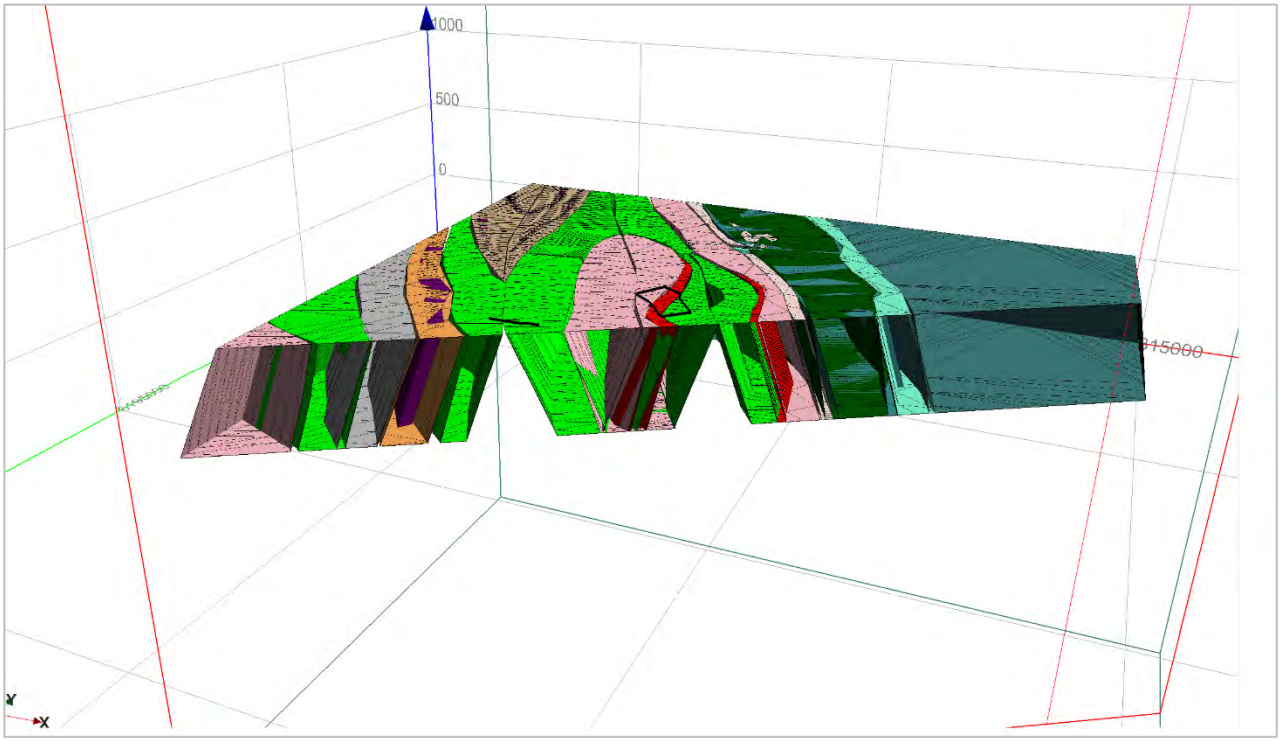


Figure 3.4: Block Diagram

4 Aquifer Properties

4.1 Hydraulic conductivity, Transmissivity, Storativity and Specific Yield

Aquifer testing at the Kapunda Site has comprised the following:

- Opportunistic low rate testing at KP001 during borehole sampling
- Eight-hour constant rate pumping test at the SELT site
- Hydraulic conductivity inferred from NMR Logs of drillhole KPFRT02 at the SELT site
- Analysis of water yield reported during historic exploration drilling
- Analysis of reported historic mine dewatering rates.

An overview is provided in the table below and details are provided in Groundwater Science 2020.

Table 4.1: Summary of hydraulic testing and aquifer properties.

Tests	Test Bore	Observation Bore	Transmissivity (m^2/day)	Storativity	Specific Yield	Aquifer thickness (m)	Bulk average Hydraulic Conductivity (m/day)	Solution
Constant Rate Pumping Test at CRT Site	KPFRT03	KPFRT02	0.36	0.00035	0.01	7.5	0.048	Neuman
	KPFRT03	Pumped	0.93	0.0004	0.02	7.5	0.12	Moench
NMR Log	KPFRT02		0.66			15	0.04	NMR
Low Rate pumping test at KP001	KP001	KP001	40	-	-	unknown		Logan
Historic Exploration Drilling yields	Mean (Min and Max)	27 data points	10 (0.3-36)	-	-	variable		Logan
Historic Mine dewatering rates	Historic Workings	N/A	18	-	-	146	0.1	Logan

Notes:
1) The Logan Approximation was applied to water yield recorded during exploration drilling. This is typically very short duration pumping at significant depth, and the aquifer response will be due to depressurisation of confined fractures rather that slow drainage of unconfined (specific yield) storage, hence the confined form of the equation was used.
2) The Logan Approximation was also applied to reported historic rates of dewatering from the mine workings. This long duration pumping will represent slow drainage of unconfined storage in this setting, so the unconfined form of the Logan Approximation was used. The unconfined form returns the bulk average hydraulic conductivity estimate of 0.18 m/day.
3) Storativity is the elastic (confined) storage released during early times of the pumping tests before slow drainage of the unconfined storage occurs.

Testing the transmissivity of fractured rock aquifers is problematic because of the variability in fracture occurrence. Typically, small-scale tests such as single borehole tests or pumping tests will determine the transmissivity of the specific joint sets intersected by the drillhole. Regional scale transmissivity is controlled by the frequency and connectivity between joint sets. Larger scale test methods are better suited to determining transmissivity per Cook (2003)[1]:

> *At the scale of hundreds of metres or more, hydrogeologic simulation models calibrated to estimates of recharge rates, watertable positions and/or potentiometric head data may be the most suitable and reliable way of estimating the large-scale hydraulic conductivity of the fractured rock aquifer.*

[1] Cook, P. G. (Peter G.). A guide to regional groundwater flow in fractured rock aquifers. CSIRO 2003

The analysis of reported dewatering from the historic workings is likely the most useful regional scale evaluation of transmissivity for the current study. The transmissivity of the fractured rock aquifer is likely to range around 10 to 14 m^2/day, whilst the concomitant bulk average hydraulic conductivity will be around 0.05 to 0.1 m/day.

Hydraulic conductivity and Transmissivity is likely to be anisotropic with higher conductivity along the planes of bedding and also along the planes of fracturing.

There is uncertainty in the estimation of aquifer properties in the fractured rock aquifer at this site.

4.2 Fracture and bedding orientation

The structure of the deposit was reviewed in detail on the basis of logging cored drillholes, historic geotechnical reports, aerial scanning of the historic pits and automated structural analysis, and optical imaging of the KPFRT00 pilot hole (Wang, 2020). The orientation of the main structures at the site is summarised in Table 4.2 and Figure 4.1.

Table 4.2: Fracture and bedding orientation

Feature	Dip direction (Degrees)	Dip (degrees from vertical)
Bedding	240	35
Fracture Set #1	270	70
Fracture Set #2	050	55
Fracture Set #3	310	65-80

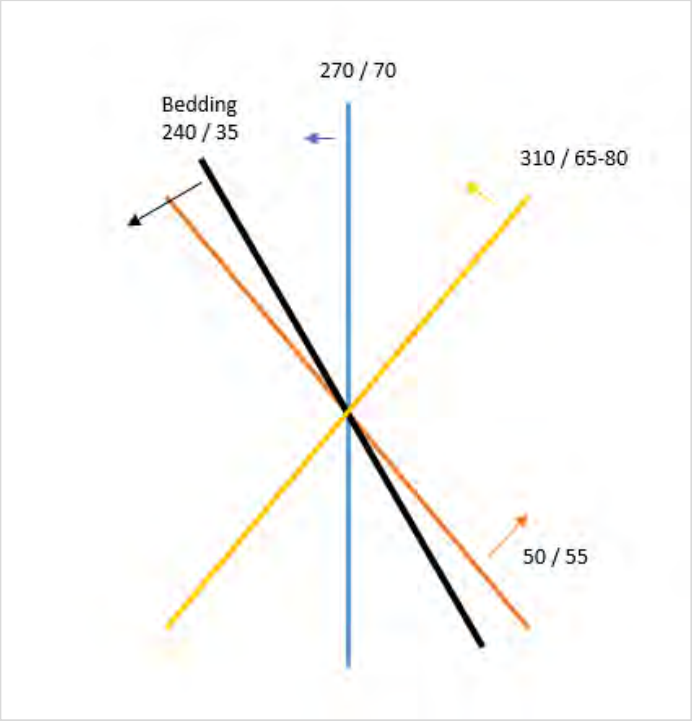


Figure 4.1: Fracture and bedding orientation

4.3 Porosity

Total porosity of a sedimentary rock typically ranges around 0.2 – 0.45. This reduces with cementation and lithification. Calibrated neutron logs were run on Pilot Hole KPFRT001. The total porosity measured by neutron log ranges around 0.35 from 10 to 30 m depth. Porosity decreases with depth to approximately 0.25 at the end of hole at 65 m depth.

Effective porosity was estimated based on structural analysis undertaken using downhole optical images. In total 82 structures were identified to 60 m depth. Cumulative fracture aperture was 1.08 m which equates to an average porosity of 1.7%. In the interval 20 to 60m the fracture porosity ranged from 1 to 3.5 % and averaged 2.5%. There is no data regarding cementation or filling of the fractures. The percentages presented here are an upper limit for effective (fracture) porosity assuming that the fractures are clean and open. Visual inspection of two larger fractures confirmed that these are mostly infilled. For example, the fracture logging derived from optical borehole scan of drillhole KPFRT001 identifies two large fractures, one at 21.35 m with 120 mm aperture and a second at 31.67 m depth with 31 mm aperture. Visual inspection of the borehole images shows that these are not clean, open fractures, but rather infilled structures (Figure 4-3 and Figure 4-4).

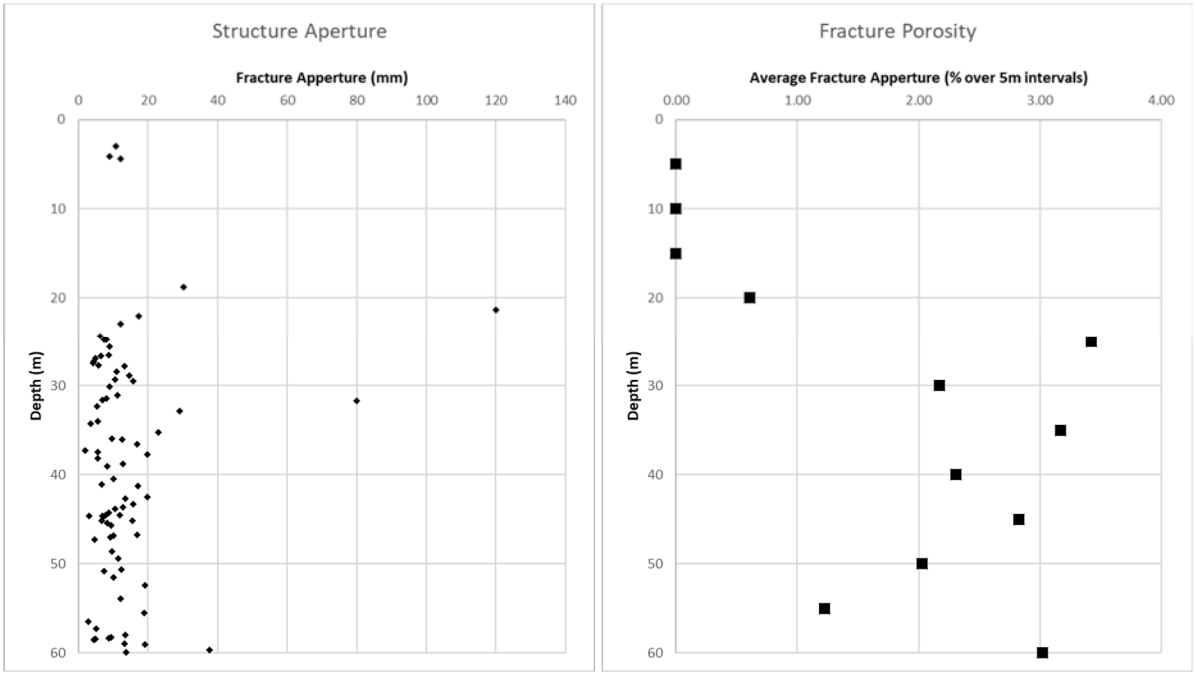


Figure 4-2: Fracture (Effective) Porosity

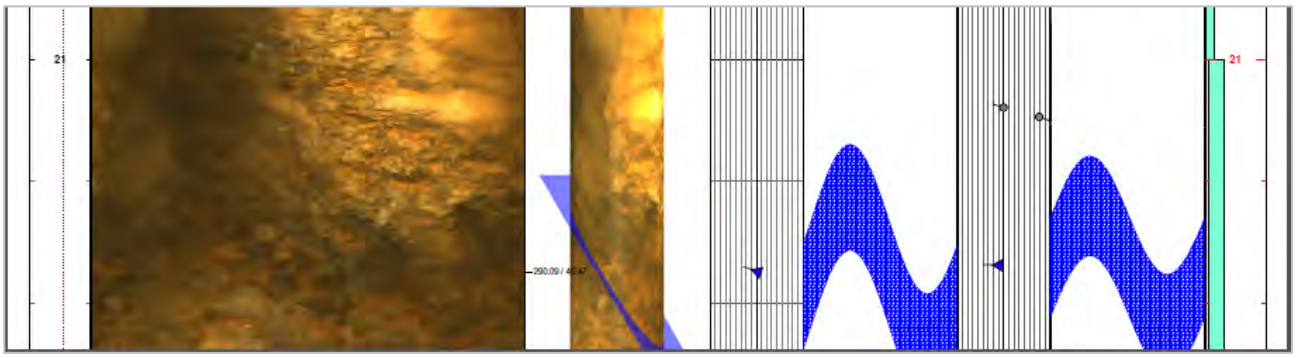


Figure 4-3: Large Fractures – infill detail – 21.35 m depth

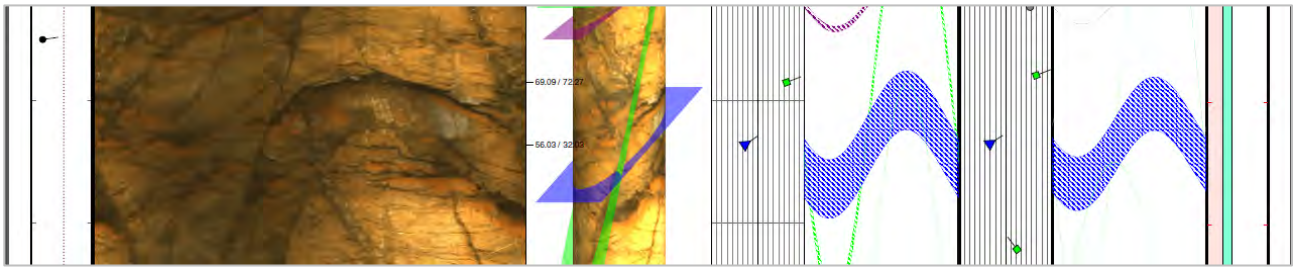


Figure 4-4: Large Fractures – infill detail – 31.67 m depth

4.4 Properties of confining strata

The fractured rock aquifer at the site is unconfined. There are no identified confining strata.

4.5 Connectivity of aquifers

The fractured rock aquifer at the site is unconfined, there is no overlying aquifer. Rock permeability is expected to decrease with depth, as is typical for fractured rock aquifers.

The fractured rock aquifer discharges to the Light River, which at its closest is a distance of some 650 m to the south east of the project site. The groundwater discharge maintains saline perennial pools in the river (CSIRO 2020).

5 Static Water Levels.

5.1 Potentiometric surface

Groundwater elevation data were obtained from; the WaterConnect Data base, industrial site investigations at Kapunda BP site (JBS&G 2019) and the drillholes drilled and sampled by ECR.

The data points, the inferred water table elevation and inferred groundwater flow is presented as **Error! Reference source not found.**. The data is tabulated as Table 5.1. The Groundwater elevation at the FRT site is 206 m AHD. Groundwater flow is inferred from the NNW to SSE along the axis of the syncline axis and bedding, and perpendicular to the Light River.

Table 5.1: Relative Standing Water Level Data

Well ID	Depth to water date	Easting	Northing	Drill Depth (m)	Depth to water (mbgl)	Collar Elevation (mAHD)	Relative Static Water Level (mAHD)	Salinity (mg/L TDS)	Source
MW01	23/09/2019	307675	6197993	12	8.3	232.5	225.1	941	JBSG Kap BP
MW02	23/09/2019	307715	6198001	14	11.5	233.2	222.6	2669	JBSG Kap BP
MW03	23/09/2019	307754	6198034	20	11.0	233.7	223.6	1072	JBSG Kap BP
MW04	23/09/2019	307688	6198026	9	8.1	232.2	225.1	2651	JBSG Kap BP
MW05	23/09/2019	307710	6197993	13	10.7	233.3	222.6	9381	JBSG Kap BP
MW06	23/09/2019	307722	6198011	15	11.6	233.2	222.6	4690	JBSG Kap BP
MW07	23/09/2019	307722	6197999	14	11.9	233.5	222.5	7316	JBSG Kap BP
MW08	23/09/2019	307724	6197987	12	10.8	233.4	222.5	16101	JBSG Kap BP
MW09	23/09/2019	307702	6197979	13	10.3	232.9	222.5	11435	JBSG Kap BP
662902067	18/10/2005	307893	6197562	18	13.6	240.4	226.8		Water Connect
662902068	19/10/2005	307960	6197484	24	17.9	246.9	229.0		Water Connect
662902069	19/10/2005	307954	6197583	24	18.9	243.2	224.3		Water Connect
662901459	11/12/1990	309713	6196320	200	24.9	243.0	218.1	6781	Water Connect
662900563	9/02/1976	308109	6199559	168	43.5	273.0	229.5	3628	Water Connect
662900564	5/02/1975	307246	6198976	23	13.1	249.3	236.2	2340	Water Connect
662900566	4/02/1976	306896	6198180	100	19.1	246.8	227.7	4330	Water Connect
662900567	4/02/1976	306808	6198234	52	16.6	244.0	227.4	4251	Water Connect
662900572	5/02/1976	308738	6197440	168	21.6	242.1	220.5	6786	Water Connect
662900264	26/10/1974	308069	6194907	8	5.4	224.0	218.6	1605	Water Connect
662900574	26/02/1976	308305	6197764	160	32.5	255.2	222.7	560	Water Connect
662900575	26/02/1976	308324	6197777	178	32.8	255.1	222.3	3763	Water Connect
662900576	17/06/1949	308172	6198188	38	30.5	251.2	220.7		Water Connect
662900578	7/08/1953	308469	6198496	87	50.3	259.0	208.7		Water Connect
662900281	26/11/1964	311889	6195876	45	9.5	247.0	237.5	133	Water Connect
662900282	11/09/1975	312074	6195879	40	12.0	238.0	226.0	1732	Water Connect
662900387	4/02/1976	306821	6198130	1	16.3	241.6	225.3	5036	Water Connect
662900388	22/01/1976	306669	6198192	15	6.7	236.1	229.4	381	Water Connect
662900390	5/02/1976	306745	6198765	52	19.2	250.4	231.2	4548	Water Connect
662900391	5/02/1976	307180	6199278	200	16.5	259.5	243.0	622	Water Connect
662900392	5/02/1975	307589	6200420	9	7.9	270.5	262.6	3628	Water Connect
662900393	6/02/1975	307676	6200507	6	5.3	270.7	265.4	2081	Water Connect
662900394	5/02/1975	307050	6201077	14	14.2	283.3	269.1		Water Connect
662900395	21/01/1976	305918	6200429	12	10.4	271.6	261.2	287	Water Connect
662900398	18/02/1960	309893	6197612	23	7.9	260.4	252.5	3478	Water Connect
662900400	6/02/1975	311692	6197138	15	9.6	237.1	227.5	3195	Water Connect
662900403	6/02/1975	311301	6198481	7	2.5	246.8	244.3	1840	Water Connect
662900407	6/02/1975	311377	6198545	8	4.4	255.7	251.4	1653	Water Connect
662900408	6/02/1975	311908	6199713	44	15.0	284.4	269.4	6039	Water Connect
662900410	6/02/1975	311978	6198262	6	2.6	258.0	255.4	2866	Water Connect
662900560	26/02/1976	308038	6199519	55	46.0	270.6	224.6	3628	Water Connect
662900561	26/02/1976	307754	6199435	170	41.3	271.2	229.9	1078	Water Connect
662900562	26/02/1976	307640	6199431		36.3	266.2	229.9	3113	Water Connect
662901309	27/11/1985	307222	6198558	79	16.0	245.9	229.9	3539	Water Connect
662900373	21/01/1976	303459	6198806	4	2.6	273.9	271.3	5788	Water Connect
662900375	6/02/1975	305801	6195785	11	9.3	222.1	212.8	2950	Water Connect
662900378	25/02/1976	307888	6196048	28	28.2	234.8	206.6	7690	Water Connect
662900384	4/02/1976	308527	6196689	148	23.0	229.2	206.2	5285	Water Connect
662900386	4/02/1976	306726	6198085	100	9.4	237.5	228.1	2767	Water Connect
662902256	29/10/2012	307752	6197697	12	10.0	238.6	228.6		Water Connect
662902257	29/10/2012	307797	6197653	12	10.0	238.5	228.5		Water Connect
662902255	29/10/2012	307731	6197656	12	10.0	237.3	227.3		Water Connect
662902065	17/10/2005	307945	6197534	19	13.1	243.6	230.5		Water Connect
662902066	18/10/2005	307911	6197582	18	13.6	241.7	228.1		Water Connect
662902074	24/01/2005	307934	6197502	24	17.5	245.0	227.5		Water Connect
662901645	8/04/1997	310022	6196448	71	12.0	228.8	216.8	8269	Water Connect
662902137	20/12/2005	308153	6198846	31	26.3	254.4	228.1		Water Connect
662901847	4/05/2004	307765	6197662	16	10.2	238.7	228.5		Water Connect

Well ID	Depth to water date	Easting	Northing	Drill Depth (m)	Depth to water (mbgl)	Collar Elevation (mAHD)	Relative Static Water Level (mAHD)	Salinity (mg/L TDS)	Source
662901848	5/05/2004	307764	6197674	17	10.3	239.0	228.7		Water Connect
662901849	6/05/2004	307774	6197666	16	10.4	239.0	228.6		Water Connect
662901850	7/05/2004	307789	6197617	17	11.1	236.5	225.4		Water Connect
KP001	12/12/2017	308607	6197420	58	17.7	239.0	221.4	6300	Surveyed GWS
Historic #1	3/10/2019	308669	6197229	16	12.3	231.4	219.2	9750	Surveyed GWS
Angled Hole	9/12/2019	308549	6196699	?	16.6	224.4	207.8		Surveyed GWS
KP6060	9/12/2019	308813	6196439	?	11.1	214.9	203.7	4500	Surveyed GWS
KPFRT02	9/12/2019	308640	6196669	29	11.8	217.5	205.7	9500	Surveyed GWS
KPFRT03	9/12/2019	308639	6196660	29	11.7	217.5	205.9		Surveyed GWS

Note: Grey shaded data points were excluded from contour interpolation in **Error! Reference source not found.**

5.2 Seasonal Fluctuation

The only available record of seasonal water level fluctuation is a set of 15 monitoring wells installed around the former Mobil Petrol Station at the corner of Perry St and Main St. The depth to water ranges from 13 to 18 mBGL. 6 water level monitoring events occurred between 2003 and 2008. The maximum fluctuation in any one well from 2003 to 2008 was 1.1 m change from April 2003 to November 2005 in monitoring well MW3. In general, seasonal fluctuation was around 0.3 m. Six observations in 5 years may not allow proper assessment of seasonal fluctuations. They may be underestimated. The data presented is the only data available.

6 Conceptual Model

The Kapunda Site is conceptualised as a localised and structurally controlled groundwater flow system. The site sits within a syncline structure oriented North West to South east with synform and antiform folds. Groundwater flow is parallel to the fold axes and discharges to the Light river.

6.1 Recharge

Groundwater recharge will be via diffuse rainfall recharge and some localised higher rates at outcropping or thinly covered basement rock. The Clare valley is a nearby analogous fractured rock aquifer system. Estimated recharge reported in the Clare Valley Water Allocation Plan (NYMRMB, 2009)[2] is 30 mm/year, though it is reported that the rate is variable and in many areas of the WAP, less than that estimate.

Chloride mass balance analysis of the groundwater at the Kapunda site (Li et al 2020) produced an estimate of 4 mm/year. This value seems appropriate for the more saline system at Kapunda.

6.2 Discharge

Discharge from the system is via baseflow to the Light River. The Light River at the site has been investigated by CSIRO (2020). The report concluded that the River receives groundwater discharge and that the discharge maintains flow and pools over summer.

6.3 Groundwater Flow

Groundwater flows through the fractured rock aquifer toward the discharge zone of the Light River. Flow will be preferential via fractures. Flow velocity estimates of up to 15 m per year have been derived as follows:

Porous Media Equivalent

An estimate of flow velocity around 15 m per year is derived by the Darcy equation from the measured hydraulic gradient of 0.004, the bulk hydraulic conductivity estimate of 0.1 m/day, and an effective porosity estimate of 1% (Assuming partially filled fracture porosity of 2.5%).

[2] Northern and Yorke Natural Resources Management Board, 2009, *Water Allocation Plan for the Clare Valley Prescribed Water Resources Area*. Government of South Australia, through the Northern and Yorke Natural Resources Management Board, Crystal Brook, South Australia

The porous media equivalent approach is used because the fracture frequency at the site is relatively high (Averaging approximately 2.4 fractures per metre), with three main orientations of fracturing, whilst the bulk hydraulic conductivity estimated from pumping tests is low (0.1 m/day).

There is uncertainty in the estimation of groundwater flow in the fractured rock aquifer at this site using porous media equivalent methods

7 Environmental Value of Groundwater

7.1 FRT Site

Groundwater at the FRT site is saline. Salinity ranges from 5,300 to 9,500 mg/L TDS. The groundwater is acidic with pH in the range of 4. The groundwater exhibits elevated metals with 48 mg/L copper, 85mg/L Zinc, 9 mg/L Nickel and 1,200 mg/L.

The low pH, high metals groundwater quality at the site is possibly due to impacts from historic mining, for instance oxidation of sulphides resulting in acid and metalliferous mine drainage effects.

The beneficial use of groundwater is constrained by the elevated metals. The water is not suited for drinking, stock watering or irrigation and is suited only to industrial use including mining.

Table 7.1: KPFRT001 Metals Concentrations Compared to Beneficial Use Limits (mg/L)

Minutes into Test	45	105	165	210	255	300	360	405	450	510	Beneficial Use Limits		
											ADWG	Irrigation	Livestock
Silicon	67	64	63	63	63	54	64	61	69	65			
Heavy Metals													
Aluminium	18	16	16	17	16	17	16	16	15	17	7	20	5
Arsenic	0.06	0.048	0.046	0.051	0.044	0.03	0.04	0.053	0.024	0.027	0.01	2.0	0.05
Barium	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	2		
Beryllium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		0.05	
Boron	2.7	2.6	2.6	2.9	2.7	2.8	2.7	2.7	2.7	3	4	0.5	5
Cadmium	0.069	0.064	0.063	0.065	0.062	0.063	0.058	0.06	0.058	0.064	0.002	0.05	0.01
Chromium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		1	
Cobalt	6.1	5.8	5.8	6.1	5.8	5.9	5.5	5.7	5.6	6.2		0.1	1
Copper	70	49	46	52	48	49	47	46	43	50	2	5	0.4
Gold	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1			
Iron	1600	1300	1200	1300	1300	1200	1200	1100	1200	1300		10	
Lead	0.047	0.043	0.042	0.045	0.042	0.042	0.04	0.041	0.039	0.044	0.01	5	0.1
Manganese	2.6	2.5	2.5	2.6	2.5	2.5	2.4	2.4	2.4	2.7	0.5	10	
Mercury	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		0.002	
Molybdenum	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.05	
Nickel	9.8	9.3	9.3	9.8	9.3	9.5	9	9.1	9	10	0.5	2	1
Selenium	0.025	0.02	0.018	0.019	0.015	0.019	0.016	0.017	0.015	0.017	0.1	0.05	0.02
Silver	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
Uranium	0.2	0.18	0.17	0.18	0.17	0.17	0.16	0.17	0.16	0.18	0.02	0.1	0.2
Vanadium	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.5	
Zinc	110	87	82	91	86	86	81	78	80	92		5	20

7.2 Broader Catchment

Salinity in the broader catchment ranges from 2,000 and 8,000 mg/L, with isolated occurrences of salinity less than 1,500 mg/L TDS. The data is collated in and presented on Figure 7-2.

Three bores sampled for this project returned salinity values of 4500 to 11,738 mg/L TDS (Table 7.2). These salinity levels are classified as brackish to saline and the groundwater is suitable for stock or industrial uses (but not irrigation). Well Locations are presented as Figure 7-1.

Table 7.2: Baseline groundwater chemistry - broader catchment (mg/L).

BOREID	KP001	KP 60	KP009
Chloride	4000	2600	
pH	8.7	7.8	
Salinity (expressed as TDS)*	6300	4500	11738
Silica (calculation from Si filtered)	< 10.67	< 5	12
Sulphate (as SO4)	990	370	
Alkali Metals			
Calcium	36	44	210
Magnesium	330	230	510
Potassium	55	34	70
Sodium	2600	1600	3300
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	140	92	
Carbonate Alkalinity (as CaCO3)	28	< 10	
Hydroxide Alkalinity (as CaCO3)	< 10	< 20	
Total Alkalinity (as CaCO3)	160	92	
Heavy Metals			
Aluminium (filtered)	< 0.05	< 0.05	0.2
Arsenic (filtered)	< 0.001	< 0.001	
Barium (filtered)	< 0.02	< 0.02	<0.1
Beryllium (filtered)	< 0.001	< 0.001	
Boron (filtered)	1.4	0.81	3
Cadmium (filtered)	< 0.0002	< 0.0002	<0.1
Chromium (filtered)	< 0.001	0.001	<0.1
Cobalt (filtered)	< 0.001	< 0.001	
Copper (filtered)	< 0.001	< 0.001	0.2
Iron (filtered)	< 0.05	11	<0.1
Lead (filtered)	< 0.001	< 0.001	<0.1
Manganese (filtered)	0.28	0.72	<0.1
Mercury (filtered)	< 0.0001	< 0.0001	
Molybdenum (filtered)	< 0.005	< 0.005	<0.1
Selenium (filtered)	< 0.001	0.002	
Uranium (filtered)	< 0.005	< 0.005	
Vanadium (filtered)	< 0.005	< 0.005	<0.1
Zinc (filtered)	< 0.005	< 0.005	<0.1

Legend

Baseline_Monitoring_Bores

GROUNDWATER SCIENCE

Job Number: ECR-20-1

Client: ECR

Version: 1 Date: 11/09/2020

Drawn by: BJ

N

0 0.075 0.15 0.3

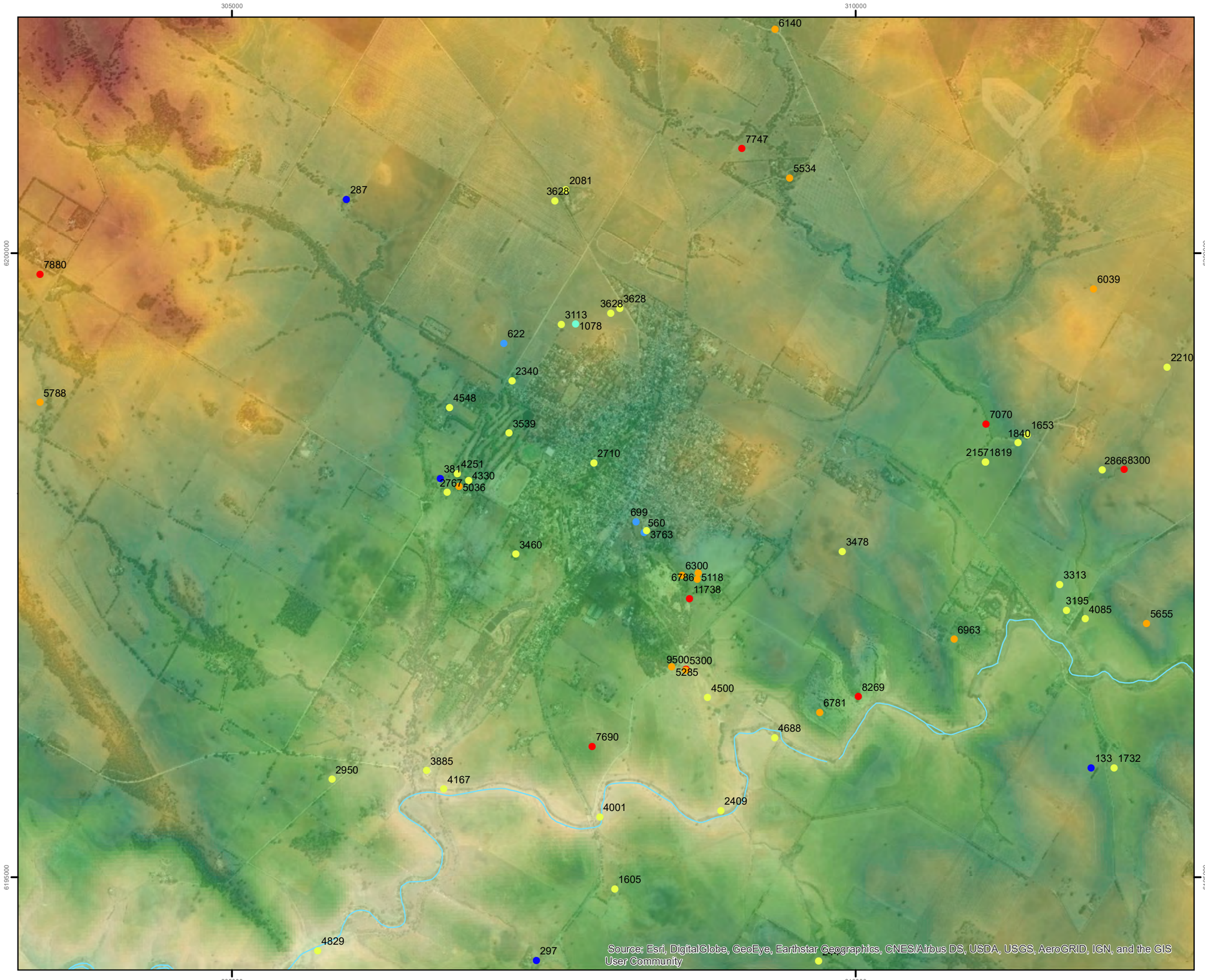
Kilometers

Coordinate System: GDA 1994 MGA Zone 54

Baseline Groundwater Monitoring Sites

Figure 7.1

Document Path: C:\Users\Ben Jeuken\Dropbox (Groundwater Science)\Groundwater Science Team Folder\Project Files\ECR\ECR-19-2-Field Testing\GIS\Maps\Monitoring Plan.mxd
Document Name: Monitoring Plan



Legend

Groundwater Salinity

TDS (mg/L)

- 7001 - 336808
- 5001 - 7000
- 1501 - 5000
- 1001 - 1500
- 501 - 1000
- 15 - 500

GROUNDWATER SCIENCE

Job Number: ECR-19-2

Client: Environmental Copper Recovery Pty Ltd

Version: 1 Date: 1/12/2020

Drawn by: BJ

N

0 0.425 0.85 1.7

Kilometers

Coordinate System: GDA 1994 MGA Zone 54

Figure 7.2
Groundwater Salinity

Table 7.3: Broader Catchment Salinity

Unit Number	Easting	Northing	Status	Purpose	TDS (mg/L)	Sample date	Comments
6629-281	311889	6195876			133	26/11/74	Dis-used bore sampled in 1974 no longer exists.
6629-395	305918	6200429	ABD		287	21/1/76	Abandoned Stone well no longer exists.
6629-265	307441	6194334	ABD	IRR	297	26/11/74	Disused 6.5m deep bore sampled in 1974 no longer exists.
6629-388	306669	6198192		OBS	381	22/1/76	14m deep bore sampled by bailer in 1976 no longer exists.
6629-574	308305	6197764	ABD	EXP	560	26/2/76	Mineral Exploration hole sampled by DME no longer exists.
6629-391	307180	6199278		EXP	622	5/2/76	Mineral Exploration hole sampled by DME no longer exists.
6629-571	308238	6197848		EXP	699	4/2/76	Mineral Exploration hole sampled by DME no longer exists.
6629-561	307754	6199435		EXP	1078	26/2/76	Mineral Exploration hole sampled by DME no longer exists.
6629-264	308069	6194907	ABD	IRR	1605	26/11/74	Abandoned Brick lined well. Sampled 1974 no longer exists.
6629-407	311377	6198545		IRR	1653	6/2/75	
6629-282	312074	6195879	OPR	STK	1732	11/9/75	
6629-405	311041	6198328	NL		1819	9/9/14	
6629-403	311301	6198481		STK	1840	6/2/75	
6629-393	307676	6200507	OPR	STK	2081	6/2/75	
6629-404	311042	6198328	NL	SPR	2157	8/9/14	
6629-409	312497	6199089			2210	6/2/75	
6629-564	307246	6198976		IRR	2340	5/2/75	
6629-382	308919	6195535			2409	4/12/90	
6629-290	309704	6194328	ABD	STK	2446	13/11/74	
6629-577	307902	6198321	ABD		2710	9/9/14	
6629-386	306726	6198085		EXP	2767	4/2/76	
6629-410	311978	6198262			2866	6/2/75	
6629-375	305801	6195785		OBS	2950	6/2/75	
6629-562	307640	6199431		EXP	3113	26/2/76	
6629-400	311692	6197138			3195	6/2/75	
6629-399	311637	6197347			3313	13/5/53	
6629-385	307276	6197588	NL		3460	18/2/60	
6629-398	309893	6197612	NL		3478	18/2/60	
6629-1309	307222	6198558	OPR	IRR	3539	14/10/85	
6629-392	307589	6200420			3628	5/2/75	
6629-560	308038	6199519		EXP	3628	26/2/76	
6629-563	308109	6199559		EXP	3628	9/2/76	
6629-575	308324	6197777		EXP	3763	26/2/76	
6629-376	306561	6195856			3885	7/2/75	
6629-380	307949	6195485			4001	3/2/76	
6629-402	311842	6197072			4085	13/11/74	
6629-377	306698	6195708			4167	11/2/75	
6629-567	306808	6198234		EXP	4251	4/2/76	
6629-566	306896	6198180		EXP	4330	4/2/76	
6629-390	306745	6198765		EXP	4548	5/2/76	
6629-383	309351	6196118			4688	5/2/76	
6629-505	305688	6194414			4829	4/5/76	
6629-387	306821	6198130		EXP	5036	4/2/76	
6629-573	308731	6197389	UKN	EXP	5118	5/2/76	
6629-384	308527	6196689	UKN	EXP	5285	4/2/76	
6629-396	309472	6200601			5534	11/2/75	
6629-401	312332	6197035			5655	31/8/55	
6629-373	303459	6198806	ABD		5788	21/1/76	
6629-408	311908	6199713			6039	6/2/75	
6629-362	309354	6201795	ABD		6140		
6629-1459	309713	6196320	OPR	IND	6781	11/12/90	
6629-572	308738	6197440		EXP	6786	5/2/76	
6629-1286	310790	6196907	UKN	DOM	6963	6/3/83	
6629-406	311046	6198631		RIV	7070	11/1/68	
6629-378	307888	6196048		EXP	7690	25/2/76	
6629-397	309087	6200838	ABD	DOM	7747	9/5/77	
6629-372	303460	6199830	ABD	STK	7880	23/7/54	
6629-1645	310022	6196448	OPR	IND	8269	7/4/97	
6629-411	312152	6198267		DOM	8300	10/11/65	

8 Groundwater Receptors

8.1 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems in the study area were evaluated by firstly plotting the GDE Atlas maintained by BOM[3]. The data are shown on Figure 8-1.

In proximity to the project site, the data set identifies

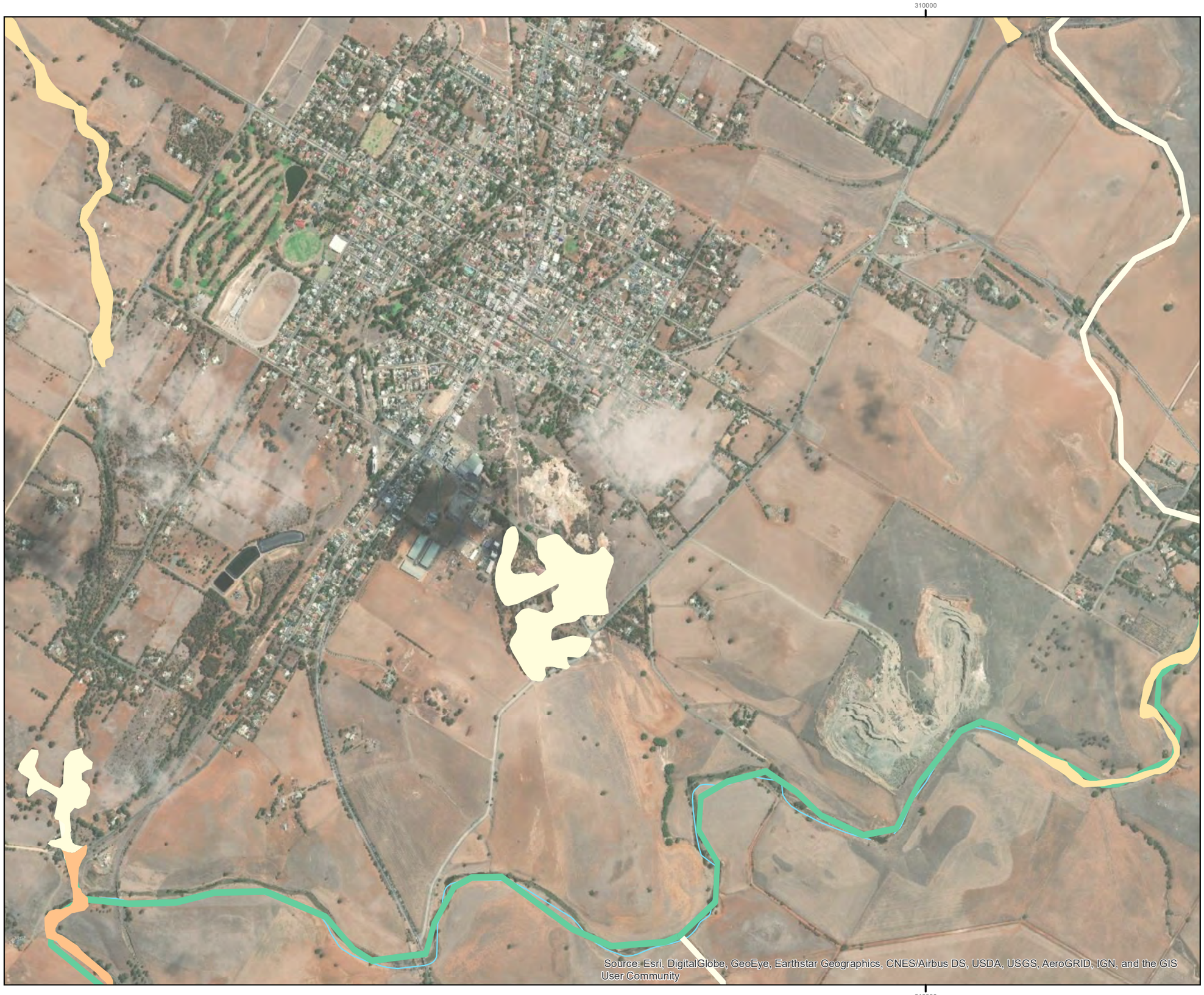
- The stand of vegetation to the south and west of the historic workings is identified as a potential terrestrial ecosystem that relies on the subsurface presence of groundwater–this includes all vegetation ecosystems. The area is classified as having a low potential for groundwater interaction.

  Given the groundwater depth is greater than 10 m below surface and the groundwater salinity is moderately high, and the dominant species is Blue Gum, this stand of vegetation can be excluded as a groundwater dependent ecosystem.

- The Light River is identified as an aquatic ecosystem that relies on the surface expression of groundwater–this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.

The Light River at the site has been investigated by CSIRO (2020). The report concluded that the River receives groundwater discharge and that the discharge maintains flow and pools over summer. Whilst a groundwater baseflow to streams and rivers is common, an interesting feature in the case of the Light River is that this baseflow is quite saline. Accordingly, the Light River is often considered by local management agencies to be 'degraded' owing to ecological classification systems for Australian waterways that use comparison with pristine (usually freshwater) reference environments. This approach is appropriate when formerly freshwater environments have become more saline due to land-use change or other processes. However, it is less so in cases when the environment is naturally saline.

[3] http://www.bom.gov.au/water/about/publications/document/BOM_GDE_Atlas_info_sheet_WEB.pdf



Legend

Terrestial Ecosystems

- Identified in previous study: fieldwork
- Identified in previous study: desktop
- High potential for GW interaction
- Moderate potential for GW interaction
- Low potential for GW interaction

Aquatic Ecosystems

- Identified in previous study: fieldwork
- Identified in previous study: desktop
- High potential for GW interaction
- Moderate potential for GW interaction
- Low potential for GW interaction

GROUNDWATER SCIENCE

Job Number: ECR-19-2

Client: Environmental Copper Recovery Pty Ltd

Version: 1 Date: 1/12/2020

Drawn by: BJ

N

0 0.225 0.45 0.9

Kilometers

Coordinate System: GDA 1994 MGA Zone 54

Figure 8.1 Groundwater Dependent Ecosystems

8.2 Third Party Groundwater Users

A review of all third party bores in proximity to the site was undertaken. Bore records were downloaded from WaterConnect and filtered to exclude records described as; mineral exploration holes (MW), or water points (WP), and to exclude records where the status was described as; backfilled or abandoned. The remaining records are presented as Table 8.1 and on Figure 8-2. The status of these bores was followed up by site inspection and enquiry.

The only bores in use for water supply are located in Mantina Quarry approximately 1 km to the south east of the site.

The remaining bore records are monitoring bores associated with a service station in Kapunda, a single shallow monitoring bore within Kapunda and two bores that no longer exist.

Table 8.1: Third Party Bore Records in proximity to the site

DHNO	Unit_No	East	North	Date	Depth	purpose	Status	Audit Comment
63534	6629-381	309139	6196389					No Longer Exists
63551	6629-398	309893	6197614		22.86		NL	No Longer Exists
64602	6629-1459	309713	6196322	14/11/90	200	IND	OPR	Mantina Quarry Bore (in use)
164823	6629-1645	310023	6196450	8/04/97	71	IND	OPR	Mantina Quarry Bore (in use)
200105	6629-1847	307765	6197663	4/05/04	16	MON		Service Station Monitoring
214274	6629-2065	307945	6197536	17/10/05	19	MON		Service Station Monitoring
214275	6629-2066	307911	6197584	18/10/05	18	MON		Service Station Monitoring
214277	6629-2067	307894	6197563	18/10/05	18	MON		Service Station Monitoring
214278	6629-2068	307960	6197486	19/10/05	23.8	MON		Service Station Monitoring
214279	6629-2069	307954	6197584	19/10/05	24	MON		Service Station Monitoring
214370	6629-2074	307934	6197503	24/01/05	24	MON		Service Station Monitoring
214371	6629-2075	307951	6197533	24/01/05	24			Service Station Monitoring
214372	6629-2076	307971	6197550	25/01/05	24			Service Station Monitoring
214373	6629-2077	307948	6197569	27/01/05	24			Service Station Monitoring
214374	6629-2078	307907	6197553	27/01/05	22			Service Station Monitoring
214375	6629-2079	307922	6197577	28/01/05	18			Service Station Monitoring
271988	6629-2255	307732	6197657	29/10/12	12	INV		Service Station Monitoring
272010	6629-2256	307753	6197698	29/10/12	12	INV		Service Station Monitoring
289421	6629-2277	307792	6197410	29/01/16	15	INV		50 mm monitoring bore cased to 6m

8.3 Prescription of water Resources

The Site is not in a Prescribed Wells Area or Prescribed water Resources Area

Legend

WaterConnect Bore Records

GROUNDWATER SCIENCE

Job Number: ECR-19-2

Client: Environmental Copper Recovery Pty Ltd

Version: 1 Date: 1/12/2020

Drawn by: BJ

N

0 0.15 0.3 0.6

Kilometers

Coordinate System: GDA 1994 MGA Zone 54

Figure 8.2
Third Party Bores

9 Numerical Groundwater Flow Model

A numerical Groundwater flow model of the Site was developed by the University of Adelaide (Li et al 2020). The full report is appended and a brief summary provided here.

The fracture rock aquifer was simulated using the equivalent porous medium approach. A 3D regional-scale numerical groundwater model was developed for Kapunda using MODFLOW Unstructured Grid (USG).

9.1 Model Grid

The model domain is 5.5 km × 5.2 km in area and the model edges were set ~2 km away from the study area to avoid boundary effects (Figure 1). The Voronoi grid was generated using AlgoMesh with a nominal cell size of 10 m² in the study area and up to ~25,000 m² in the regional area. The same grid was applied to two layers, resulting in a total of 294,356 cells.

The groundwater model was discretised into two layers, with the top layer representing the more permeable, weathered part of the fractured rock aquifer and the bottom layer representing the less permeable, unweathered part of the aquifer.

9.2 Layer Properties

Lyaer properties were applied in the range presented in Table 9.1

Table 9.1: Model Layer Properties

Parameter group	Layer	Unit	Initial value	Lower bound	Upper bound	Source
Hydraulic conductivity	1	m/d	0.1	$1e^{-5}$	1	Aquifer test Logan Approximation
Hydraulic conductivity	2	m/d	$1e^{-4}$	$1e^{-5}$	$1e^{-3}$	Aquifer test Logan Approximation
Specific storage	1, 2	m^{-1}	$1e^{-6}$	$1e^{-7}$	$1e^{-5}$	Li and Cranswick (2016)
Specific yield	1, 2	-	0.01	0.001	0.05	Li and Cranswick (2016)
Rainfall-to-recharge ratio	1	-	0.008	$1e^{-4}$	0.05	Chloride mass balance

9.3 Boundary Conditions

9.3.1 River

The Light River and other ephemeral creeks were simulated using MODFLOW's RIV package. Time-varying river depths were used for the Light River based on data from the nearest gauging station.

9.3.2 Model Perimeter

The regional lateral groundwater inflows from the northern and southern sides were modelled in both layers using MODFLOW's GHB package. The head values were derived from groundwater level observations and the conductance was set to 0.1 m²/d.

9.3.3 Recharge

Net groundwater recharge was simulated using MODFLOW's RCH package. Annually varying rainfall data were incorporated into the model as recharge multipliers, which were multiplied with the spatially-varying rainfall-to-recharge ratios (a calibration parameter) to derive net recharge.

9.3.4 Historic Pits

The historical mine and quarry were represented as groundwater discharge features using MODFLOW's DRN package. The drain elevation was sourced from the DEM and the drain conductance was set to 0.1 m²/d.

9.4 Time Steps

The model consists of 53 stress periods. The first period is steady-state and represents the pre-1970 period, which was selected based on the observation data availability. This stress period provides the initial conditions for the subsequent 50 transient annual stress periods, which represent the time period between 1970 and 2019 and were used for history-matching.

9.5 Calibration

Model calibration entailed varying the 5 parameter sets in Table 9.1. The calibration approach was an ensembler-smoother method via PESTPP-IES. This does not produce one calibrated model , but rather an ensemble models that represent the uncertainty of the study site. This ensemble of models is run to provide a range of possible outcomes.

Further detail is provided in the model report.

10 References

Cook, P. G. (Peter G.). *A guide to regional groundwater flow in fractured rock aquifers*. CSIRO 2003

GWS (2017) *Kapunda Copper Project - Baseline Hydrogeological Assessment*. Consultant's Report to Environmental Copper Recover. Groundwater Science Pty Ltd, Adelaide Report ECR-17-1-R0001

GWS (2020) *Kapunda Copper ISR Project - Hydrogeological Testing*. Consultant's Report to Environmental Copper Recover. Groundwater Science Pty Ltd, Adelaide Report ECR-19-2-R001a

Li, C., Doble, R, Hatch, M., Heinson, G., Ky, B. (2021) *Constraining regional-scale groundwater transport predictions with multiple geophysical techniques*. Journal of Hydrogeology Regional Studies, 36.

11 April 2024 Reference: NJ-08

Matt Swann
Geologist
Environmental Copper Recovery SA Pty Ltd
Adelaide South Australia 5000

RE: Hydrogeological Testing, Kapunda Copper ISR Project, Kapunda, South Australia

Dear Matt,

Land & Water Consulting (LWC) is pleased to present Environmental Copper Recovery SA Pty Ltd (Enviro Copper) with the findings of the hydrogeological testing of groundwater bores KPSELTX01 and KPSELTI01 completed in March 2024

Please find attached the outcomes of the investigation (Attachment A) and LWC's statement of limitations associated with this report provided in Attachment B.

If you have any questions regarding the above information, please don't hesitate to call the undersigned.

Yours sincerely,

Emily Picken | Principal Hydrogeologist

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ATTACHMENTS

Attachment A	Enviro Copper Kapunda ISR Project Analysis of Pump Testing of Bores KPSELTX01 and KPSELTI01
Attachment B	Statement of Limitations

ATTACHMENT A

Enviro Copper Kapunda ISR Project Analysis of Pump Testing of Bores KPSELTX01 and KPSELTI01

10th April 2024

Levi Wilkins
Senior Environmental Geoscientist
Land & Water Consulting (LWC)

Enviro Copper Kapunda ISR Project
Analysis of Pump Testing of Bores KPSELTX01 and KPSELTI01

1. Introduction

WatSec Environmental (WSE) is pleased to provide this report documenting the pump testing and analysis of data at the above bore sites. The locations of the bores are shown by the red arrows on Figure 1 and they are spaced approximately 7m apart. The bores are located on flat ground at approximately the same elevation.

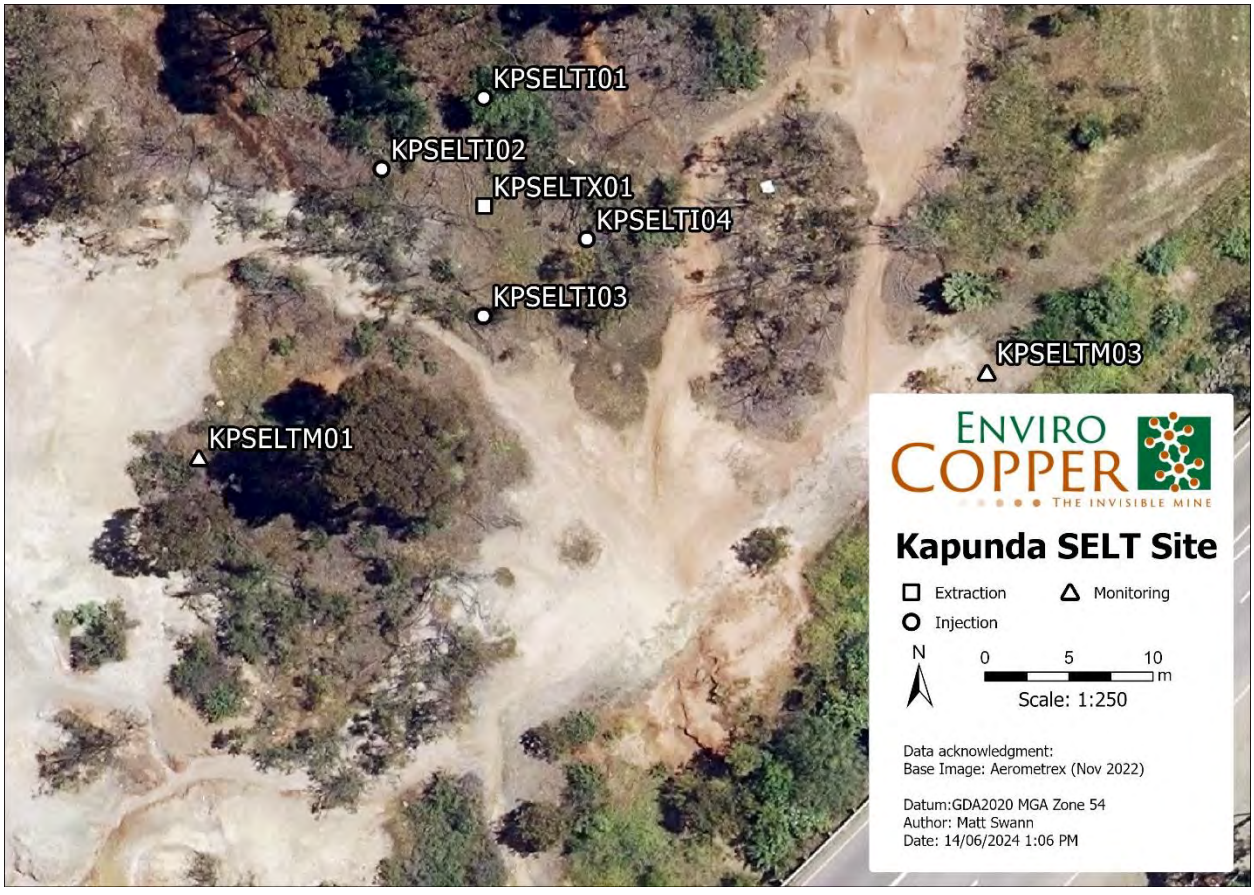

Figure 1: Bore Location Plan (after Enviro Copper)

2. Lithology and Structures

A copy of the bore constructions and lithological logs as provided by Enviro Copper are included as Attachment A. These indicate that oxidised and kaolinised materials with quartz veining and Cu-oxide / sulphide mineralisation extend to depths of 15 – 20m bgl and grade into less weathered fine grained sulphide-bearing sandstone. Groundwater levels are within the weathered zone at ~9.7m bgl.

Geophysical logging and structural interpretations were undertaken in bore KPSELTX01 by Borehole Wireline (January 2024). The analysis identified the

structural features listed in Table 1. The first 3 of these are above the measured groundwater level and will therefore not provide direct structure connectivity between the 2 bores, although it's possible they could provide indirect pathways for water transport where they extend below the water table.

The following comments can be made regarding the structures as potential hydraulic pathways assuming they extend across the area between the 2 bores:

- The first structure at 6.77m dips towards KPSELTI01 but with the shallow dip of 12.12° is likely to be above the water table at KPSELTI01.
- The second structure dips to the west and is likely to be at a similar depth and above the water table at KPSELTI01.
- The third structure dips to slightly south of east and is likely to be at a shallower depth and above the water table at KPSELTI01.
- The deepest structure is ~0.2m below the water table in KPSELTX01 and dips to the north west. It could therefore be found at a depth of ~12m in KPSELTI01, about 2.3m below the water table. This structure could provide some hydraulic connection between the bores but the pumping water level would quickly drop below this depth. Hydraulic connection could however be maintained during injection.

Table 1: Structures Identified in KPSELTX01 (after Borehole Wireline, 2024)

STRUCTURE'S DEPTH	STRUCTURE'S CLASSIFICATION	CLASS	STRUCTURE'S CONTINUITY	STRUCTURE'S AZIMUTH	STRUCTURE'S DIP	STRUCTURE'S APERTURE
6.77	Unclassified Structure	8	Continuous	348.36	12.19	101.8
9.33	Large Discontinuity	16	Continuous	269.8	26.1	143.62
9.48	Large Discontinuity	35	Discontinuous	99.31	24.86	0
9.95	Large Discontinuity	16	Continuous	311.81	15.46	63.69

3. Bore Pump Testing Schedule

LWC carried out low flow rate pumping tests on each of the bores using a diaphragm pump with the pump inlet and data loggers installed to the following depths:

- KPSELTI01 – pump inlet 24.22m bgl, logger depth 25.52m bgl.
- KPSELTX01– pump inlet 22.57m bgl, logger depth 23.82m bgl.

The data loggers recorded water level changes at 1 minute intervals for the period from approximately 10:00 am on the 25th March to approximately 9:00 am on the 28th March. This covered the period of initial trial testing in bore KPSELTI01 and subsequent pumping and recovery from KPSELTI01 and then KPSELTX01. Further detailed records of the field bore testing carried out were provided by LWC and these are included as Attachment B.

Data logger records were barometrically corrected by LWC and provided to WSE for aquifer testing analysis. The corrected water level records are shown on Figure 2 together with the pump testing schedule periods and manual readings as a check on the logger records.

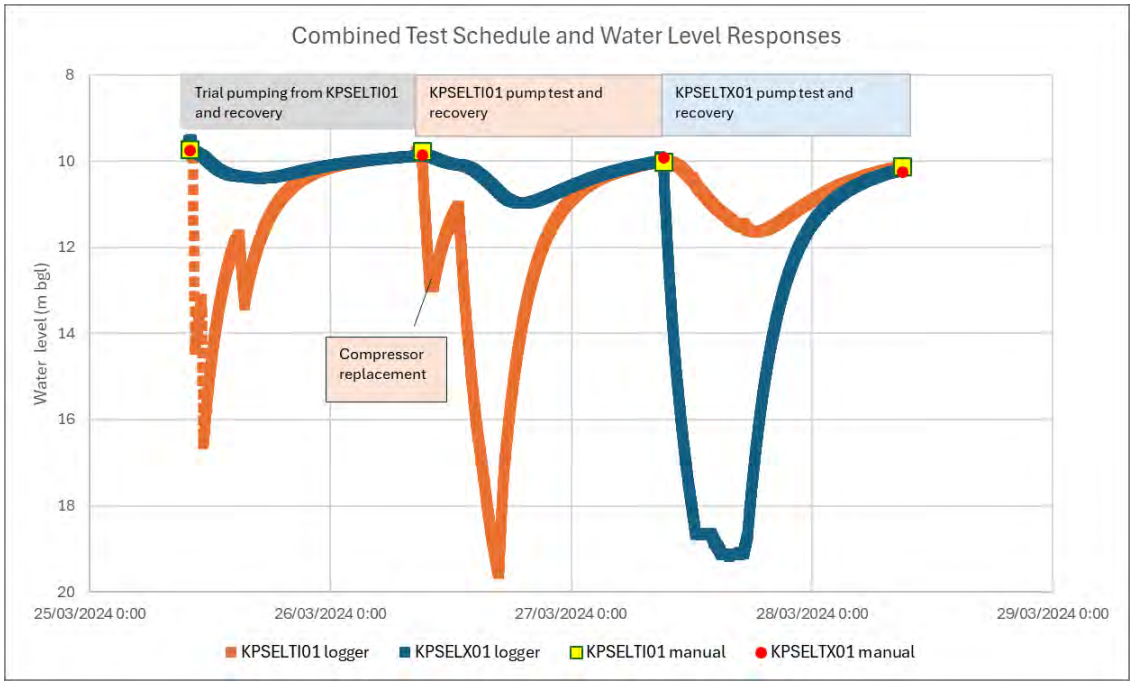

Figure 2: Combined Test Schedule and Water Level Records

The water level responses shown in Figure 2 indicate that a hydraulic response in each bore to pumping from the other bore was observed, as was a recovery response after cessation of pumping.

A summary of the pump testing is provided in Table 2 below.

Table 2: Pump Test Summary Details

Bore	Pumping time (minutes)	Average pumping rate (litres per minute)	Recovery time (minutes)	Volume removed (L)	Bore storage volume (L)	Bore volumes removed
KPSELTI01	307	0.80	982	246	180	1.4
KPSELTX01	480	0.83	962	398	157	2.5

4. Aquifer Test Analyses

The water level data for the 2 tests was reduced to drawdown and recovery responses in each bore for each of the tests. The drawdown and recovery data were analysed in Aqtesolv to provide estimates of hydraulic parameters for the formations tested.

The KPSELTI01 pump test was interrupted when a compressor replacement was required and the recovery due to the pause in pumping is included in the aquifer testing analysis as a period of no flow and recovery.

The data was analysed using the Neuman and Moench Solutions for an unconfined aquifer. Based on the lithological logs and interpretations of structures intersected in KPSELTX01, it is reasonable to assume that the oxidised and weathered rock profiles at both sites can be approximately modelled as equivalent porous media aquifer. The

aquifer thicknesses were assumed to extend from the standing groundwater level to the bottom of the slotted casing. The Moench Solution was used for the pumped bore since this equation allows for wellbore storage which is significant for these very low rate tests. The Neuman and Moench solutions were used to analyse observation bore data, depending on the best analysis match obtained in Aqtesolv.

Plots of the Aqtesolv aquifer test analysis are provided in Attachment C and the results are summarised in Table 3.

The analysis of these short term and low flow rate testing of bores KPSELTX01 and KPSELTI01 indicate the formations tested are of low average hydraulic conductivity and specific yield of 0.003 m/d and 1.7%, respectively.

5. Water Chemistry Logging

A YSI ProQ water chemistry logger was used to monitor the chemistry of the pumped groundwater at 10 second intervals. The parameters monitored are shown on the graph sets included in Attachment D.

The results show that:

- KPSELTI01 – Figure 3 shows a graph of water level with the specific conductivity of the pumped water. This shows a decrease during pumping from an initial value of ~17 mS/cm to 15 mS/cm then back up to 16 mS/cm. Similar trends can be seen in the measured pH (increase then decrease) and ORP (decrease then increase). The initial trend correlates to the interval 10 – 15m bgl which, from the bore log, appears to be the more oxidised and gossanous interval. The second trend correlates with water being drawn from the interval 15 – 20m bgl which correlates with the underlying grey fine grained sandstone.
- KPSELTXI01 – Figure 4 shows a graph of water level with the specific conductivity of the pumped water. This shows a stable conductivity at ~13 mS/cm which then increases abruptly to ~14.3 mS/cm when the pumping water level is drawn down to ~19.2m bgl. The bore log indicates the weathered siltstone / sandstone boundary is at 21m bgl. The ORP and DO records tend to show overall decreasing and increasing trends, respectively with some step changes at later stages of pumping when the water level is relatively stable at ~19.2m bgl.

The significance of the observed water quality trends for ISR operations are not discussed further in this report, however the logging of water quality parameters is useful to identify if any major changes in water chemistry can be attributed to specific geological intervals. It is recommended that this data be collected during any future pump testing.

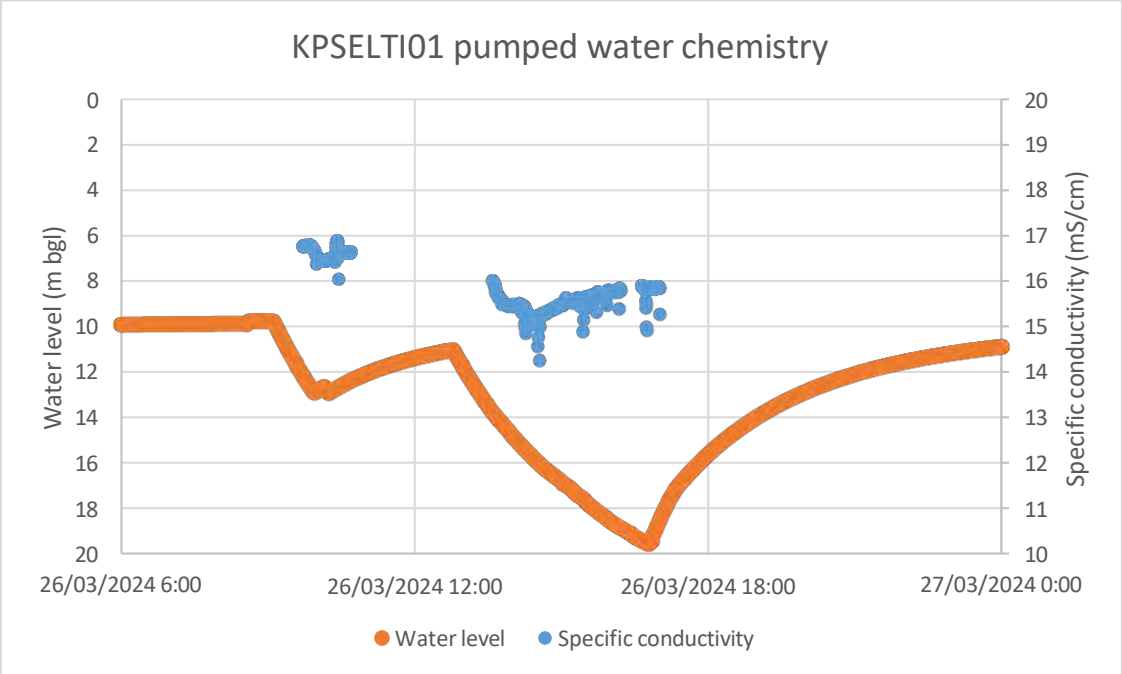

Figure 3: KPSELTI01 Pumping Water Level and Specific Conductivity

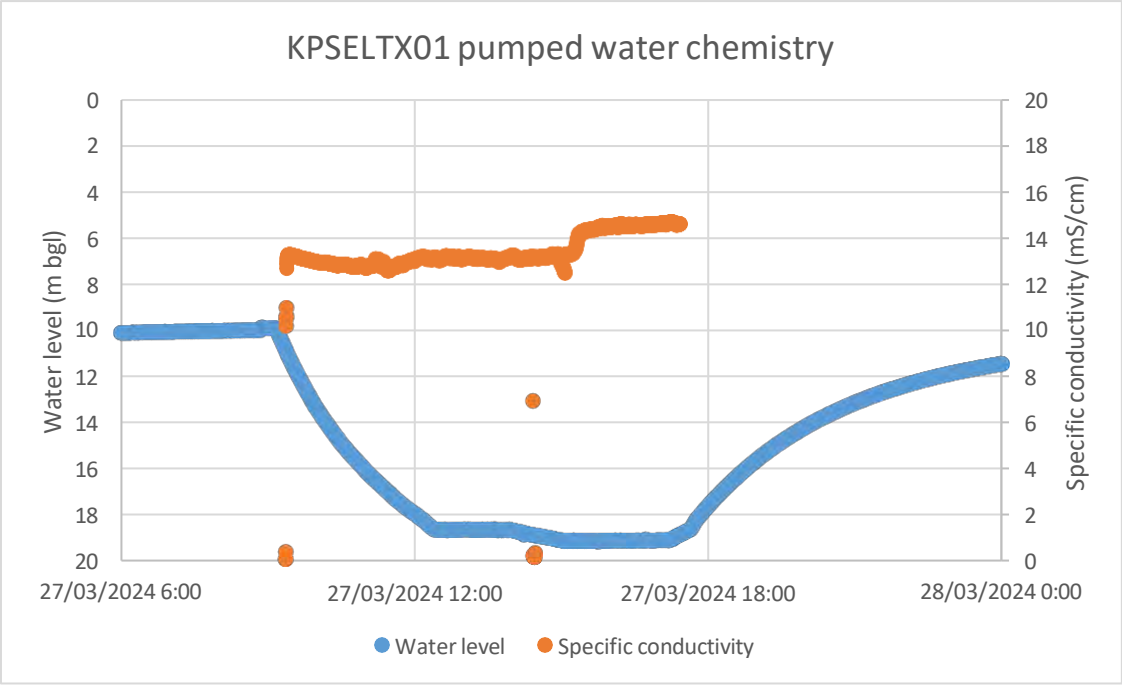

Figure 4: KPSELTX01 Pumping Water Level and Specific Conductivity

6. Closing

WSE appreciates the opportunity to provide this report, and if any further information is required, please contact me directly.

Yours Sincerely

Nick Watkins
Principal

WatSec Environmental
Consulting in the water and environmental industries

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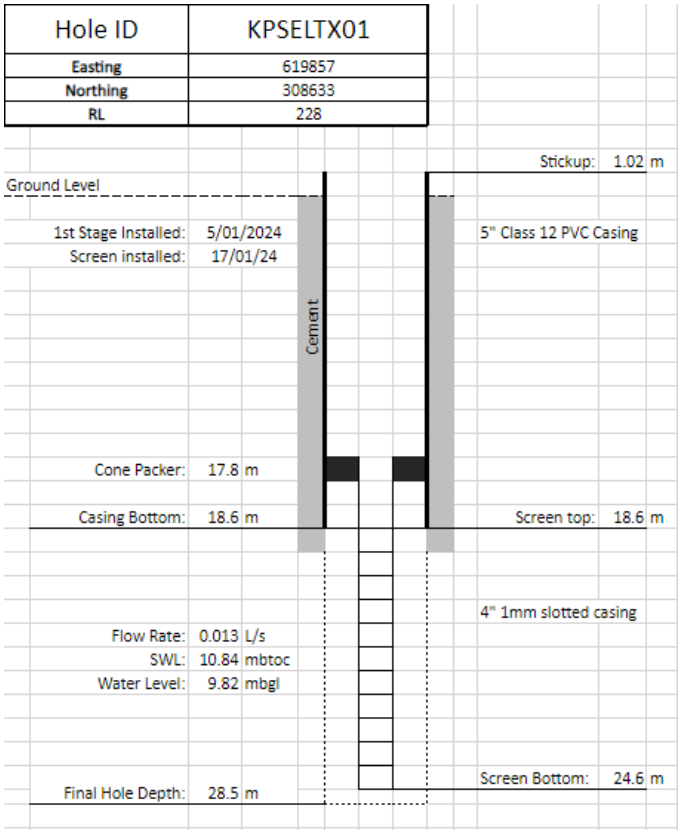
E: nick@watsecenv.com.au

Table 3: Results of Aquifer Test Analyses

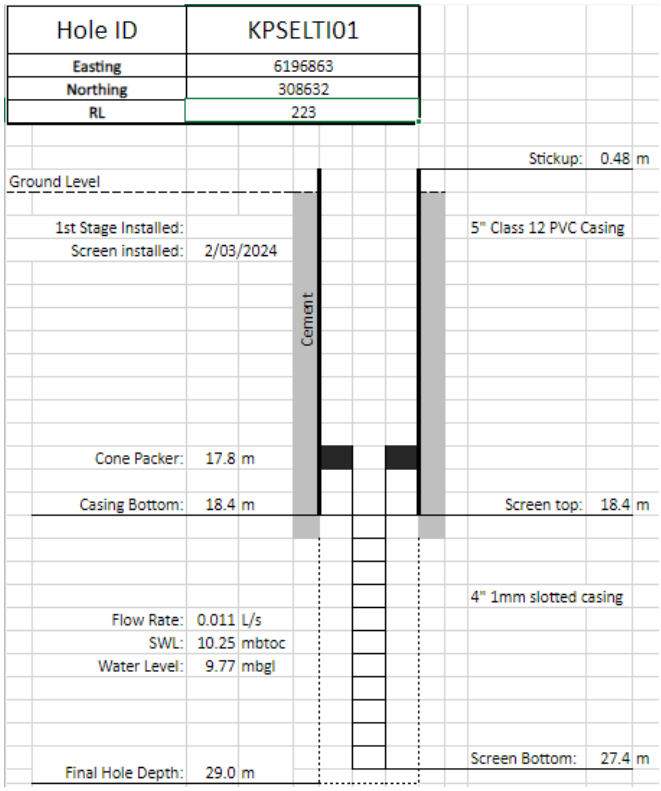
Pumped bore	Observation bore	Aquifer thickness (m)[1]	Analytical solution	Transmissivity (m^2/d)	Hydraulic conductivity (m/d)	Storage co-efficient (-)	Specific yield (%)	Kv/Kh[2]
KPSELTI01	KPSELTI01	18	Moench	0.050	0.003	0.00023	1.7	0.26
	KPSELTX01	15	Moench	0.061	0.004	0.00010	2.0	0.26
KPSELTX01	KPSELTI01	18	Neuman	0.042	0.002	0.00041	1.6	0.30
	KPSELTX01	15	Moench	0.057	0.004	0.00054	1.6	0.23
Average of all results				**0.053**	**0.003**	**0.00032**	**1.7**	**0.26**

[1] Aquifer thickness assumed to be from water table to base of slotted casing
[2] Ratio of vertical to horizontal hydraulic conductivity

Attachment A – Bore Constructions and Lithological Logs



Topsoil 1-3m, 3-9.5m fine grained sandstone, 9.5-10.5m quartz vein, 10.5-21m weathered siltstone to kaolin, 21-28.5 very fined grained sandstone with sulphides (approx 2%)



Stratigraphy notes for KPSELTI01
0-6.5m Oxidised, Fe rich, poorly consolidated materials with abundant clays.
6.5-9m Fe rich, dark red-maroon fine-grained sandstones with minor kaolinization. Minor quartz veining and Cu oxides including chalcocite.
9-14m Significant quartz veining and Fe rich mineralisation. Minor Cu oxides (malachite). Pink to maroon fine-grained sandstone, transitioning to grey fine-grained sandstone.
14-15.5m Yellow, fine grained sandstone with minor sulphide mineralisation, minor quartz and some gossanous (Fe) mineralisation.
15.5-20m Grey, fine-grained sandstones hosting abundant sulphide mineralisation and white/pink kaolin clays. Some oxidised Cu noted.
20-21m Grey, fine grained sandstones. Abundant quartz, minor red kaolin and Cu oxides. Abundant sulphides.
21-26m Dark grey, fine-grained sandstone with minor oxides. Abundant sulphides and quartz. Minor red kaolin.
26-29m Dark grey, fine-grained sandstone with abundant sulphides including minor chalcocite. Some quartz.

Attachment B - LWC Field Pump Testing Records

Monday 25/3/24

- The first day was used to trial pump setup and set up data loggers in preparation for 8 hour pump tests on following days.
- Loggers were installed in each well and logged water level every minute until 28/3/24 at 9:10 am when they were removed.
- Initially used a diaphragm pump in KPSELTI01. Installed at top of screen at approximately 17.2 m as it is too large to fit in the 100 mm screened section.
- KPSELTI01 was first trial tested with diaphragm pump on 25/3/24 at 10:19 am. Pump depth 17.2m, flow rate 3.9 L/min. Water level was notably reduced. Switched off after 15 mins at 10:34.
- Restarted the pump at 11:11, water level was reduced to the level of the pump at 11:21 and the pump was switched off.
- Due to the slow recharge and not being able to install the pump deeper into the well we opted for a large capacity low flow pump instead.
- Low flow pump tested at 2:57 pm for 30 mins. Flow rate of 0.8 L/min. Water level dropped from 12.28 to 13.785 over this period.

Tuesday 26/3/24

- Began pump test of KPSELTI01 at 9:08 am. Flow rate of 0.8 L/Min. Compressor stopped working at approx. 10 am and I had to get a replacement from town.
- Restarted pump test at 12:48. Ran for 4hrs at 0.8 L/min. Stopped pumping at 4:48.
- Total volume pumped from this well approximately 300L (Visual estimate from IBC).

Wednesday 27/3/24

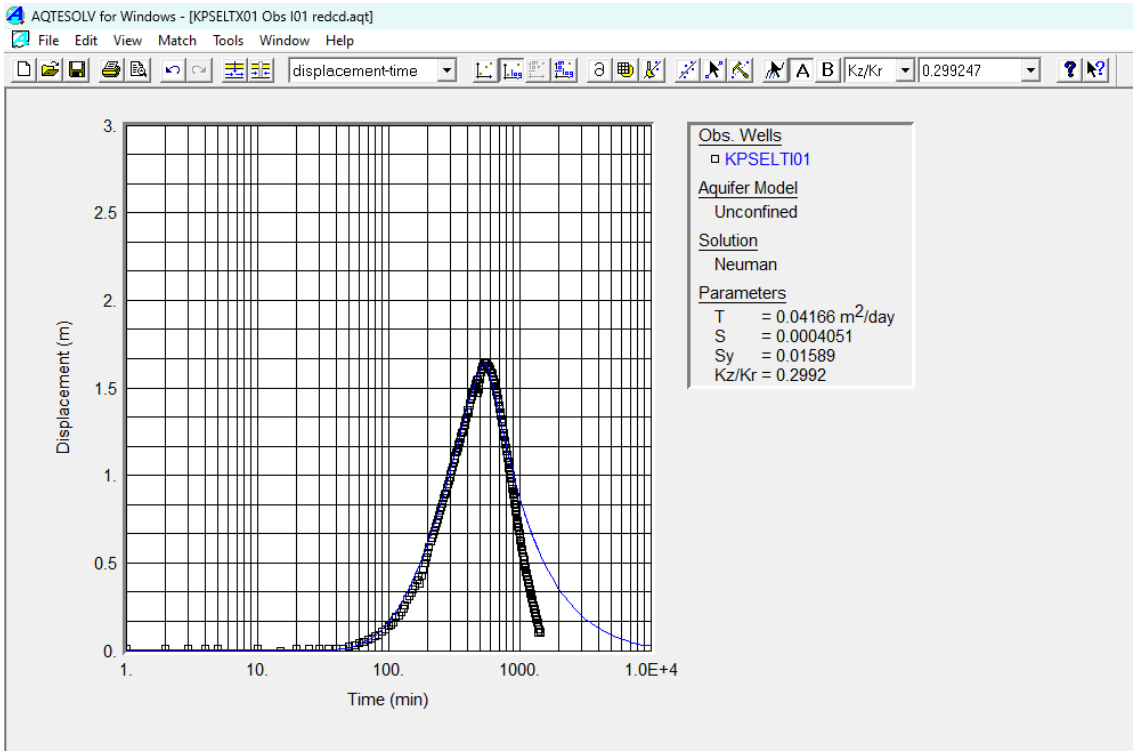
- Loggers removed from wells for data download at 9am. Replaced immediately after.
- Began pump test of KPSELTX01 at 9:10 am. Flow rate 0.89 L/min. Flow rate dropped to 0.63 L/min after 360mins, then 0.66L/min from 400 mins until 480 mins (end of pumping)
- Pump stopped after 8 hours at 5:10 pm.
- Total volume pumped from this well approximately 350L (visual estimate from IBC).

Thursday 28/3/24

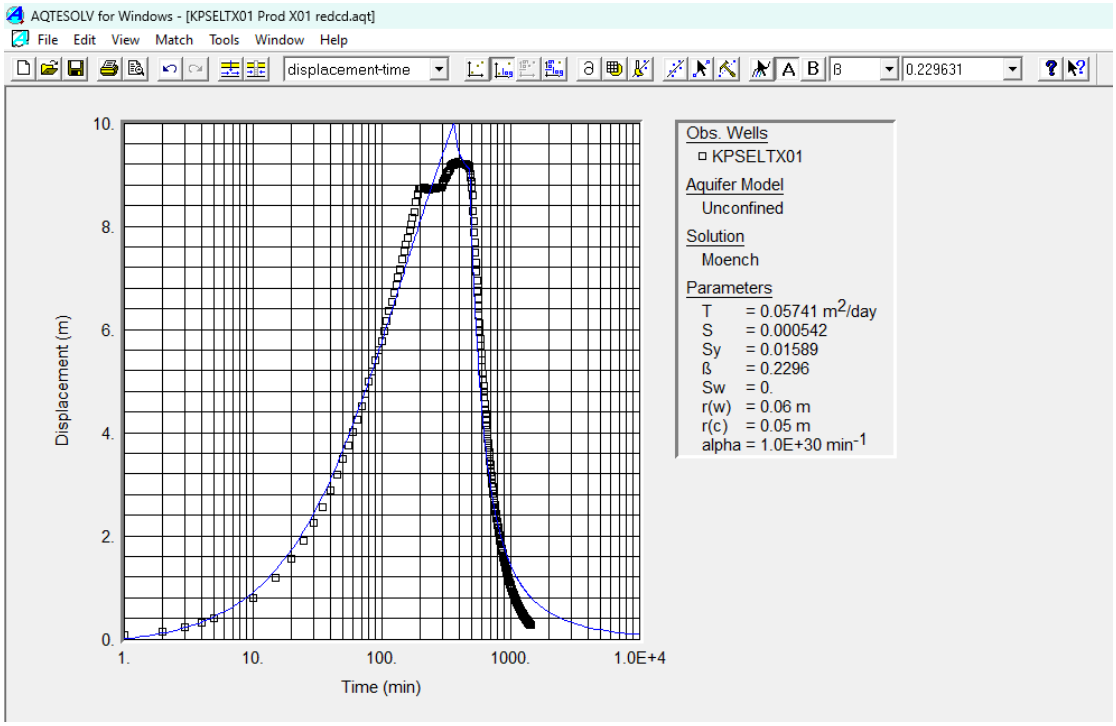
- Loggers removed from wells at 9:10 am and final manual water levels taken.

Attachment C – Aqtesolv Pump Test Analyses

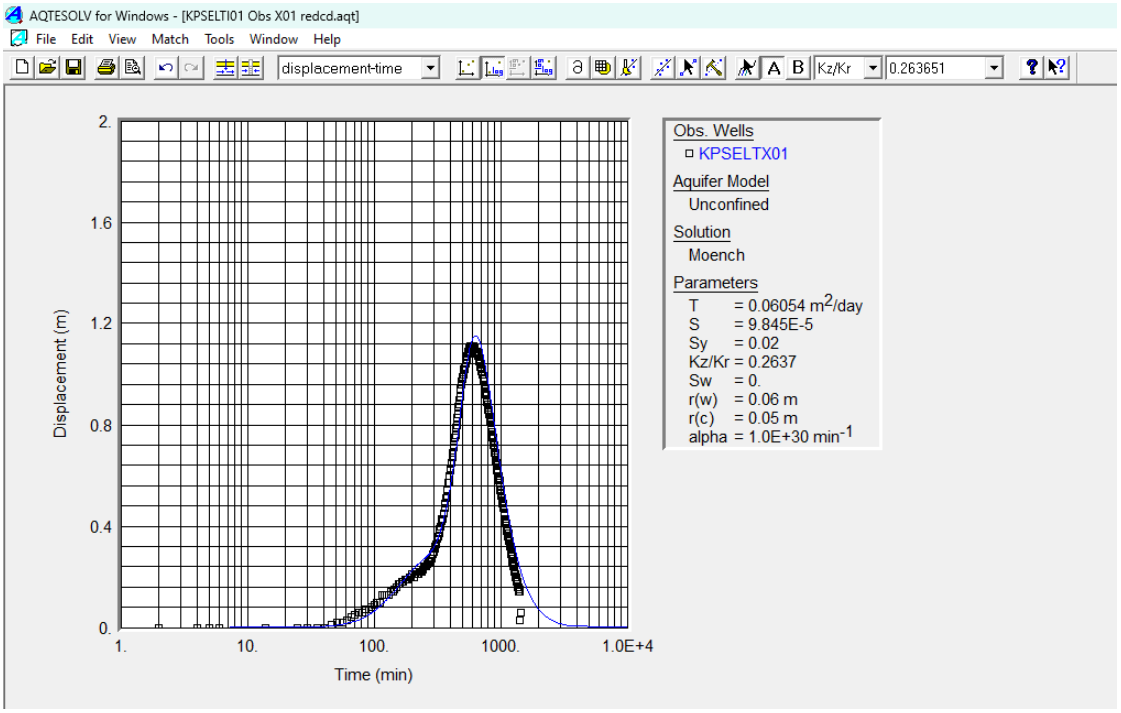
Pumped well KPSELTX01
Observation well KPSELTI01



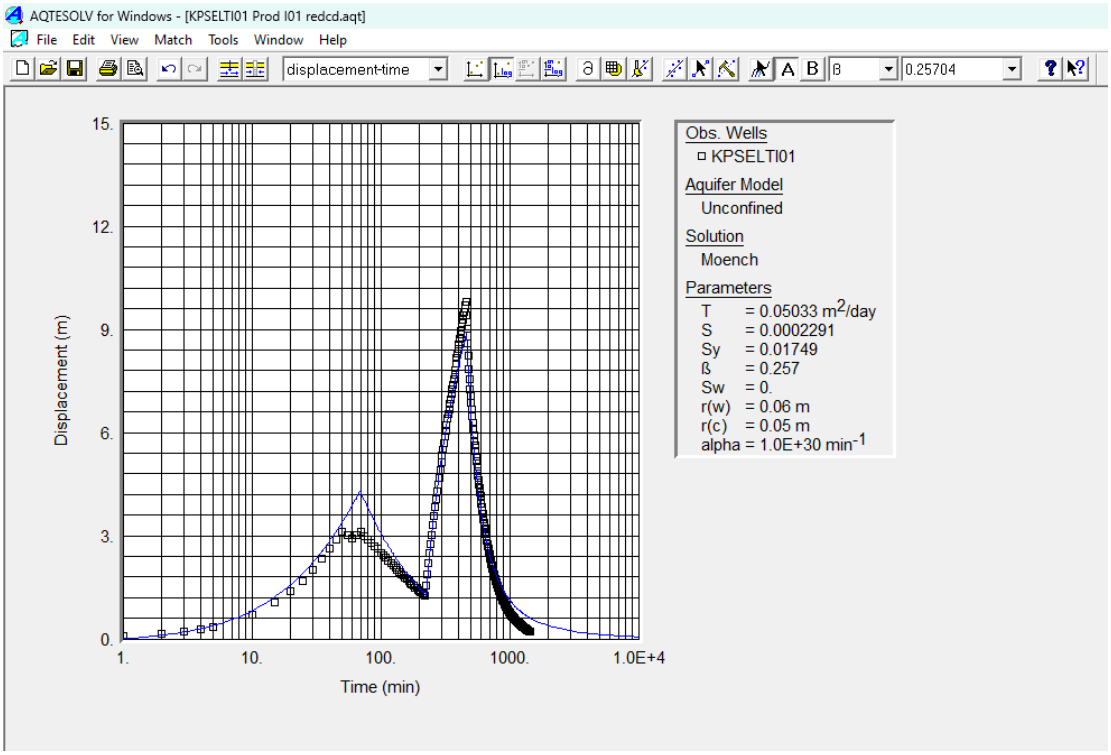
Pumped well KPSELTX01
Observation well KPSELTX01



Pumped well KPSELTI01
Observation well KPSELTX01

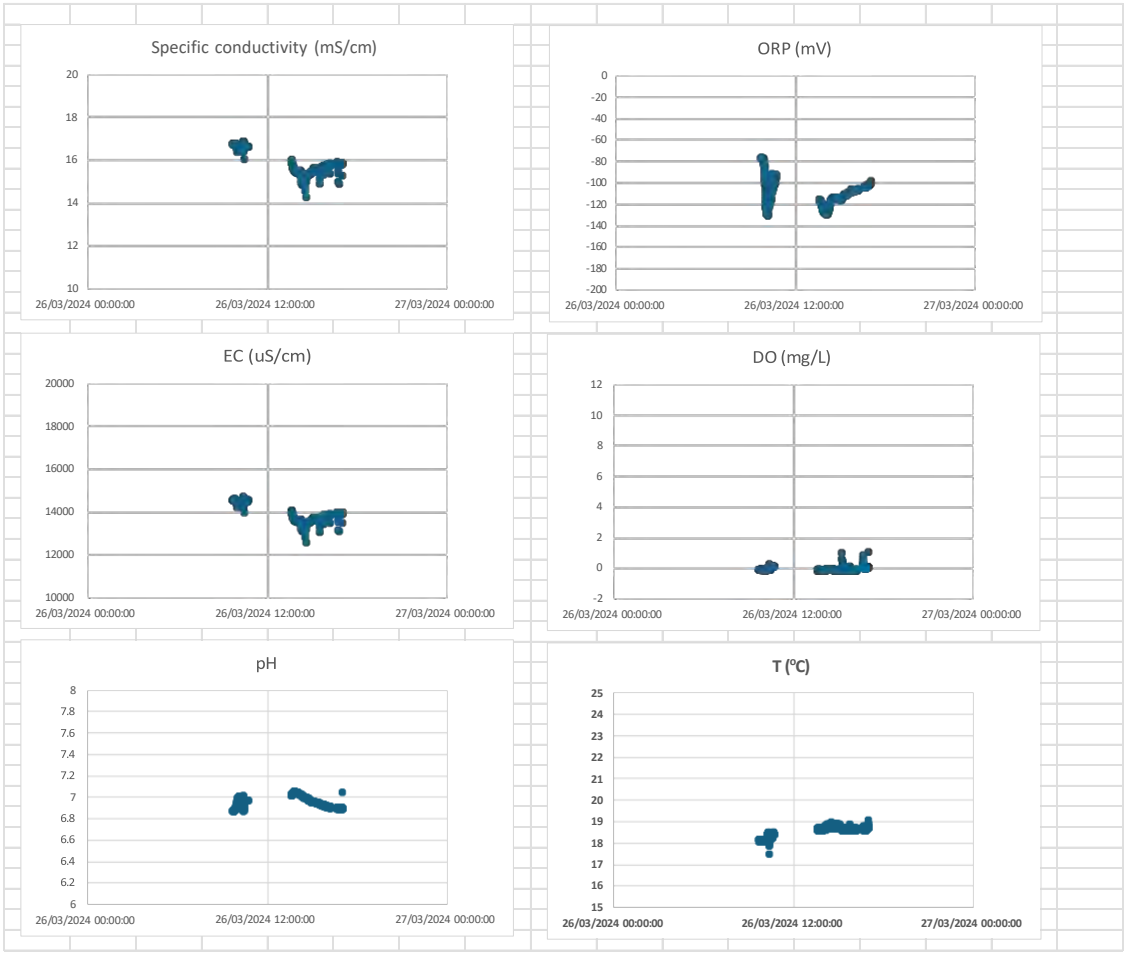


Pumped well KPSELTI01
Observation well KPSELTI01

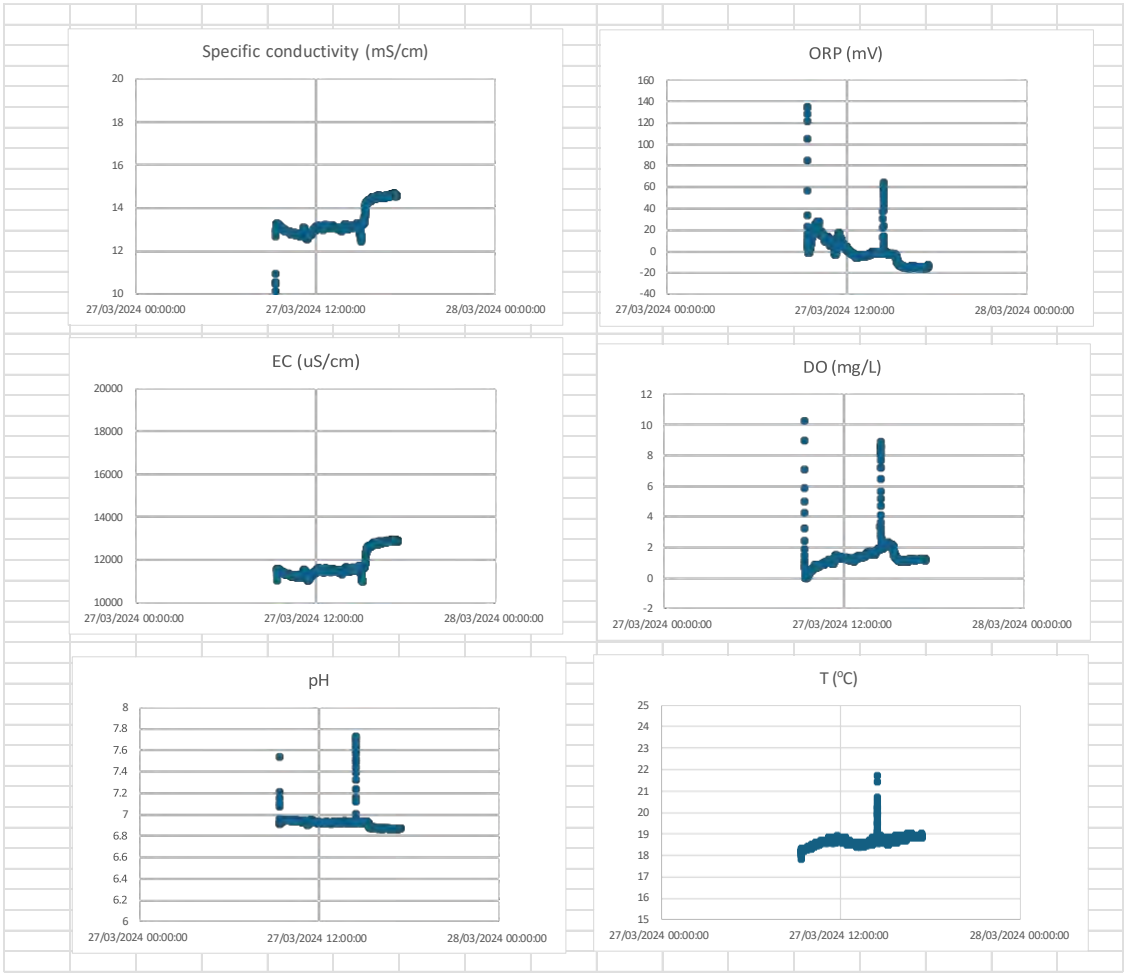


Attachment D – Water Chemistry Logs

KPSELTI01 Water Chemistry Log



KPSELTX01 Water Chemistry Log



ATTACHMENT B

Statement of Limitations

STATEMENT OF LIMITATIONS & IMPORTANT INFORMATION REGARDING YOUR REPORT

INTRODUCTION

This report has been prepared by Land & Water Consulting for you, as Land & Water Consulting's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Land & Water Consulting may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Land & Water Consulting has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

No warranty or guarantee of the site conditions is intended.

This report was prepared for the sole use of you, the Client and may not contain sufficient information for purposes of other parties or for other uses. Any reliance on this report by third parties shall be at such parties sole risk. This report shall only be presented in full and may not be used to support any other objectives than those set out in the report, except where written approval with comments are provided by Land & Water Consulting.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

LIMITATIONS OF THE REPORT

The scope of works undertaken and the report prepared to complete the assessment was in accordance with the information provided by the client and the specifications for works required under the contract. As such, works undertaken and statements made are based on those specifications (such as levels of risks and significance of any contamination) and should be considered and interpreted within this context. The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

Your environmental report should not be used without reference to Land & Water Consulting in the first instance:

- When the nature of the proposed development is changed, for example if a residential development is proposed instead of a commercial one;
- When the size or configuration of the proposed development is altered;
- When the location or orientation of the proposed structures are modified;
- When there is a change in ownership;
- For application to an adjacent site.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

ENVIRONMENTAL ASSESSMENT "FINDINGS" ARE PROFESSIONAL ESTIMATES

The information in this report is considered to be accurate with respect to conditions encountered at the site at the time of investigation and considering the inherent limitations associated with extrapolating information from a sample set. Note however that site assessment identifies actual subsurface conditions only at those specific points where samples are taken, when they are taken. Environmental data derived through sampling and analysis are interpreted by consultants who then render an opinion about overall subsurface conditions, the nature and extent of contamination and potential impacts on the use of the land. Actual conditions may differ from those inferred to exist as no professional and no subsurface assessment program can reveal every detail within the ground across a site. Subsurface conditions can vary across a particular site and no practical degree of sampling can ever eliminate the possibility that conditions may be present at a site that have not been represented though sampling.

SUBSURFACE CONDITIONS CAN CHANGE

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Land & Water Consulting should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions. Since subsurface conditions (including contamination concentrations) can change within a limited period of time and space, this inherent limitation to the representation of site conditions provided by this report should always be taken into consideration particularly if the report is used after a delay in time.

DATA SHOULD NOT BE SEPARATED FROM THE REPORT

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

RESPONSIBILITY

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

18 October 2024 Reference: NJ-08

Matt Swann
Geologist
Environmental Copper Recovery SA Pty Ltd
Adelaide South Australia 5000

RE: Hydrogeological Injection Testing to support the Kapunda Copper ISR Project, Kapunda, South Australia

Dear Matt,

Land & Water Consulting (LWC) is pleased to present Environmental Copper Recovery SA Pty Ltd (Enviro Copper) with the findings of the hydrogeological injection testing at Site B in Kapunda, South Australia completed in August 2024.

Please find attached the outcomes of the investigation (Attachment A).

A summary of the field program data and observations is provided in Attachment B and Certified Analytical Laboratory Reports are provided in Attachment C.

LWC's statement of limitations associated with this report provided in Attachment D.

If you have any questions regarding the above information, please don't hesitate to call the undersigned.

Yours sincerely,

Emily Picken | Principal Hydrogeologist

Land & Water Consulting

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epicken@lwconsulting.com.au

Dr James Fox | Principal Geochemist

Land & Water Consulting

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ATTACHMENTS

Attachment A	Enviro Copper Kapunda ISR Project Bromide Solution Injection Testing of Bore KPSELTX01
Attachment B	Statement of Limitations

ATTACHMENT A

Enviro Copper Kapunda ISR Project Bromide Solution Injection Testing of Bore KPSELTX01

15th October 2024

Levi Wilkins
Senior Environmental Geoscientist
Land & Water Consulting (LWC)

Enviro Copper Kapunda ISR Project
Bromide Solution Injection Testing of Bore KPSELTX01

1. Introduction

This report documents the Bromide solution injection testing and analysis of data at bore site KPSELTX01. The following data was obtained during the injection testing:

- Bore KPSELTX01 – logger data of water levels and recording of Br solution injection events.
- KPSELTI01, I02, I03 and I04 - logger data of water levels and regular sampling for laboratory analysis of Br concentration during the injection testing.
- A water chemistry logger was also installed in bore KPSELTI03.

The locations of the bores are shown by the red arrow (injection) and blue arrows (extraction and monitoring) on Figure 1. The bores are located on flat ground at approximately the same elevation with the 4 monitoring bores arranged in a rectangular pattern and located at distances between 6.4m and 8.9m from KPSELTX01.

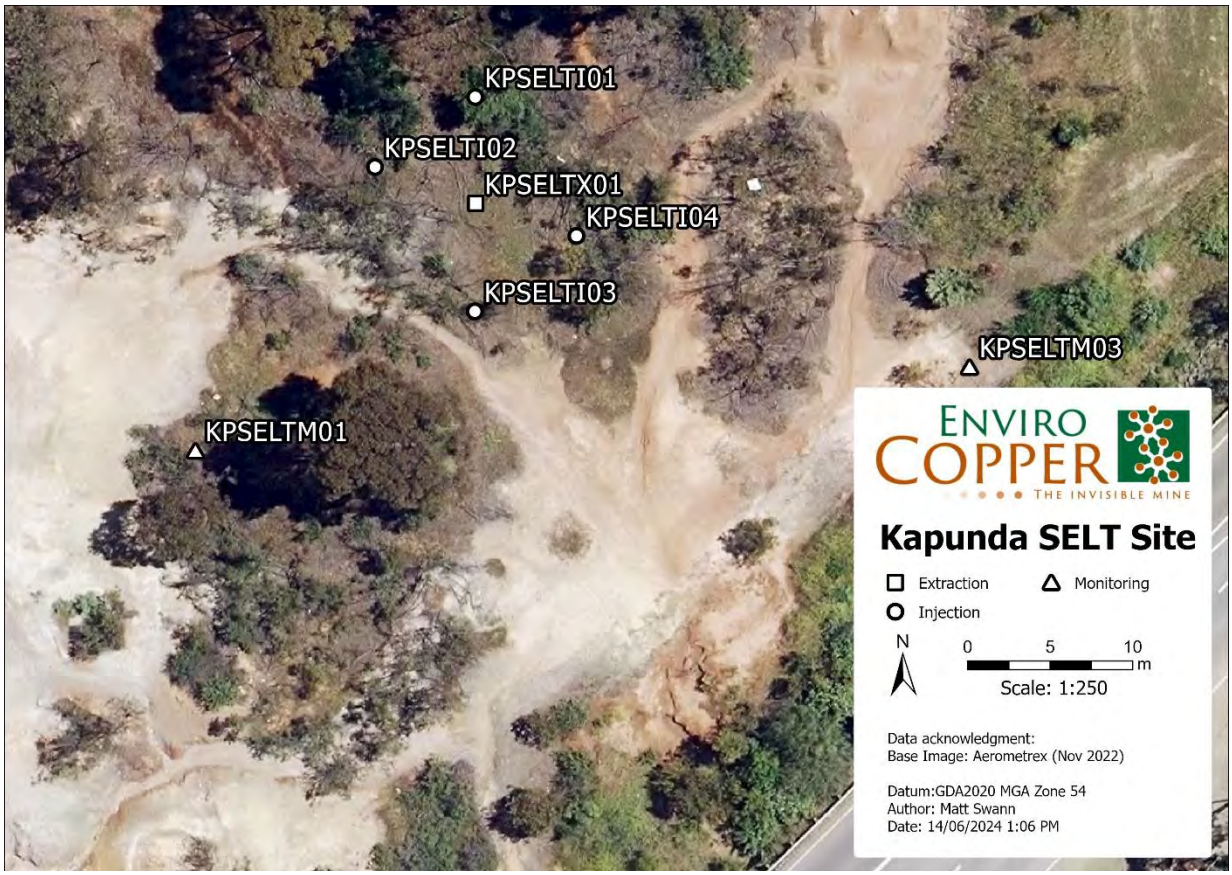


Figure 1: Bore Location Plan (after Enviro Copper)

2. Previous pump testing results

The results of a pump testing trial on bores KPSELX01 and KPSELTI01 undertaken in March 2024 and reported in WSE (2024)[1] found that:

- The geological formations tested are of low average hydraulic conductivity and specific yield of 0.003 m/d and 1.7%, respectively.
- A hydraulic response in each bore to pumping from the other bore was observed, as was a recovery response after cessation of pumping.
- Some geological structures could provide a pathway for hydraulic connection between the bores.

The data provided for that study also indicated that the groundwater levels at the site are likely to be within a weathered zone at ~9m bgl comprising oxidised and kaolinised rock with quartz veining and Cu-oxide / sulphide mineralisation.

3. Injection testing of KPSELTX01

Data logger records of water levels in each of the bores were corrected using the regular manual readings taken during the injection testing where required (refer to Appendix for graphs) and were also corrected by LWC for barometric pressure where required for non-vented loggers. The corrected bore water levels plotted to AHD are presented on Figure 2 and show that the pre-test water levels were at ~ 206 mAHD with very little variation between them indicating no significant hydraulic gradients existed between the bores prior to injection testing. Note the x-axis on this graph shows time in minutes relative to the start of injection testing.

All field work associated with the injection testing and extraction sampling was undertaken by LWC with the data provided to WSE for analysis and reporting. Full details of the field investigations are to be reported by LWC and a summary of the work is provided below:

- KPSELTX01 – injection of ~500 litres of NaBr solution in 3 separate events between 9:15 am and 4:30 pm on 8th August 2024. Laboratory analyses show the injectate has a Br concentration of between 2,400 and 2,500 mg/L. The injection events are indicated by the water level increases logged on Figure 2. The subsequent recovery water level following the injection cycles is also evident from the logged water levels.
- KPSELTI01, I02, I03 and I04 – continuously sampled with low flow pumps during the injection testing and regular sampling for laboratory analysis of Br concentration. The extraction from these bores is indicated by the drop in logged water levels and subsequent recovery after extraction ceases. Extraction rates varied between 0.3 and 0.5 L/minute.
- KPSELTI03 – the specific conductivity measured in this bore is also shown on Figure 2. The logger data indicates an increase in SC of ~3,200 ECU approximately 4 hours after the injection testing.

[1] WatSec Environmental (2024). Enviro Copper Kapunda ISR Project. Analysis of Pump Testing of Bores KPSELTX01 and KPSELTI01. Letter report to Land & Water Consulting, April 2024.

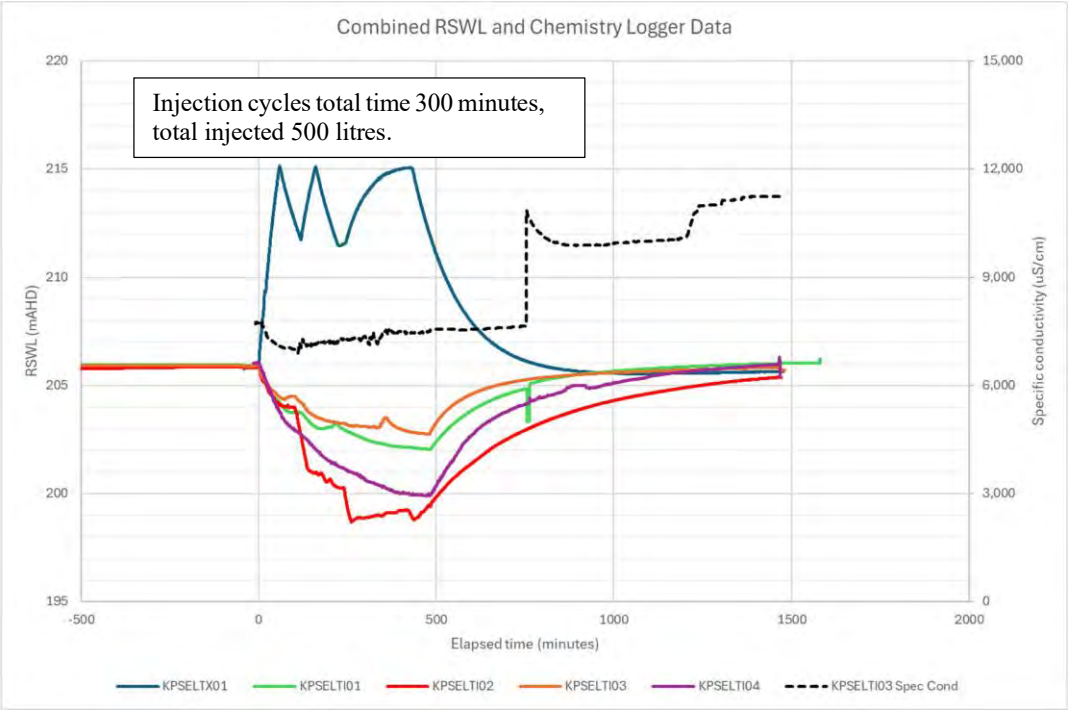


Figure 2: Combined RSWL and chemistry logger data

4. Water level and chemistry comparisons

Comparison graphs of the logged bore water levels, laboratory Br concentrations and field EC readings are presented in Figure 3 and Figure 4 from the start of the injection testing.

The Br concentration results indicate:

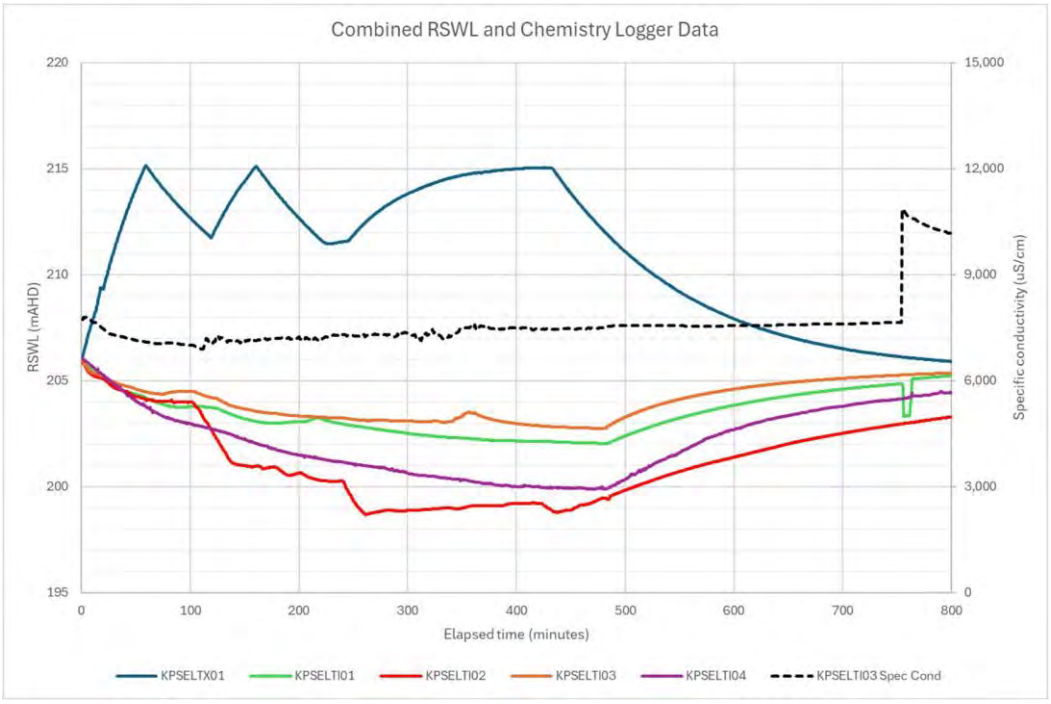
- KPSELTI01 records an initial high Br concentration of 280 mg/L which then dissipates. This result may be erroneous[2] as it is measured prior to any significant injection head build-up in KPSELTX01 for the first injection event. Elevated Br concentrations of ~9 mg/L are recorded at 4-4.5 hours into injection. The Br concentration reduces after this.
- The KPSELTI03 results show elevated Br concentrations throughout the injection testing which decline in the later stages.
- The Br concentration results from KPSELTI02 and KPSELTI04 do not show any significant trends.

The field EC measurements indicate:

- KPSELTI01 shows a significant early increase of ~3,000 EC (an approximate TDS increase of ~2,000 mg/L).
- KPSELTI02 also shows an EC increase of ~3,000 EC during the injection testing but the increase is less rapid than for KPSELTI01.

[2] This observation is supported by LWC staff and could be a result of early cross-contamination of the sample following the high concentration tracer sampling.

- KPSELTI03 does not show a significant EC increase during the injection testing and this is also reflected in the logger EC data. There is a slight increase of 300-400 EC during the latter stages of the injection period. LWC staff have advised that the sudden increase in logger EC at around 750 minutes on Figure 2 is due to the logger being disturbed and changing depth.
- KPSELTI04 shows an overall increase of ~1,500 EC.
- Field observations of LWC staff indicated that the turbidity of sampled groundwater increased over time with much higher turbidity levels from wells KPSELTI02 and KPSELTI04. This could also be contributing to the increase in measured EC from these wells.
- The initial tracer solution reported ~6,000 EC, which is generally close to or lower than the EC observed in the groundwater.



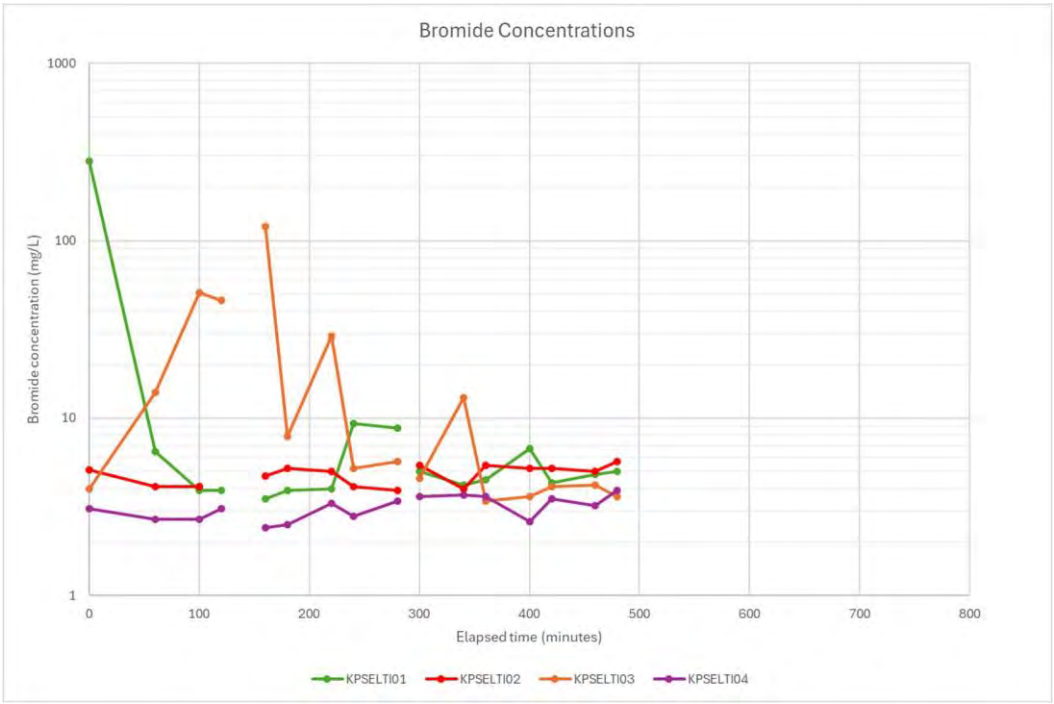
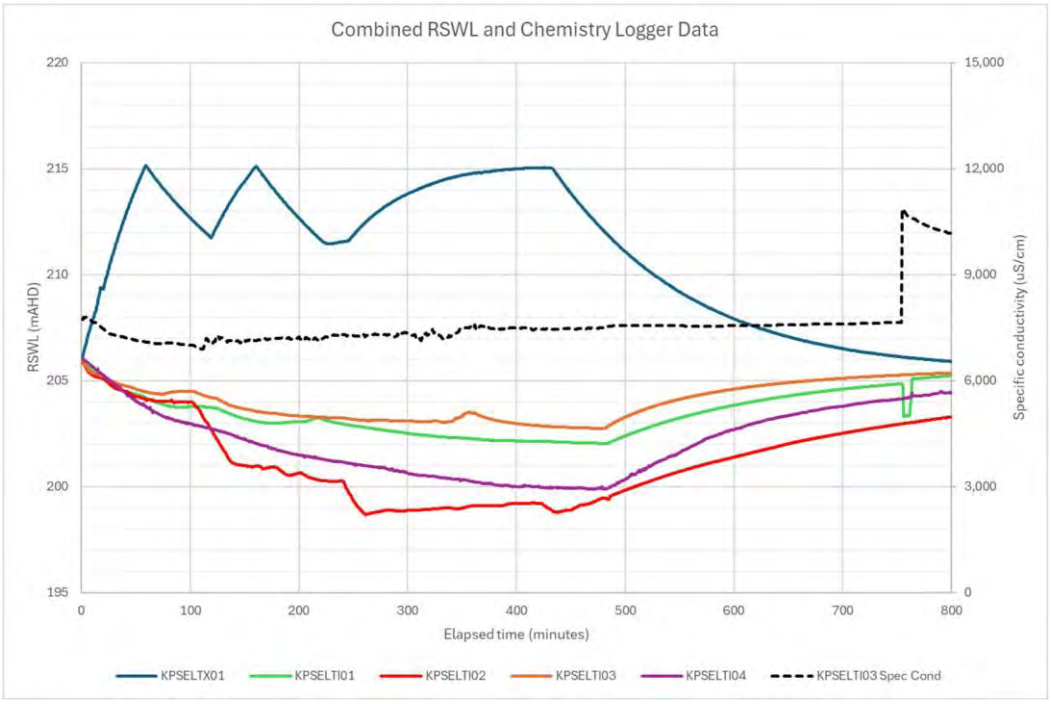


Figure 3: Water level and Br concentration comparisons



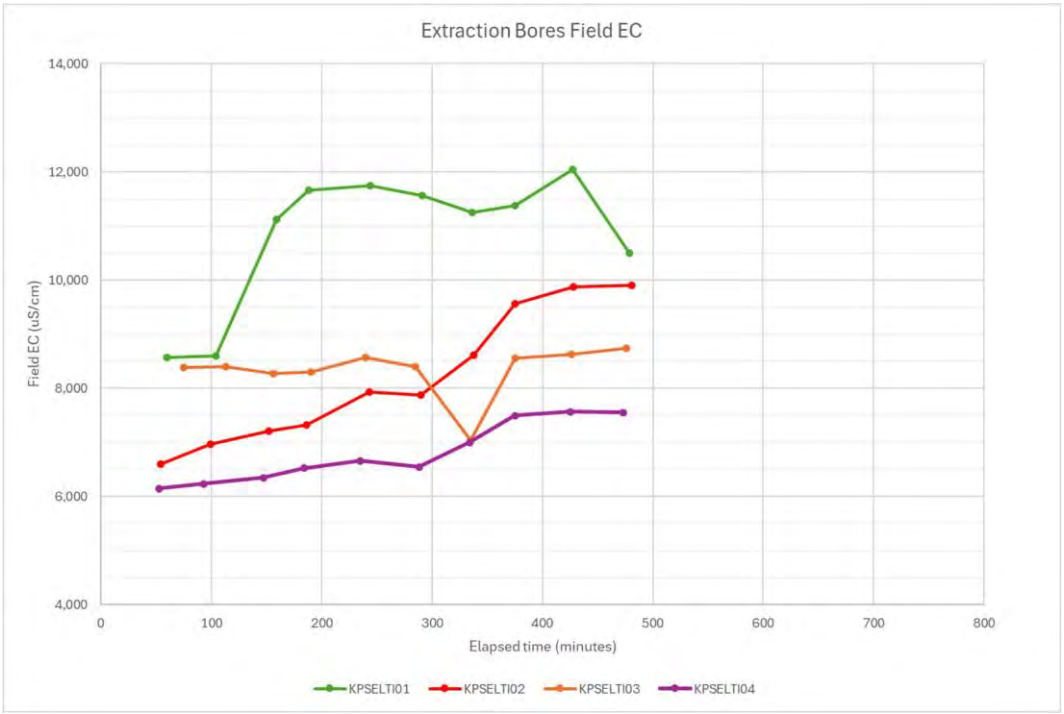


Figure 4: Water level and field EC comparisons

5. Closing

Based on the field and laboratory data provided for this study it is inferred that the hydraulic connection between the monitoring bores to the injection bore KPSELTX01 can be summarised as follows:

- KPSELT01 – likely good connection indicated by the field EC data although the Br concentration data is ambiguous. The previous pump testing results reported in WSE (2024) indicated the bores are hydraulically connected.
- KPSELTI02 – possible connection indicated by the field EC data although this is not supported by the Br concentration data.
- KPSELTI03 – likely connection indicated by the Br concentration data but this is not strongly supported by the field EC data. The EC logger record shows an EC increase of ~3,000 EC some 4.5 hours after completion of the injection cycles. This data implies a lagged response to the injection cycles which may be the result of a lower degree of connection with this bore relative to the other bores.
- KPSELTI04 - possible connection indicated by the field EC data although this is not supported by the Br concentration data.

Although there are some inconsistencies in the data sets there appears to be an overall hydraulic connectivity across the area of the injection trial. The relative degree of hydraulic connection with KPSELTX01 appears to increase from south to north i.e. higher in the direction of bore KPSELTI01 and lower in the direction of KPSELTI03.

The data inconsistencies and apparent variations in hydraulic connection, as well as the lack of Br hits from wells KPSELTI02 and KPSELTI04 support a follow-up pump testing program. This is recommended to comprise pumping from the central well and monitoring the 4 surrounding wells to confirm hydraulic connectivity in the various directions. A pumping time of up to 8 hours may be required. This information would provide additional confidence on variations in hydraulic connectivity across the site and on the injection capabilities for each specific well.

WSE appreciates the opportunity to provide this report, and if any further information is required, please contact me directly.

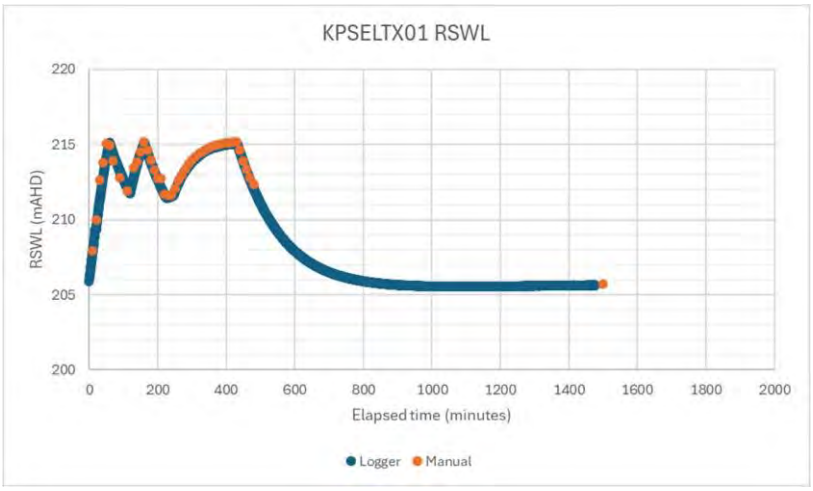
Yours Sincerely

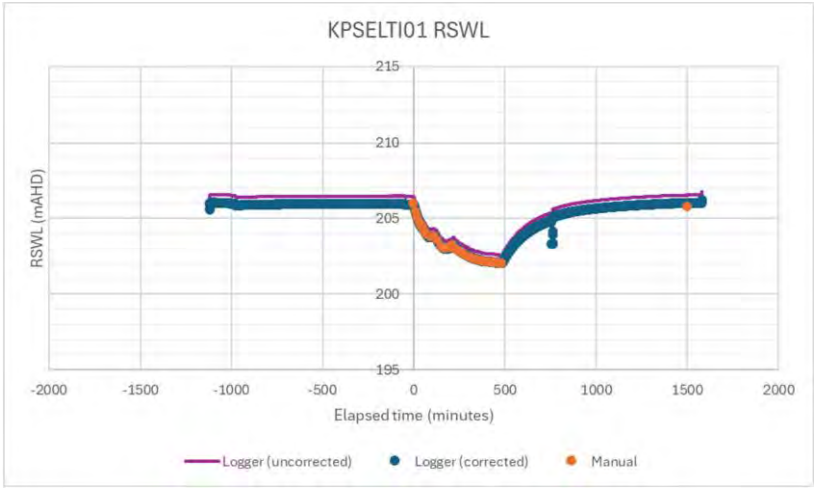
Nick Watkins
Principal

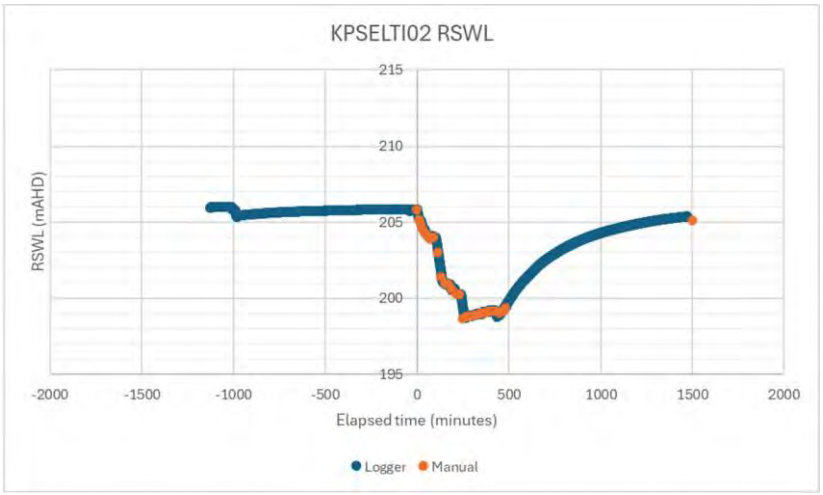
WatSec Environmental
Consulting in the water and environmental industries

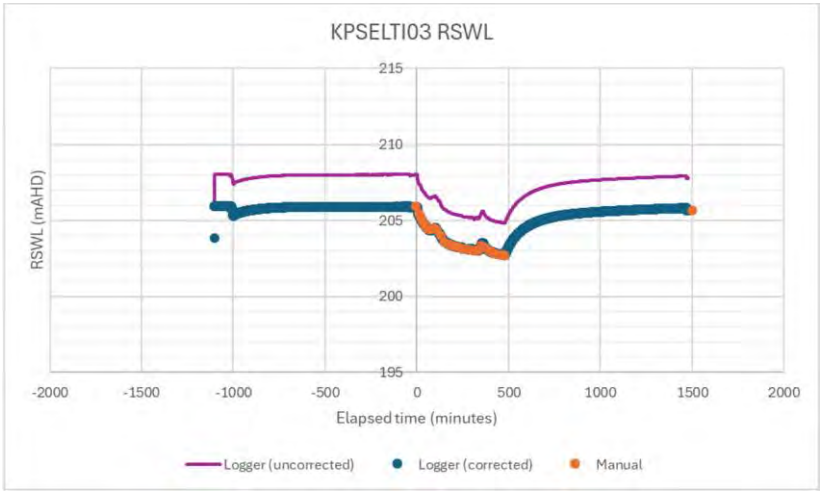
P: 0417 858 053
E: nick@watsecenv.com.au

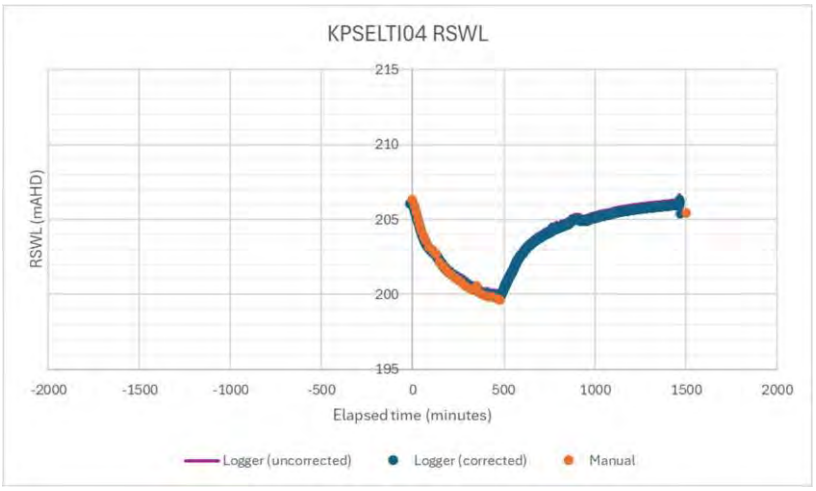
APPENDIX: Corrected Logger RSWL Records








KPSELTI03 RSWL
RSWL (mAHD)
215
210
205
200
195
-2000
-1500
-1000
-500
0
500
1000
1500
2000
Elapsed time (minutes)
Logger (uncorrected)
Logger (corrected)
Manual


KPSELTI04 RSWL
RSWL (mAHD)
215
210
205
200
195
-2000
-1500
-1000
-500
0
500
1000
1500
2000
Elapsed time (minutes)
Logger (uncorrected)
Logger (corrected)
Manual

ATTACHMENT B

Field Program Summary

Well construction information		Injection Test										
Bore ID	Purpose	Logger installation time 7/8/24	SWL (mBRP) 7/8/24	Logger Depth below water at install time (m)	Logger install depth (mBRP)	SWL Time	SWL at start of Test (mBRP) 8/8/24	Time	SWL after test (m(BRP) 9/8/24	Time	Pump type	Notes
KPSELTX01	Extraction	14:56	11.26	5.565	16.825	7/08/2024 14:54	11.275	8/08/2024 9:09	11.519	9/08/2024 10:15	N/A	
KPSELTI01	Injection	14:34	10.613	14.298	24.911	7/08/2024 14:31	10.715	8/08/2024 9:10	10.925	9/08/2024 10:15	Proactive Supertwister 12V	
KPSELTI02	Injection	14:25	11.625	12.944	24.569	7/08/2024 14:19	11.754	8/08/2024 9:11	12.494	9/08/2024 10:15	Proactive Megamonsoon 12V	
KPSELTI03	Injection	14:50	11.431	6.247	17.678	7/08/2024 14:48	11.455	8/08/2024 9:12	11.756	9/08/2024 10:15	Geotech SS Geosub	Additional Conductivity Logger installed at 9:06AM 8/8/24
KPSELTI04	Injection	14:43	11.15	11.28	22.43	7/08/2024 14:41	11.314	8/08/2024 9:08	12.183	9/08/2024 10:15	Micropurge Low Flow	
KPSELTM01	Monitoring											
KPSELTM03	Monitoring											

KPSELTX01											
Manual Water Levels				Field Parameters							
Time	Manual SWL (mBRP)	Tracer QAQC sampling intervals	Notes/ Comments	Time	pH	Conductivity (µS/cm)	Redox (mV)	Temp (°C)	Dissolved Oxygen (ppm)	Appearance	Observations
8/08/2024 9:09	11.275	9:15	with Sodium Bromide. 6kg NaBr = 4659.36 mg/L Br in 1000L.	11:45	8.01	6312	13.8	11.1	9.82	Clear, low/no turbidity, no odour or sheen	Tracer mixed on 7/8/24
8/08/2024 9:25	9.291										
8/08/2024 9:35	7.27										Tracer could not be added consistently for the entire 8 hour period due to water level increasing significantly with initial injection.
8/08/2024 9:45	4.602										
8/08/2024 9:55	3.45										Three periods of injection occurred during the 8 hour period with breaks in between to allow water levels to drop.
8/08/2024 10:05	2.18										
8/08/2024 10:15	2.259		Injection stopped at 10:15 due to elevated water level								Reduction of water levels in the surrounding wells and the steeper associated hydraulic gradient appeared to allow for a longer injection period between 13:05 and 16:27. This suggests injection/extraction rates would increase over a longer pumping/injection test (not sure if 8 hour test is sufficent to determine all parameters accurately).
8/08/2024 10:25	3.309										
8/08/2024 10:45	4.438										
8/08/2024 11:05	5.34										
8/08/2024 11:25	3.78	11:25	Injection started at 11:15								
8/08/2024 11:35	3.37										
8/08/2024 11:45	2.734										
8/08/2024 11:55	2.05		Injection stopped at 11:56. 300L injected by this point.								Datalogger data does not appear affected by the break in on site at approx 10pm 8/8/24
8/08/2024 12:05	2.58										
8/08/2024 12:15	3.295										Total volume injected = 500L
8/08/2024 12:25	3.92										
8/08/2024 12:35	4.461										
8/08/2024 12:45	4.493										
8/08/2024 12:55	5.543										
8/08/2024 13:05	5.566		Injection started at 13:05								
8/08/2024 13:15	5.582										
8/08/2024 13:25	5.14										
8/08/2024 13:35	4.61										
8/08/2024 13:45	4.245										
8/08/2024 13:55	3.885										
8/08/2024 14:05	3.53	14:00									
8/08/2024 14:15	3.282										
8/08/2024 14:25	3.05										
8/08/2024 14:35	2.841										
8/08/2024 14:45	2.69										
8/08/2024 14:55	2.547										
8/08/2024 15:05	2.422										
8/08/2024 15:15	2.315										
8/08/2024 15:25	2.26										
8/08/2024 15:35	2.211										
8/08/2024 15:45	2.16	15:55									
8/08/2024 15:55	2.122										
8/08/2024 16:05	2.083										
8/08/2024 16:15	2.06										
8/08/2024 16:25	2.04		Injection stopped at 16:27. Total of 500L injected. Total injection time 300 mins.								
8/08/2024 16:35	2.596										
8/08/2024 16:45	3.315		Average injection rate was 100L/hour. Note that due to gravity feed, as the IBC emptied the flow rate decreased.								
8/08/2024 16:55	3.872										
8/08/2024 17:05	4.456										
8/08/2024 17:15	4.86										
9/08/2024 10:15	11.519		Final water level taken the following day after data logger removal.								

KPSELTI01											
Manual Water Levels				Field Parameters							
Time	Manual SWL (mBRP)	Bromide sampling intervals	Notes/ Comments	Time	pH	Conductivity (µS/cm)	Redox (mV)	Temp (°C)	Dissolved Oxygen (ppm)	Appearance	Observations
8/08/2024 9:10	10.715	9:15		10:09	7.35	6599	52.1	17.9	2.11	Clear/cloudy, low turbidity, no odour or sheen	12V Supertwister pump installed at this location and flow rate calibrated on 7/8/24.
8/08/2024 9:25	11.229			10:54	7.47	6969	14.2	17.7	0.1	Increasing turbidity over time	
8/08/2024 9:35	11.657	9:35		11:47	7.47	7207	-109.1	18.6	1.82		Flow rates were calculated to be 22L/hour at beginning of the test, however flow rates were not consistent with this pump and it had to be continually turned up throughout the period to correct for this. The pump was connected to a running car battery so voltage should have remained constant. Possibly sediment in the well resulted in the slower flow rates.
8/08/2024 9:45	12.025			12:21	7.54	7317	-98.1	17.7	3.75		
8/08/2024 9:55	12.211	9:55		1:18	7.56	7927	-144.5	18.7	0.79		
8/08/2024 10:05	12.352			2:05	7.43	7873	-130.7	18.1	0.63		
8/08/2024 10:15	12.589	10:15		2:53	7.33	8614	-124.7	17.9	0.67		
8/08/2024 10:25	12.761	10:35		3:30	7.06	9568	-107.5	18.2	1.12		The dial for controlling flow rate was not precise for the slow rates involved and made it difficult to achieve a similar flow rate after the flow rate decreased. Would not recommend this pump for the consistent but relatively low rates required.
8/08/2024 10:45	12.917	10:55		4:23	7	9873	-103	18.1	0.59		
8/08/2024 11:05	12.9	11:15	Water level stabilised due to flow rate slowing down. Pump was turned up to be consistent with pervious flow rate.	5:16	6.97	9902	-92.8	17.3	0.7		Possibly this pump would be more suitable when the required flow rate is higher (>1L/min) but unsure if it would give consistent flow over 8 hours.
8/08/2024 11:25	13.132	11:35									
8/08/2024 11:45	13.55	11:55									The site was broken into overnight at approximately 10pm on 8/8/24. The pump was taken from the well and the datalogger cable was cut, dropping it to the bottom of the well. The logger was recovered but the data was disrupted at that point with the logger being lifted up then dropped about 250mm lower than previous depth.
8/08/2024 12:05	13.705	12:15									
8/08/2024 12:25	13.631	12:35									
8/08/2024 12:45	13.45	12:55	Flow rate had notably decreased at this time. Pump had to be turned up to be consistent with previous flow rate.								Total volume removed = approx. 160L
8/08/2024 13:05	13.711	13:15									
8/08/2024 13:25	13.874	13:35									
8/08/2024 13:45	14.015	13:55									
8/08/2024 14:05	14.165	14:15									
8/08/2024 14:25	14.279	14:35									
8/08/2024 14:45	14.37	14:55									
8/08/2024 15:05	14.44	15:15									
8/08/2024 15:25	14.502	15:35									
8/08/2024 15:45	14.544	15:55									
8/08/2024 16:05	14.561	16:15									
8/08/2024 16:25	14.595	16:35									
8/08/2024 16:45	14.64	16:55									
8/08/2024 17:05	14.67	17:15									
8/08/2024 17:15	14.68										
9/08/2024 10:15	10.925		Final water level taken the following day after data logger removal.								

KPSELTI02											
Manual Water Levels				Field Parameters							
Time	Manual SWL (mBRP)	Bromide sampling intervals	Notes/ Comments	Time	pH	Conductivity (µS/cm)	Redox (mV)	Temp (°C)	Dissolved Oxygen (ppm)	Appearance	Observations
8/08/2024 9:11	11.754	9:15		10:15	6.47	8574	-143.1	16.4	6.7	Clear, low turbidity, no odour or sheen.	Proactive Megamonsoon 12V pump installed and flow rate calibrated on 7/8/24. Water level dropped notably during this initial pumping on 7/8/24 and did not recover to previous levels overnight. Possibly a slower recharge at this location compared with others. Flow rate calculated as 22L/hour initially however it was not consistent and required an increase in voltage/flow rate to "restart" the flow when it slowed down. This resulted in an increased flow rate of approx 70L/hour until 1:30PM when flow rate was reduced to approx 15L/hour due to the low water level and to avoid "dryrunning" the pump. Water levels were stable/stabilised during this period. This pump is not recommended for constant rate pumping due to even slight movement of the tubing at surface slowing or stopping the flow rate and inconsistent rates of flow from the controller. Datalogger data does not appear affected by the break in on site at approx 10pm 8/8/24 Total volume removed = approx. 240L
8/08/2024 9:25	12.391			10:59	6.46	8594	-149	19	0.63	Increased turbidity over time.	
8/08/2024 9:35	12.695	9:35		11:54	6.49	11127	-116.6	16.6	6.8		
8/08/2024 9:45	13.01			12:23	6.54	11662	-112.8	18.6	3.54		
8/08/2024 9:55	13.25	9:55		1:19	6.48	11745	-95.6	19.3	0.44		
8/08/2024 10:05	13.38			2:06	6.54	11565	-83.8	17.2	1.17		
8/08/2024 10:15	13.5	10:15		2:51	6.57	11250	-62.2	16.6	1.24		
8/08/2024 10:25	13.708	10:35		3:30	6.53	11384	-42.8	16.7	1.01		
8/08/2024 10:45	13.558	10:55		4:22	6.45	12045	-33.7	19.3	0.16		
8/08/2024 11:05	14.581	11:15	Flow rate increased at 11:00 after it stuttered/decreased. Difficult to get consistent flow rate.	5:14	6.48	10504	-13.1	14.2	0.57		
8/08/2024 11:25	16.154	11:35									
8/08/2024 11:45	16.632	11:55	Pump rate inconsistent between 11:30 and 1:30. Pump had to be "restarted" by turning up flow rate.								
8/08/2024 12:05	16.671	12:15									
8/08/2024 12:25	16.989	12:35									
8/08/2024 12:45	17.295	12:55									
8/08/2024 13:05	17.334	13:15									
8/08/2024 13:25	18.915	13:35	Consistent but fast flow rate from 1:30 to 1:45. Flow rate approx 70L/hour. SWL dropped rapidly								
8/08/2024 13:45	18.766	13:55	Flow rate then decreased to approx 15L/hour - still not consistent flow rate based on recovery curve.								
8/08/2024 14:05	18.755	14:15									
8/08/2024 14:25	18.712	14:35									
8/08/2024 14:45	18.655	14:55									
8/08/2024 15:05	18.536	15:15									
8/08/2024 15:25	18.535	15:35									
8/08/2024 15:45	18.438	15:55									
8/08/2024 16:05	18.418	16:15									
8/08/2024 16:25	18.44	16:35									
8/08/2024 16:45	18.545	16:55									
8/08/2024 17:05	18.43	17:15									
8/08/2024 17:15	18.24										
9/08/2024 10:15	12.494										

KPSELTI03											
Manual Water Levels				Field Parameters							
Time	Manual SWL (mBRP)	Bromide sampling intervals	Notes/ Comments	Time	pH	Conductivity (µS/cm)	Redox (mV)	Temp (°C)	Dissolved Oxygen (ppm)	Appearance	Observations
8/08/2024 9:11	11.455	9:15		10:30	6.84	8388	-150.3	17.3	5.02	Clear, no turbidity, no odour or sheen.	Geotech SS Geosub240V pump installed in this well and flow rate calibrated on 7/8/24.
8/08/2024 9:25	11.965			11:08	6.75	8403	-162	18.1	0		
8/08/2024 9:35	12.184	9:35		11:51	6.77	8268	-135.6	18.2	0		Conductivity logger also installed in this wellon 8/8/24 at 9am.
8/08/2024 9:45	12.461			12:25	6.85	8304	-131.9	17.8	1.6		
8/08/2024 9:55	12.631	9:55		1:15	6.77	8566	-132	18.6	0		Flow rate was approximately 24L/hour.
8/08/2024 10:05	12.771			2:00	6.79	8406	-126.6	17	0.61		
8/08/2024 10:15	12.94	10:15		2:50	6.8	7045	-102.1	16.7	0.77		Pump was powered by diesel generator on site. As the generator ran low on fuel the output voltage
8/08/2024 10:25	13.025	10:35	Flow rate stopped/slowed at 10:30-11:00. Restarted at 11:00	3:30	6.8	8561	-106.7	17.3	0.69		appeared to decrease, resulting in a lower pump rate. Not an ideal setup for 8 hour pumping
8/08/2024 10:45	12.905	10:55		4:21	6.8	8630	-86.9	18	0.61		program. To be more suitable, this setup requires either a bigger generator which does not need
8/08/2024 11:05	13.021	11:15		5:11	6.81	8741	-69.1	17.8	0.62		refueling mid program or a reliable 12V power source and inverter.
8/08/2024 11:25	13.37	11:35									
8/08/2024 11:45	13.811	11:55									Flow rates were generally consistent outside of power source fluctuations. This pump could be
8/08/2024 12:05	13.95	12:15									suitable for this purpose with a consistent power source but the ability to adjust flow rates is still
8/08/2024 12:25	14.061	12:35									less precise than low flow and the unit used would not be suitable for deeper wells with shallow SWL
8/08/2024 12:45	14.125	12:55									(no drop tube option).
8/08/2024 13:05	14.177	13:15									
8/08/2024 13:25	14.275	13:35									Primary datalogger data does not appear affected by the break in on site at approx 10pm 8/8/24
8/08/2024 13:45	14.296	13:55									
8/08/2024 14:05	14.321	14:15									Conductivity logger appears to be affected by break in on site at approx 10pm 8/8/24 - logger drops
8/08/2024 14:25	14.374	14:35									approximately 1.22m deeper into the well. Other parameters such as conductivity are affected by
8/08/2024 14:45	14.392	14:55	Pump rated slowed and was intermittent as generator ran low on fuel between 13:30 and 15:00.								the shift. This likely indicates either variation in the well column profile, stirring up of sediment/stratified water in the well or the logger dropping to the base of the well.
8/08/2024 15:05	14.04	15:15	Generator powering the pump ran out of fuel at 15:10. Had to be refueled and restarted.								Total volume removed = approx. 160L
8/08/2024 15:25	14.146	15:35									
8/08/2024 15:45	14.375	15:55									
8/08/2024 16:05	14.527	16:15									
8/08/2024 16:25	14.603	16:35									
8/08/2024 16:45	14.656	16:55									
8/08/2024 17:05	14.681	17:15									
8/08/2024 17:15	14.715										
9/08/2024 10:15	11.756										

KPSELTI04											
Manual Water levels				Field Parameters							
Time	Manual SWL (mBRP)	Bromide sampling intervals	Notes/ Comments	Time	pH	Conductivity (µS/cm)	Redox (mV)	Temp (°C)	Dissolved Oxygen (ppm)	Appearance	Observations
8/08/2024 9:11	11.314	9:15		10:08	7.23	6144	117	16.8	7.2	staining.	Micropurge low flow pump installed in this location and flow rate calibrated on 7/8/24.
8/08/2024 9:25	11.724			10:48	7.23	6230	17.3	17.1	7.14		
8/08/2024 9:35	12.115	9:35		11:42	7.23	6348	21.7	17.5	7.21	Increased turbidity over time, becoming grey.	I04 had generally consistent flow rates. Initially 30L/hour.
8/08/2024 9:45	12.61			12:19	7.29	6525	69.1	17.3	6.51		
8/08/2024 9:55	13.03	9:55		1:10	7.26	6655	66.2	17.9	4.98		The low flow setup provided the most consistent flow rates of all the options and flow rates are
8/08/2024 10:05	13.397			2:03	7.17	6542	15.3	16.8	5.03		easily adjustable. If the compressor ran out of fuel, there was enough pressure in the tank to
8/08/2024 10:15	13.746	10:15		2:49	7.09	7002	62.8	16.4	2.77		continue pumping with no downtime during refilling. For multiple low flow pumps running
8/08/2024 10:25	14.012	10:35		3:30	7.03	7494	21.7	16.7	2.07		simultaneously, a large compressor and air tank would be required.
8/08/2024 10:45	14.43	10:55		4:20	7.01	7567	20.7	17.3	1.84		
8/08/2024 11:05	14.682	11:15		5:08	7.01	7556	22.1	17	1.85		Total volume removed = approx. 240L
8/08/2024 11:25	14.955	11:35									
8/08/2024 11:45	15.48	11:55									The datalogger installed in this location was disturbed by the break in on site at approx 10pm
8/08/2024 12:05	15.77	12:15									8/8/24. The logger was still attached to cable on 9/8/24. Based on the depth reading curve it
8/08/2024 12:25	16.05	12:35									appears to have been moved but returned to the initial deployment depth.
8/08/2024 12:45	16.273	12:55									
8/08/2024 13:05	16.5	13:15									
8/08/2024 13:25	16.682	13:35									
8/08/2024 13:45	16.843	13:55									
8/08/2024 14:05	17.04	14:15									
8/08/2024 14:25	17.185	14:35									
8/08/2024 14:45	17.323	14:55									
8/08/2024 15:05	17.052	15:15									
8/08/2024 15:25	17.547	15:35									
8/08/2024 15:45	17.633	15:55									
8/08/2024 16:05	17.742	16:15									
8/08/2024 16:25	17.784	16:35									
8/08/2024 16:45	17.852	16:55									
8/08/2024 17:05	17.934	17:15									
8/08/2024 17:15	17.978										
9/08/2024 10:15	12.183										

ATTACHMENT C

Certified Analytical Laboratory Reports

Land & Water Consulting
Suite 3/ 4-8 Goodwood Road
Wayville
SA 5034

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: **Levi Wilkins**

Report **1128855-W-V2**
Project name
Project ID NJ-08
Received Date Aug 13, 2024

Client Sample ID			**TRACER_START**	**TRACER_11-25**	**TRACER_2-00**	**TRACER_3-55**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M24-Au0040432**	**M24-Au0040433**	**M24-Au0040434**	**M24-Au0040435**
Date Sampled			**Aug 08, 2024**	**Aug 08, 2024**	**Aug 08, 2024**	**Aug 08, 2024**
Test/Reference	LOR	Unit				
Bromide	1	mg/L	2500	2400	2500	2500

Client Sample ID			**KPSELTI01_9-15**	**KPSELTI01_10-15**	**KPSELTI01_10-55**	**KPSELTI01_11-15**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M24-Au0040436**	**M24-Au0040437**	**M24-Au0040438**	**M24-Au0040439**
Date Sampled			**Aug 08, 2024**	**Aug 08, 2024**	**Aug 08, 2024**	**Aug 08, 2024**
Test/Reference	LOR	Unit				
Bromide	1	mg/L	280	6.5	3.9	3.9

Client Sample ID			**KPSELTI01_11-55**	**KPSELTI01_12-15**	**KPSELTI01_12-55**	**KPSELTI01_1-15**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M24-Au0040440**	**M24-Au0040441**	**M24-Au0040442**	**M24-Au0040443**
Date Sampled			**Aug 08, 2024**	**Aug 08, 2024**	**Aug 08, 2024**	**Aug 08, 2024**
Test/Reference	LOR	Unit				
Bromide	1	mg/L	3.5	3.9	4.0	9.3

Client Sample ID			KPSELTI01_1-55	KPSELTI01_2-15	KPSELTI01_2-55	KPSELTI01_3-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040444	M24-Au0040445	M24-Au0040446	M24-Au0040447
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	8.8	5.0	4.2	4.5

Client Sample ID			KPSELTI01_3-55	KPSELTI01_4-15	KPSELTI01_4-55	KPSELTI01_5-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040448	M24-Au0040449	M24-Au0040450	M24-Au0040451
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	6.7	4.3	4.8	5.0

Client Sample ID			KPSELTI02_9-15	KPSELTI02_10-15	KPSELTI02_10-55	KPSELTI02_11-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040452	M24-Au0040453	M24-Au0040454	M24-Au0040455
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	5.1	4.1	4.1	< 1

Client Sample ID			KPSELTI02_11-55	KPSELTI02_12-15	KPSELTI02_12-55	KPSELTI02_1-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040456	M24-Au0040457	M24-Au0040458	M24-Au0040459
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	4.7	5.2	5.0	4.1

Client Sample ID			KPSELTI02_1-55	KPSELTI02_2-15	KPSELTI02_2-55	KPSELTI02_3-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040460	M24-Au0040461	M24-Au0040462	M24-Au0040463
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	3.9	5.4	4.0	5.4

Client Sample ID			KPSELTI02_3-55	KPSELTI02_4-15	KPSELTI02_4-55	KPSELTI02_5-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040464	M24-Au0040465	M24-Au0040466	M24-Au0040467
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	5.2	5.2	5.0	5.7

Client Sample ID			KPSELTI03_9-15	KPSELTI03_10-15	KPSELTI03_10-55	KPSELTI03_11-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040468	M24-Au0040469	M24-Au0040470	M24-Au0040471
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	4.0	14	51	46

Client Sample ID			KPSELTI03_11-55	KPSELTI03_12-15	KPSELTI03_12-55	KPSELTI03_1-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040472	M24-Au0040473	M24-Au0040474	M24-Au0040475
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	120	7.9	29	5.2

Client Sample ID			KPSELTI03_1-55	KPSELTI03_2-15	KPSELTI03_2-55	KPSELTI03_3-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040476	M24-Au0040477	M24-Au0040478	M24-Au0040479
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	5.7	4.6	13	3.4

Client Sample ID			KPSELTI03_3-55	KPSELTI03_4-15	KPSELTI03_4-55	KPSELTI03_5-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040480	M24-Au0040481	M24-Au0040482	M24-Au0040483
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	3.6	4.1	4.2	3.6

Client Sample ID			KPSELTI04_9-15	KPSELTI04_10-15	KPSELTI04_10-55	KPSELTI04_11-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040484	M24-Au0040485	M24-Au0040486	M24-Au0040487
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	3.1	2.7	2.7	3.1

Client Sample ID			KPSELTI04_11-55	KPSELTI04_12-15	KPSELTI04_12-55	KPSELTI04_1-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040488	M24-Au0040489	M24-Au0040490	M24-Au0040491
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	2.4	2.5	3.3	2.8

Client Sample ID			KPSELTI04_1-55	KPSELTI04_2-15	KPSELTI04_2-55	KPSELTI04_3-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040492	M24-Au0040493	M24-Au0040494	M24-Au0040495
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	3.4	3.6	3.7	3.6

Client Sample ID			KPSELTI04_3-55	KPSELTI04_4-15	KPSELTI04_4-55	KPSELTI04_5-15
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M24-Au0040496	M24-Au0040497	M24-Au0040498	M24-Au0040499
Date Sampled			Aug 08, 2024	Aug 08, 2024	Aug 08, 2024	Aug 08, 2024
Test/Reference	LOR	Unit				
Bromide	1	mg/L	2.6	3.5	3.2	3.9

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
Bromide	Melbourne	Aug 16, 2024	28 Days

- Method: LTM-INO-4270 Anions by Ion Chromatography

eurofins

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Company Name: Land & Water Consulting
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Project Name:
Project ID: NJ-08

Order No.:
Report #: 1128855
Phone: 08 8271 5255
Fax:

Received: Aug 13, 2024 11:53 AM
Due: Aug 20, 2024
Priority: 5 Day
Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TRACER_START	Aug 08, 2024		Water	M24-Au0040432	X	
2	TRACER_11-25	Aug 08, 2024		Water	M24-Au0040433	X	
3	TRACER_2-00	Aug 08, 2024		Water	M24-Au0040434	X	
4	TRACER_3-55	Aug 08, 2024		Water	M24-Au0040435	X	
5	KPSELTI01_9-15	Aug 08, 2024		Water	M24-Au0040436	X	
6	KPSELTI01_10-15	Aug 08, 2024		Water	M24-Au0040437	X	
7	KPSELTI01_10-55	Aug 08, 2024		Water	M24-Au0040438	X	
8	KPSELTI01_11-15	Aug 08, 2024		Water	M24-Au0040439	X	
9	KPSELTI01_11-55	Aug 08, 2024		Water	M24-Au0040440	X	

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Received: Aug 13, 2024 11:53 AM
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Priority: 5 Day
Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
10	KPSELTI01_12-15	Aug 08, 2024		Water	M24-Au0040441	X	
11	KPSELTI01_12-55	Aug 08, 2024		Water	M24-Au0040442	X	
12	KPSELTI01_1-15	Aug 08, 2024		Water	M24-Au0040443	X	
13	KPSELTI01_1-55	Aug 08, 2024		Water	M24-Au0040444	X	
14	KPSELTI01_2-15	Aug 08, 2024		Water	M24-Au0040445	X	
15	KPSELTI01_2-55	Aug 08, 2024		Water	M24-Au0040446	X	
16	KPSELTI01_3-15	Aug 08, 2024		Water	M24-Au0040447	X	
17	KPSELTI01_3-55	Aug 08, 2024		Water	M24-Au0040448	X	
18	KPSELTI01_4-15	Aug 08, 2024		Water	M24-Au0040449	X	
19	KPSELTI01_4-55	Aug 08, 2024		Water	M24-Au0040450	X	

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Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
20	KPSELTI01_5-15	Aug 08, 2024		Water	M24-Au0040451	X	
21	KPSELTI02_9-15	Aug 08, 2024		Water	M24-Au0040452	X	
22	KPSELTI02_10-15	Aug 08, 2024		Water	M24-Au0040453	X	
23	KPSELTI02_10-55	Aug 08, 2024		Water	M24-Au0040454	X	
24	KPSELTI02_11-15	Aug 08, 2024		Water	M24-Au0040455	X	
25	KPSELTI02_11-55	Aug 08, 2024		Water	M24-Au0040456	X	
26	KPSELTI02_12-15	Aug 08, 2024		Water	M24-Au0040457	X	
27	KPSELTI02_12-55	Aug 08, 2024		Water	M24-Au0040458	X	
28	KPSELTI02_1-15	Aug 08, 2024		Water	M24-Au0040459	X	
29	KPSELTI02_1-55	Aug 08, 2024		Water	M24-Au0040460	X	

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Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
30	KPSELTI02_2-15	Aug 08, 2024		Water	M24-Au0040461	X	
31	KPSELTI02_2-55	Aug 08, 2024		Water	M24-Au0040462	X	
32	KPSELTI02_3-15	Aug 08, 2024		Water	M24-Au0040463	X	
33	KPSELTI02_3-55	Aug 08, 2024		Water	M24-Au0040464	X	
34	KPSELTI02_4-15	Aug 08, 2024		Water	M24-Au0040465	X	
35	KPSELTI02_4-55	Aug 08, 2024		Water	M24-Au0040466	X	
36	KPSELTI02_5-15	Aug 08, 2024		Water	M24-Au0040467	X	
37	KPSELTI03_9-15	Aug 08, 2024		Water	M24-Au0040468	X	
38	KPSELTI03_10-15	Aug 08, 2024		Water	M24-Au0040469	X	
39	KPSELTI03_10-55	Aug 08, 2024		Water	M24-Au0040470	X	

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Project ID: NJ-08

Order No.:
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Phone: 08 8271 5255
Fax:

Received: Aug 13, 2024 11:53 AM
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Priority: 5 Day
Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
40	KPSELTI03_11-15	Aug 08, 2024		Water	M24-Au0040471	X	
41	KPSELTI03_11-55	Aug 08, 2024		Water	M24-Au0040472	X	
42	KPSELTI03_12-15	Aug 08, 2024		Water	M24-Au0040473	X	
43	KPSELTI03_12-55	Aug 08, 2024		Water	M24-Au0040474	X	
44	KPSELTI03_1-15	Aug 08, 2024		Water	M24-Au0040475	X	
45	KPSELTI03_1-55	Aug 08, 2024		Water	M24-Au0040476	X	
46	KPSELTI03_2-15	Aug 08, 2024		Water	M24-Au0040477	X	
47	KPSELTI03_2-55	Aug 08, 2024		Water	M24-Au0040478	X	
48	KPSELTI03_3-15	Aug 08, 2024		Water	M24-Au0040479	X	
49	KPSELTI03_3-55	Aug 08, 2024		Water	M24-Au0040480	X	

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Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
50	KPSELTI03_4-15	Aug 08, 2024		Water	M24-Au0040481	X	
51	KPSELTI03_4-55	Aug 08, 2024		Water	M24-Au0040482	X	
52	KPSELTI03_5-15	Aug 08, 2024		Water	M24-Au0040483	X	
53	KPSELTI04_9-15	Aug 08, 2024		Water	M24-Au0040484	X	
54	KPSELTI04_10-15	Aug 08, 2024		Water	M24-Au0040485	X	
55	KPSELTI04_10-55	Aug 08, 2024		Water	M24-Au0040486	X	
56	KPSELTI04_11-15	Aug 08, 2024		Water	M24-Au0040487	X	
57	KPSELTI04_11-55	Aug 08, 2024		Water	M24-Au0040488	X	
58	KPSELTI04_12-15	Aug 08, 2024		Water	M24-Au0040489	X	
59	KPSELTI04_12-55	Aug 08, 2024		Water	M24-Au0040490	X	

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Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
60	KPSELTI04_1-15	Aug 08, 2024		Water	M24-Au0040491	X	
61	KPSELTI04_1-55	Aug 08, 2024		Water	M24-Au0040492	X	
62	KPSELTI04_2-15	Aug 08, 2024		Water	M24-Au0040493	X	
63	KPSELTI04_2-55	Aug 08, 2024		Water	M24-Au0040494	X	
64	KPSELTI04_3-15	Aug 08, 2024		Water	M24-Au0040495	X	
65	KPSELTI04_3-55	Aug 08, 2024		Water	M24-Au0040496	X	
66	KPSELTI04_4-15	Aug 08, 2024		Water	M24-Au0040497	X	
67	KPSELTI04_4-55	Aug 08, 2024		Water	M24-Au0040498	X	
68	KPSELTI04_5-15	Aug 08, 2024		Water	M24-Au0040499	X	
69	KPSELTI01_9-35	Aug 08, 2024		Water	M24-Au0040500		X

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Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
70	KPSELTI01_9-55	Aug 08, 2024		Water	M24-Au0040501		X
71	KPSELTI01_10-35	Aug 08, 2024		Water	M24-Au0040502		X
72	KPSELTI01_11-35	Aug 08, 2024		Water	M24-Au0040503		X
73	KPSELTI01_12-35	Aug 08, 2024		Water	M24-Au0040504		X
74	KPSELTI01_1-35	Aug 08, 2024		Water	M24-Au0040505		X
75	KPSELTI01_2-35	Aug 08, 2024		Water	M24-Au0040506		X
76	KPSELTI01_3-35	Aug 08, 2024		Water	M24-Au0040507		X
77	KPSELTI01_4-35	Aug 08, 2024		Water	M24-Au0040508		X
78	KPSELTI02_9-35	Aug 08, 2024		Water	M24-Au0040509		X
79	KPSELTI02_9-55	Aug 08, 2024		Water	M24-Au0040510		X

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Company Name: Land & Water Consulting
Address: Suite 3/ 4-8 Goodwood Road
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SA 5034

Project Name:
Project ID: NJ-08

Order No.:
Report #: 1128855
Phone: 08 8271 5255
Fax:

Received: Aug 13, 2024 11:53 AM
Due: Aug 20, 2024
Priority: 5 Day
Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
80	KPSELTI02_10-35	Aug 08, 2024		Water	M24-Au0040511		X
81	KPSELTI02_11-35	Aug 08, 2024		Water	M24-Au0040512		X
82	KPSELTI02_12-35	Aug 08, 2024		Water	M24-Au0040513		X
83	KPSELTI02_1-35	Aug 08, 2024		Water	M24-Au0040514		X
84	KPSELTI02_2-35	Aug 08, 2024		Water	M24-Au0040515		X
85	KPSELTI02_3-35	Aug 08, 2024		Water	M24-Au0040516		X
86	KPSELTI02_4-35	Aug 08, 2024		Water	M24-Au0040517		X
87	KPSELTI03_9-35	Aug 08, 2024		Water	M24-Au0040518		X
88	KPSELTI03_9-55	Aug 08, 2024		Water	M24-Au0040519		X
89	KPSELTI03_10-35	Aug 08, 2024		Water	M24-Au0040520		X

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Site# 20794 & 2780

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Project Name:
Project ID: NJ-08

Order No.:
Report #: 1128855
Phone: 08 8271 5255
Fax:

Received: Aug 13, 2024 11:53 AM
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Priority: 5 Day
Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
90	KPSELTI03_11-35	Aug 08, 2024		Water	M24-Au0040521		X
91	KPSELTI03_12-35	Aug 08, 2024		Water	M24-Au0040522		X
92	KPSELTI03_1-35	Aug 08, 2024		Water	M24-Au0040523		X
93	KPSELTI03_2-35	Aug 08, 2024		Water	M24-Au0040524		X
94	KPSELTI03_3-35	Aug 08, 2024		Water	M24-Au0040525		X
95	KPSELTI03_4-35	Aug 08, 2024		Water	M24-Au0040526		X
96	KPSELTI04_9-35	Aug 08, 2024		Water	M24-Au0040527		X
97	KPSELTI04_9-55	Aug 08, 2024		Water	M24-Au0040528		X
98	KPSELTI04_10-35	Aug 08, 2024		Water	M24-Au0040529		X
99	KPSELTI04_11-35	Aug 08, 2024		Water	M24-Au0040530		X

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Priority: 5 Day
Contact Name: Levi Wilkins

Eurofins Analytical Services Manager : Karl Bulow

Sample Detail						Bromide	HOLD*
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
100	KPSELTI04_12-35	Aug 08, 2024		Water	M24-Au0040531		X
101	KPSELTI04_1-35	Aug 08, 2024		Water	M24-Au0040532		X
102	KPSELTI04_2-35	Aug 08, 2024		Water	M24-Au0040533		X
103	KPSELTI04_3-35	Aug 08, 2024		Water	M24-Au0040534		X
104	KPSELTI04_4-35	Aug 08, 2024		Water	M24-Au0040535		X
Test Counts						69	36

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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 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. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
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 where annotated.
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 sampling date; 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 seven 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 (CU)	

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 6.0
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 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, 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							
Bromide	mg/L	< 1			1	Pass	
Method Blank							
Bromide	mg/L	< 1			1	Pass	
Method Blank							
Bromide	mg/L	< 1			1	Pass	
Method Blank							
Bromide	mg/L	< 1			1	Pass	
Method Blank							
Bromide	mg/L	< 1			1	Pass	
LCS - % Recovery							
Bromide	%	96			70-130	Pass	
LCS - % Recovery							
Bromide	%	94			70-130	Pass	
LCS - % Recovery							
Bromide	%	91			70-130	Pass	
LCS - % Recovery							
Bromide	%	91			70-130	Pass	
LCS - % Recovery							
Bromide	%	97			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Au0040442	CP	mg/L	4.0	4.4	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Au0040450	CP	mg/L	4.8	5.0	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Au0040477	CP	mg/L	4.6	4.2	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Au0040492	CP	mg/L	3.4	2.5	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Bromide	M24-Au0040493	CP	mg/L	3.6	3.3	8.0	30%	Pass	

Comments

Report 1128855-W-V2 (amendment to report 1128855-W) has been issued with revised results for bromide on samples "Au0040432, Au0040433, Au0040434, Au0040435 and Au0040436, following repeat analysis.

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:

Catherine Wilson	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
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.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CERTIFICATE OF ANALYSIS

Work Order	: **EM2415557**	Page	: 1 of 2
Client	: **LWC MANA EMENT TY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: LEVI WILKINS	Contact	: Kieren Burns
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Telephone	: ----	Telephone	: +61881625130
Project	: NJ-08	Date Samples Received	: 11-Sep-2024 10:05
Order number	: ----	Date Analysis Commenced	: 19-Sep-2024
C-O-C number	: ----	Issue Date	: 24-Sep-2024 10:27
Sampler	: ----		
Site	: ----		
Quote number	: EN/111		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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 authoriBed signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CCR Part 11.

Signatories	*osition*	*reditation ategor*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

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
A = This result is computed from individual analyte detections at or above the level of reporting
0 = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample	TRACER5START	TRACER511425	TRACER52400	TRACER53455	4444
			Sampling date / time	08-Aug-2024 00:00	08-Aug-2024 00:00	08-Aug-2024 00:00	08-Aug-2024 00:00	----
ompo nd	S m er		nit	EM24155574001	EM24155574002	EM24155574003	EM24155574004	44444444
				Result	Result	Result	Result	----
ED009: Anions								
Bromide	24959-67-9	0.010	mg/L	**6610**	**6380**	**6400**	**5520**	**4444**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry / Biology).

(WATER) ED009: Anions

ATTACHMENT D

Statement of Limitations

STATEMENT OF LIMITATIONS & IMPORTANT INFORMATION REGARDING YOUR REPORT

INTRODUCTION

This report has been prepared by Land & Water Consulting for you, as Land & Water Consulting's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Land & Water Consulting may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Land & Water Consulting has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

No warranty or guarantee of the site conditions is intended.

This report was prepared for the sole use of you, the Client and may not contain sufficient information for purposes of other parties or for other uses. Any reliance on this report by third parties shall be at such parties sole risk. This report shall only be presented in full and may not be used to support any other objectives than those set out in the report, except where written approval with comments are provided by Land & Water Consulting.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

LIMITATIONS OF THE REPORT

The scope of works undertaken and the report prepared to complete the assessment was in accordance with the information provided by the client and the specifications for works required under the contract. As such, works undertaken and statements made are based on those specifications (such as levels of risks and significance of any contamination) and should be considered and interpreted within this context. The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

Your environmental report should not be used without reference to Land & Water Consulting in the first instance:

- When the nature of the proposed development is changed, for example if a residential development is proposed instead of a commercial one;
- When the size or configuration of the proposed development is altered;
- When the location or orientation of the proposed structures are modified;
- When there is a change in ownership;
- For application to an adjacent site.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

ENVIRONMENTAL ASSESSMENT "FINDINGS" ARE PROFESSIONAL ESTIMATES

The information in this report is considered to be accurate with respect to conditions encountered at the site at the time of investigation and considering the inherent limitations associated with extrapolating information from a sample set. Note however that site assessment identifies actual subsurface conditions only at those specific points where samples are taken, when they are taken. Environmental data derived through sampling and analysis are interpreted by consultants who then render an opinion about overall subsurface conditions, the nature and extent of contamination and potential impacts on the use of the land. Actual conditions may differ from those inferred to exist as no professional and no subsurface assessment program can reveal every detail within the ground across a site. Subsurface conditions can vary across a particular site and no practical degree of sampling can ever eliminate the possibility that conditions may be present at a site that have not been represented though sampling.

SUBSURFACE CONDITIONS CAN CHANGE

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Land & Water Consulting should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions. Since subsurface conditions (including contamination concentrations) can change within a limited period of time and space, this inherent limitation to the representation of site conditions provided by this report should always be taken into consideration particularly if the report is used after a delay in time.

DATA SHOULD NOT BE SEPARATED FROM THE REPORT

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

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THE INVISIBLE MINE

Kapunda Cu-ISR Trials

COMSOL Groundwater Impact Study

Matt Swann

October 2024

Contents

Contents 2
List of Figures 2
Introduction 3
Push Pull (PP) Modelling 3
Circulation Trial (CT) Simulation 5
Circulation Trial (CT) Estimates 6
Conclusion 7

List of Figures

Figure 1: Push Pull lixiviant plume over time 3
Figure 2: Push Pull COMSOL Groundwater Impact 3
Figure 3: LWC geochemical fate transport model 4
Figure 4: Push Pull KPFRT03&04 Baseline and Trial data 4
Figure 5: Circulation Trial lixiviant plume over time 5
Figure 6: SELT COMSOL Groundwater Impact 5
Figure 7: COMSOL CT groundwater flow 6
Figure 8: COMSOL CT PLS grade (a) & Cu Production (b) estimates 6

Introduction

As part of the environmental impact study, ECL simulated the extent of the groundwater that would be to be affected in the Kapunda Cu-ISR Site Environmental Lixiviant Trial (SELT). Using COMSOL Multiphysics the migration of lixiviant was modelled for both the Push Pull (PP) at Site A and Site B Circulation Trial (CT) programs.

ECL uses COMSOL Multiphysics to model simulations with parameters such as fluid flow and copper production. The physics packages predominately used are *Darcy's Law* (dl) and *Transport of Diluted Species in Porous Media* (tds), for fluid flow mechanics and *Domain ODEs and DAEs* (dode) to model copper dissolution and lixiviant migration which will demonstrate groundwater impact.

Push Pull (PP) Modelling

Push Pull Test will consist of pumping of lixiviant into the ground via a well, allowing it to sit for 14 days and then extracting it from the same well. This model is simulated by importing the Site A layout and simulating over the estimated time of the trial.

Modelling the lixiviant concentration (c_acid) gives the best representation of the area of impacted groundwater for the site. Figure 1 below shows the extent of the lixiviant plume extending over times 0, 3 & 14 days.

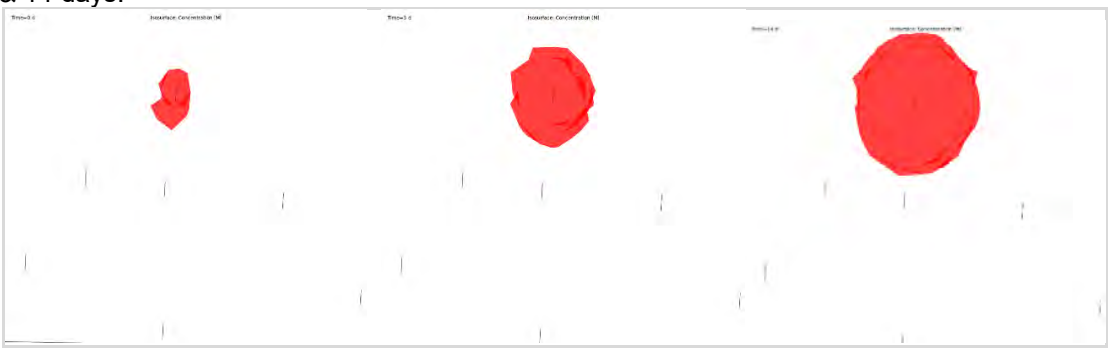

Figure 1: Push Pull lixiviant plume over time

The COMSOL results were overlaid on a site map (figure 2) which shows the extent of the affected area. The radius was calculated at approximately 7.5m from the injection well and does not reach the observation wells.

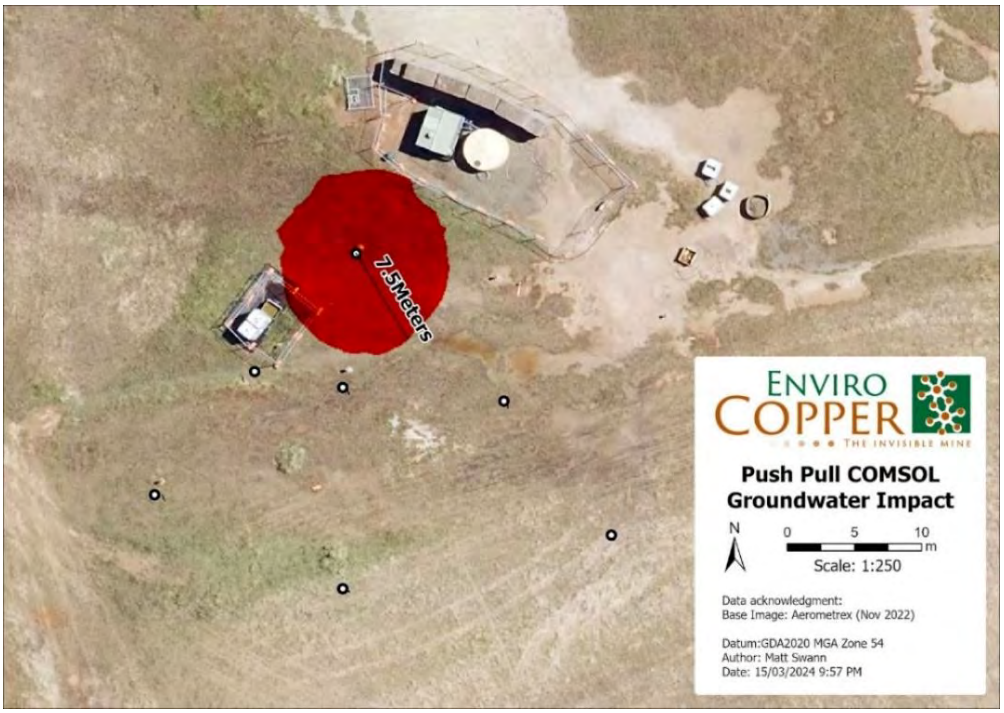

Figure 2: Push Pull COMSOL Groundwater Impact

ECL engaged Land and Water Consulting (LWC) to establish a geochemical fate transport model to access transport of copper and other pH sensitive metals for the Push Pull test (*see Conceptual Site Model and Predictive Assessment Kapunda ISR Hydrogeochemistry Support for SELT August 2021*)

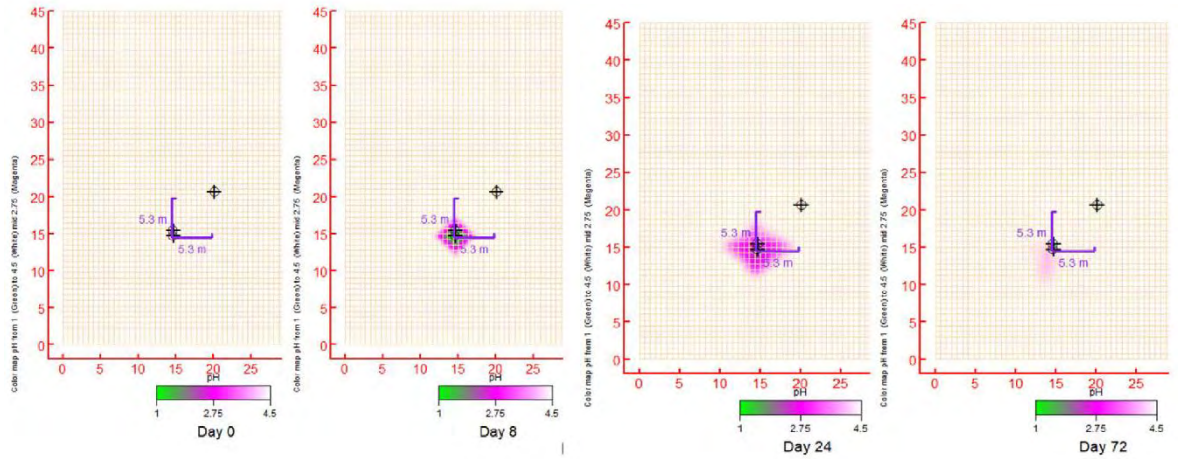

Figure 3: LWC geochemical fate transport model

Figure 3 shows the LWC's predictions that the pH and copper differences in the groundwater. The model predicts that the affected area would be approximately 5.3m lateral from the injection well. Therefore, changes would not be observable in the proposed monitoring array (KPMON01-03) and the observation array (KPFRT03, 04 & 06).

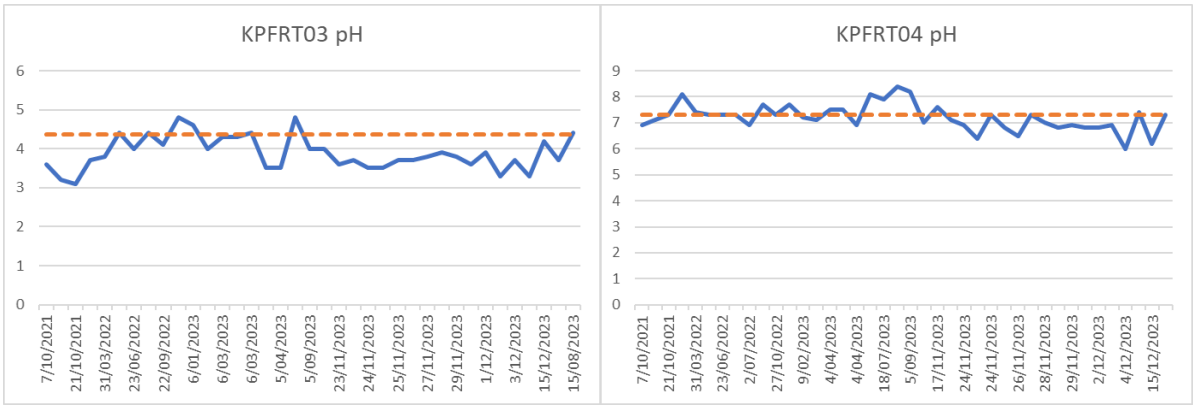

Figure 4: Push Pull KPFRT03&04 Baseline and Trial data

The trial was completed in December 2023 and results show that there was no breakthrough at the observation array (KPFRT03 & 04) situated 10m away from KPFRT02 (injection bore). Data above shows the baseline which in 2021 for the closest bores and the results collected through the duration of the Push Pull trial which commenced in November 2023. Comparing these real-world results with LWC's geochemical fate transport model and ECL's COMSOL modelling it demonstrates that the model is reliable.

Circulation Trial (CT) Simulation

The next phase of work for the Kapunda ISR trials is the circulation trial, this includes a 5-spot pattern and monitoring network located 25m away along fracture orientations. Over 60 to 90 days lixiviant will be circulated in ground. The 5-spot pattern consists of four injection wells with an extraction well at the centre approx. 6.5m away. The geometry used in this simulation are real world coordinates for the Kapunda Site B wells that were installed in early 2024.

The injection and extraction flow rates selected as 0.32L/s which was calculated from a falling head test conducted by ECL in May 2024. Where water was placed into KPSELTI01 and the rate at which water level begins to stabilise was measured. This was measured at 0.08L/s and as there are four injection wells the overall flow rate was calculated as 0.32L/s to maintain positive flow gradient. The porosity (reported as specific yield) was set as 1.7% from the hydrological drawdown test work conducted by LWC in March 2024.

The simulation duration was set for the 90 days, the maximum allowed for the CT. Concentration of acid was used again as a proxy for groundwater impact. Figure 5 shows the extent of lixiviant at the simulated times 0, 10 and 90 days.

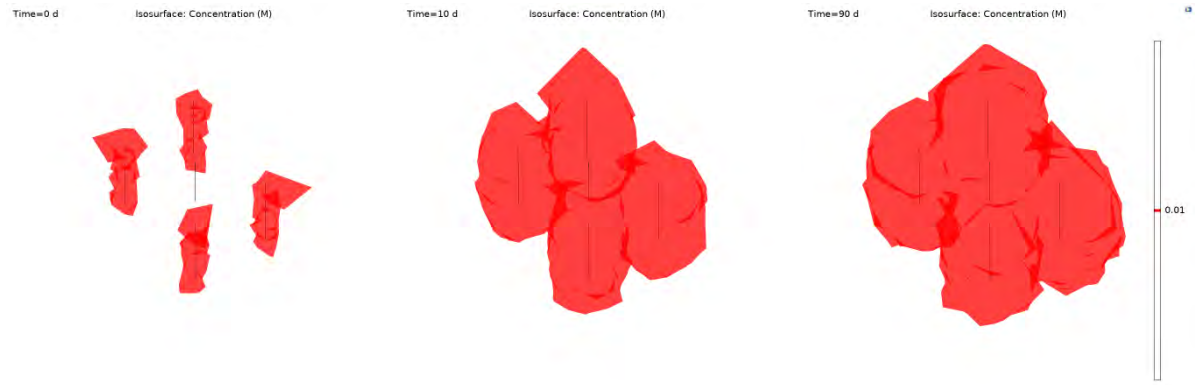

Figure 5: Circulation Trial lixiviant plume over time

The COMSOL lixiviant extent predictions were overlain on the site map (figure 6) and the extent of the affected groundwater. The calculated radius is estimated to be 12.2m from the extractor and will not reach the established monitoring array.

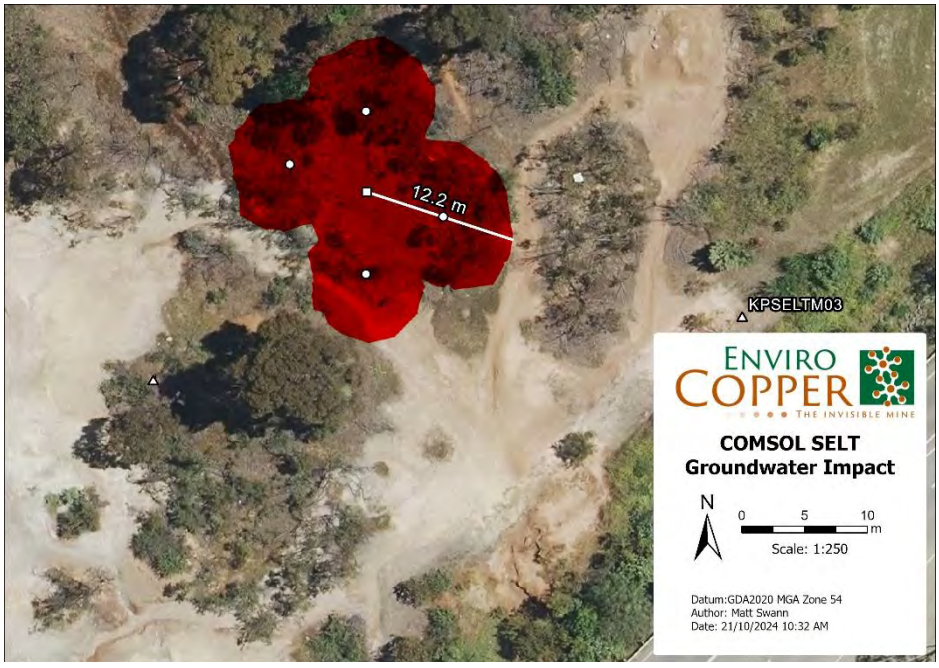

Figure 6: SELT COMSOL Groundwater Impact

Darcy velocity vectors are used to demonstrate the flow direction and speed of groundwater (figure 7). This demonstrates well the change in flow direction around the historic underground workings. Dark blue arrows represent slow and natural groundwater flow. Whereas the red arrows represent the relatively faster flows from the pumping throughout the CT. This close view of the SELT pattern also exhibits the classic 'petal' shape which is ideal for flows of a 5-spot pattern.

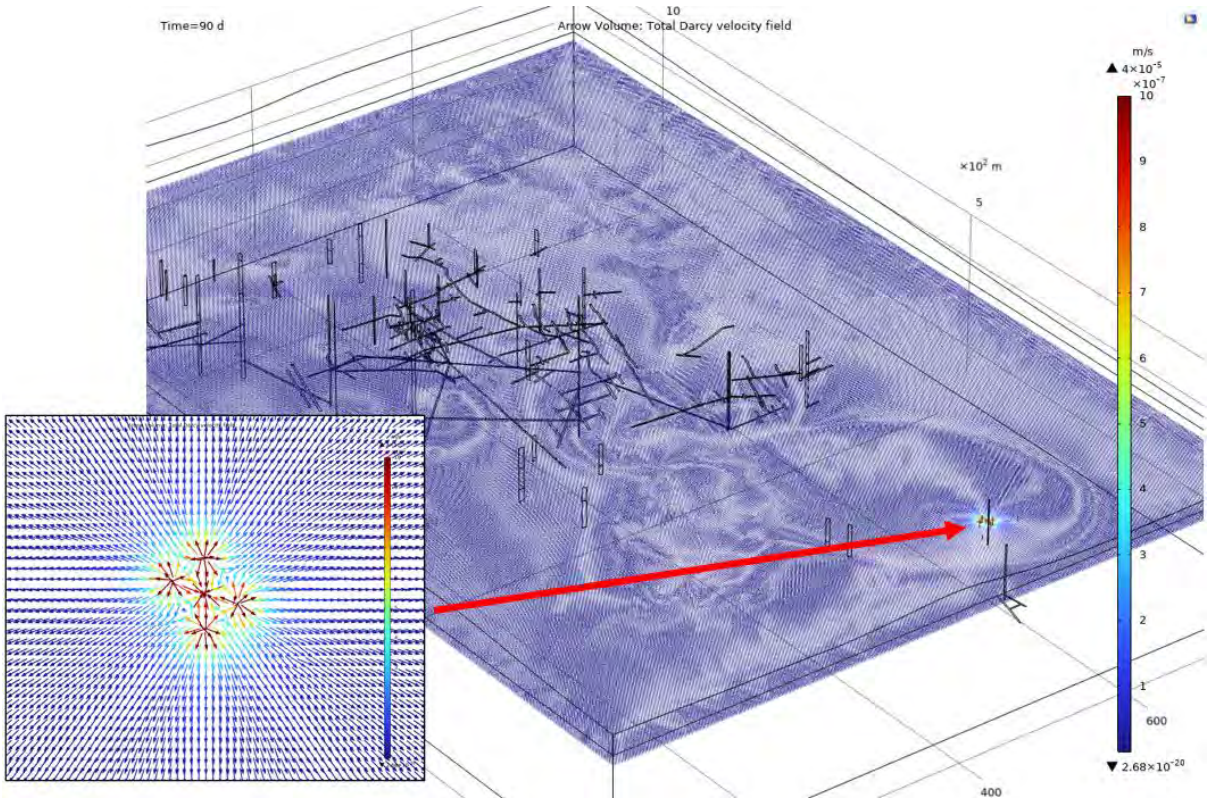

Figure 7: COMSOL CT groundwater flow

Circulation Trial (CT) Estimates

Copper production estimates were produced from the simulation (see figure 8). Over the duration of the trial the copper produced is estimated between 7,592 kg (7.5 tonnes) at 60 days and if extends to 90 days 11,767kg (11.7 tonnes). The PLS grade peaks at 5.13 g/L on day 23.

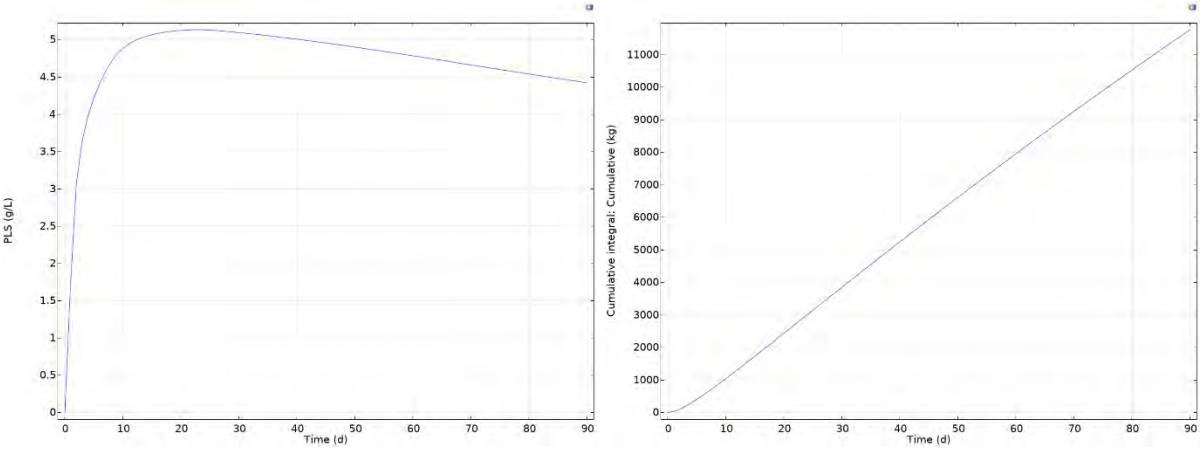

Figure 8: COMSOL CT PLS grade (a) & Cu Production (b) estimates

Conclusion

The COMSOL (ECL) and geochemical (LWC) model of the push pull trial estimated that the extent of groundwater impact to be between 5.3m and 7.5m. Comparison between the physical data which shows no significant changes at the observation array approx. 10m away which demonstrates a reliable model. With the COMSOL model verified a simulation was conducted and the extent of groundwater impact is estimated to be 12.2m from the extraction well for the upcoming Circulation Trial.

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Kapunda SELT

Site A & Site B Comparison

Contents

Executive Summary 3
Surface Mapping 4
Structural Data analysis 6
Grade Distribution 12
Hydrogeological Comparison 13
Site B Tracer Test 14
Electro Seismic Data 16
Conclusions 17
Appendix A: location Map 18

Executive Summary

A number of conclusions can be made regarding Site A and Site B including:

- Transmissivities are similar at Site A and Site B
- Material at Site B is slightly less porous than Site A
- Slight difference in fracture sets as predominately north-south group does not present at Site B therefore unlikely to require 3rd monitor bore along this fracture orientation.

By and large, the similarities between the measurements reinforce the view that there is no significant difference in a hydrogeological sense between the 2 sites, and overall, we expect Site B to behave in a hydro geologically similar way to Site A.

Structurally, site B doesn't show the pronounced North South suite of fractures that are prevalent at site A which may mean less flow in that direction under normal hydraulic gradient. This will be considered when positioning monitor bores.

Hydraulic data from pump testing, tracer testing and electro seismic estimations for both sites is similar suggesting flow rates and dispersion from injectors will be of a similar range (5-7m) so placement of monitors ~25m from the pattern should be adequate.

Figure 1 below shows the suggested primary fracture directions and monitor bore placement (light blue dots). Dark blue dots are bores that will be monitored during the trial and represent the limits of an "excursion".

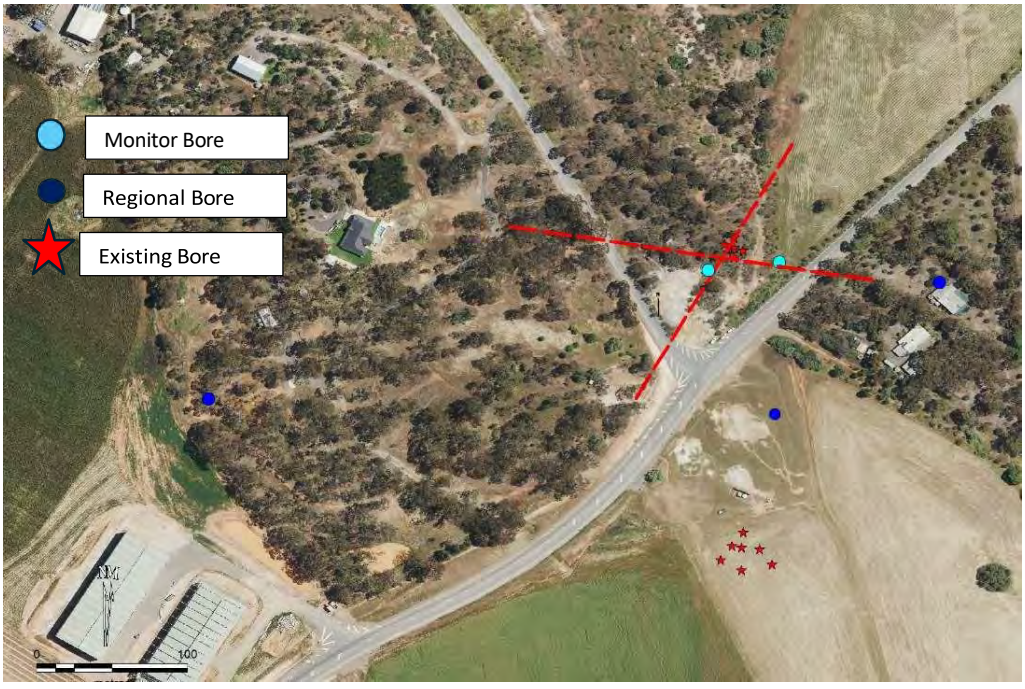


Figure 1: Image showing Google Earth imagery with monitor bores and primary fracture directions.

Surface Mapping

While drilling of the site B bores was being undertaken ECL carried out structural mapping of the closest exposure to the site B location. The area was a road cutting exposed when the Light Regional Council widened the Thiele Highway (figure 2 below)

Figure 2: Image showing Google Earth imagery with mapping overlain.

The road cutting is an effective geological snapshot as most of the vein sets can be seen including those mineralized with Malachite (Plate 1 below).

Plate 1: image showing mineralized veins in road cutting.

Interestingly most of the veins/fracture sets trend roughly Northeast - South West with almost no evidence of the conjugate set that we see quite strongly at site A.

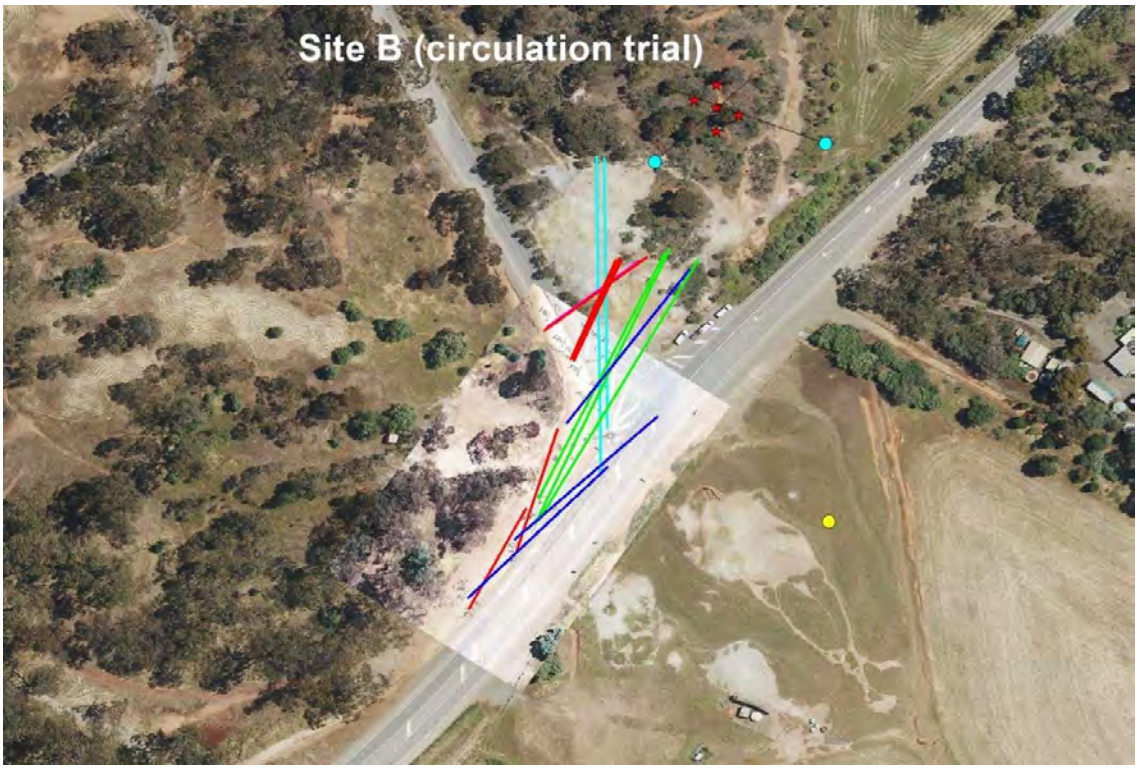


Figure 3: Image showing fractures and veins digitised onto imagery.

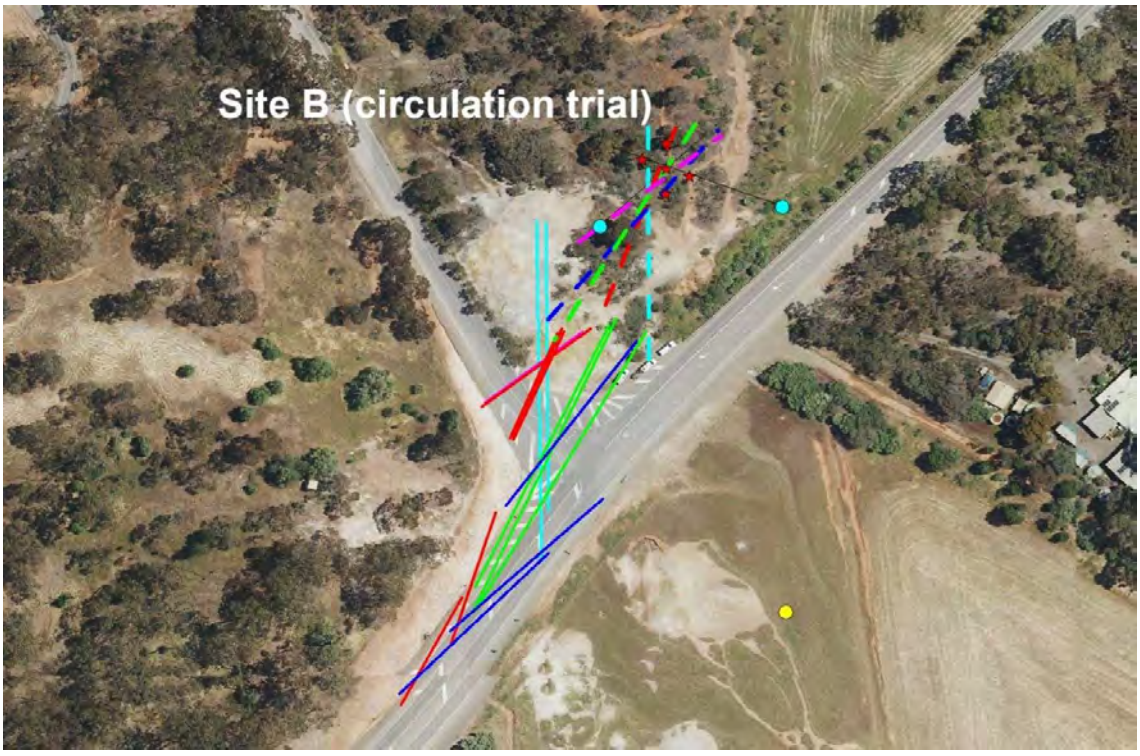
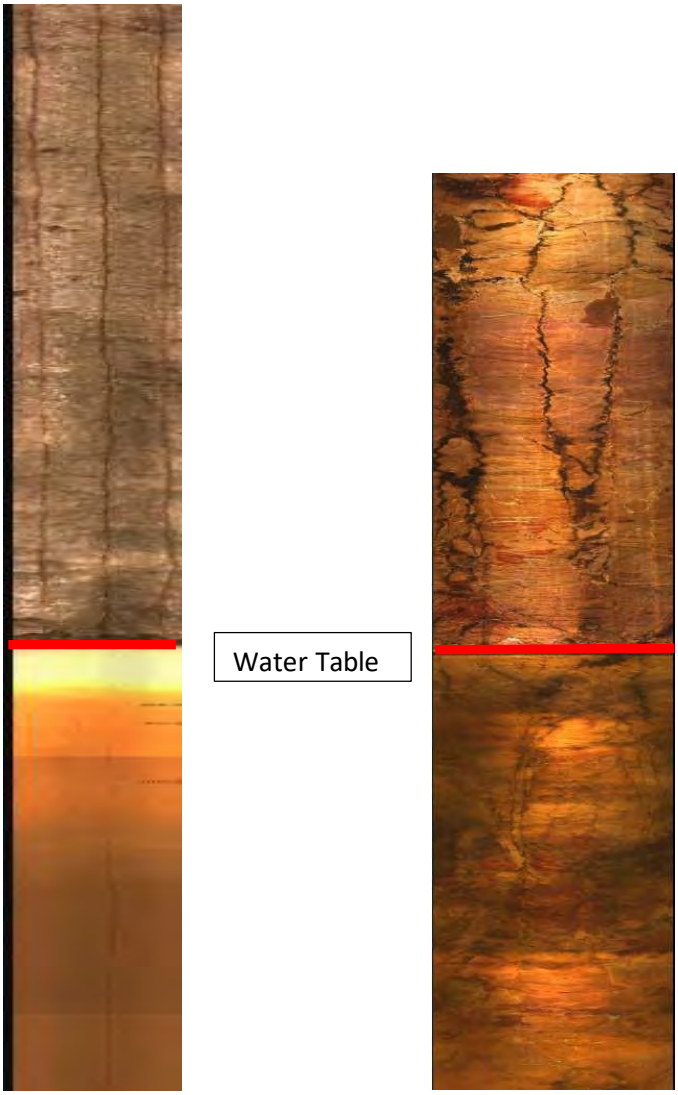


Figure 4: Image showing digitised fractures and veins transposed onto site B.

Structural Data analysis

Borehole Wireline were engaged to log the injection bores while drilling with the view to carrying out the same structural analysis as was carried out at Site B on hole KPSELTX01. Unfortunately, the ground conditions made It impossible to get the hole water clean enough to use the downhole optical scanner (see image below)



KPSELTX01 KPFRT01

Figure 5: comparison photo of KPSELTX01 (left) and KPFRT01 (right) showing view above and below water table.

In order to get some structural information at Site B, a diamond core hole was drilled. This hole was 25m deep and core recovery proved difficult, which is common at Kapunda in areas of highly kaolinised sediments. Photos of the core are included below.

Figure 6 Core photo 10-15m interval

Figure 7 Core photo 15-20m interval

Figure 8 Core photo 20-25m interval

It can be seen from the core photos that structure is difficult to see externally due to the weathered nature of the core. It was decided to send the core to OreExplore in Perth for whole core computer tomography imaging (whole core CT). This imaging process allows.

structures within the core to be seen in 3D and measurements to be taken on planar features (see figure 9 example below)

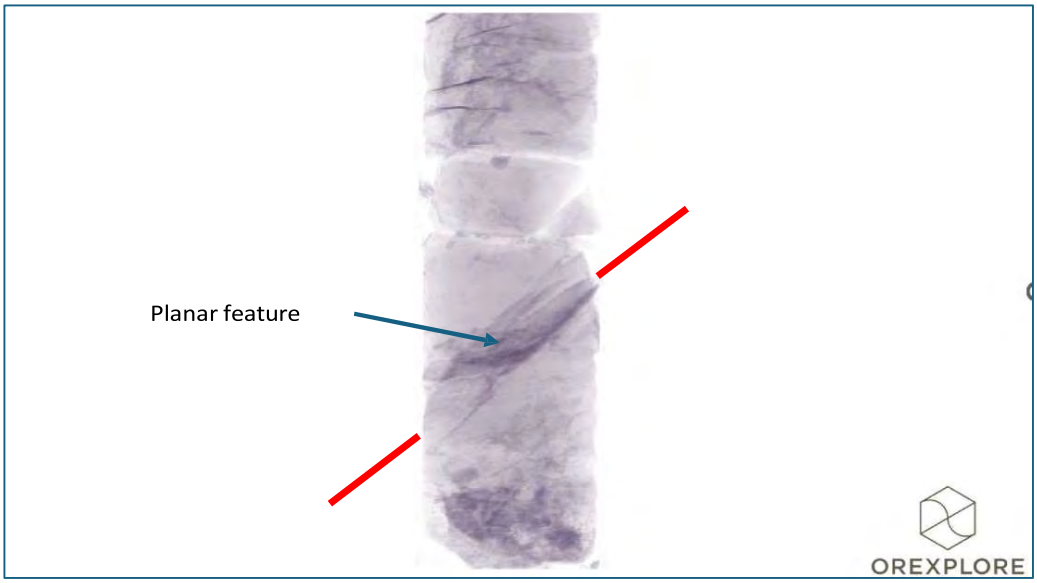


Figure 9 CT Core image showing example of planar feature.

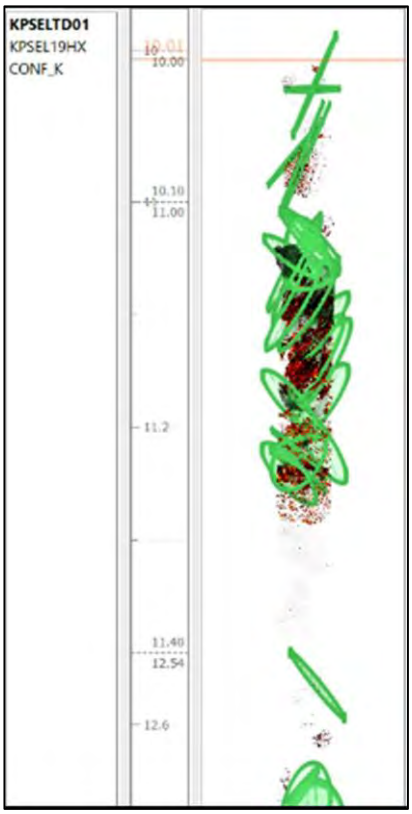


Figure 10: CT image of section of core showing structural interpretation of joints and veins.

The structural data was transferred to a spreadsheet for analysis and then loaded into Stereonet^{tm}. The figure below shows a frequency plot of fracture orientations, it can be.

seen that the peaks are around 75/250 and 290/110 degrees which agrees roughly with the surface structural mapping. It is noticeable that the north south trending set (5/355) prominent at Site A is not readily visible.

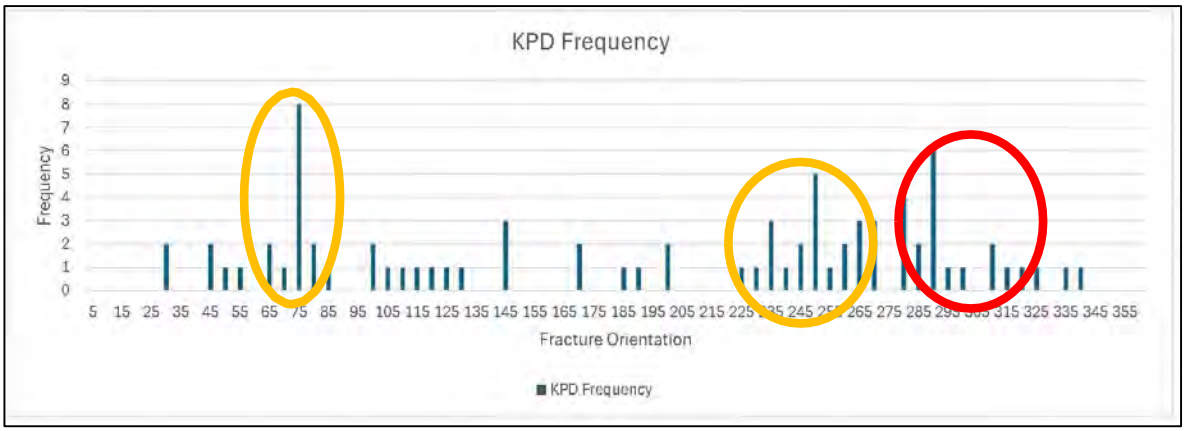


Figure 11: Frequency plot of fracture orientations showing peaks around 75/ 250 and 290/110 degrees.

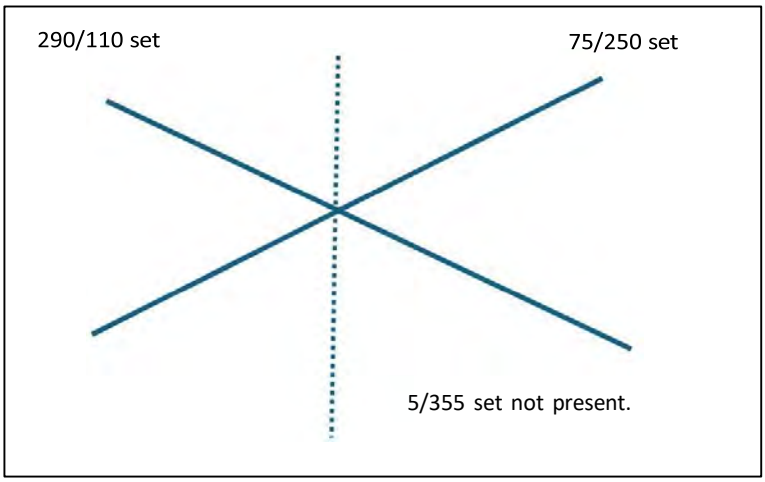


Figure 12: Frequency plot of fracture orientations.

The figures below compare the data compiled manually from CT imaging and the data from Borehole wireline logging of KPFRT01. Comparing frequency and orientation (figure 13) between the two holes highlights the absence of the northerly trending set.

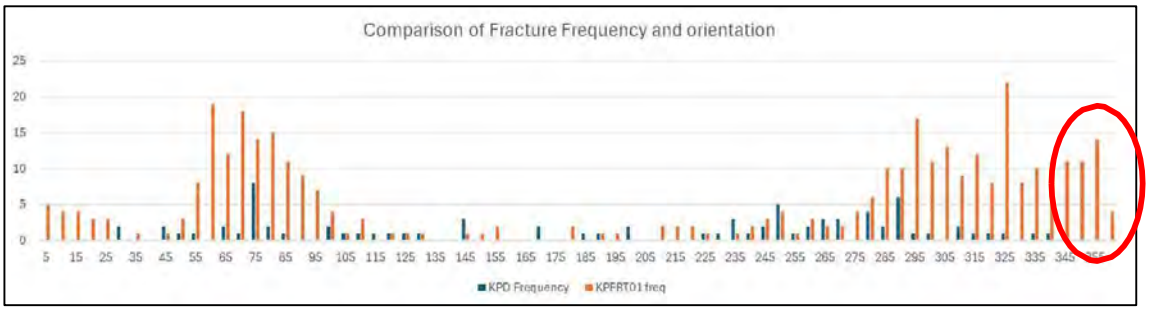


Figure 13: Comparison plot of fracture frequency and orientation between KPFRT01 and KPSELTD01 highlighting absence of north/south orientations in KPSELTD01.

Stereo plots

Data from the stereo plots highlights the point, the rose diagrams showing that the north south cluster seen at Site A is absent or very minimal at Site B.

KPFRT01: KPSELTD01:

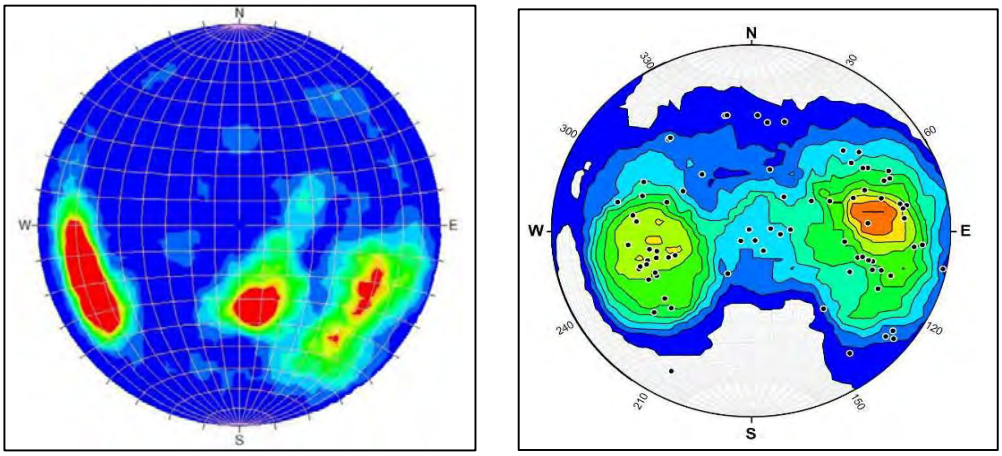
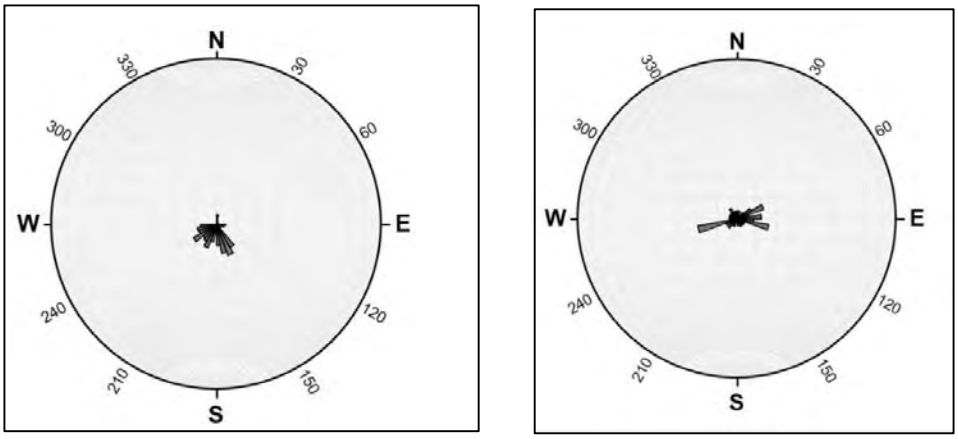


Figure 14: Comparison of stereographic projections of structural data measurements from Site A (KPFRT01) and site B (KPSELTD01)



KPFRT01 KPSELTD01

Figure 15: Comparison of rose diagrams of structural data measurements from Site A (KPFRT01) and site B (KPSELTD01)

Fracture Density

Looking at the fracture density as number per meter is difficult as the automated optical scanning picks up orders of magnitude more detail than a manual interpretation, however it is clear that the overall distribution of fracture density is quite similar between KPFRT01 and KPSELTD01.

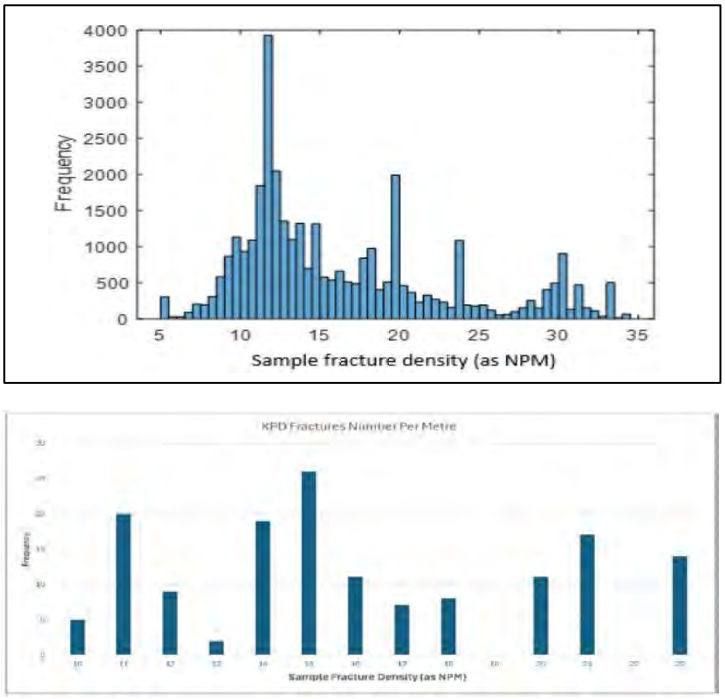


Figure 16: Comparison of comparison of fracture density (as NPM) for Kapunda general (top) and KPSELTDD1 (bottom)

We would expect that the different fracture orientation data will have a slight impact on the hydraulic conductivity, mainly on the preferred flow direction away from injectors down hydraulic gradient.

Summary of structural data

Overall, the structural data for both sites is similar except that Site B does not seem to have the North/South fracture set that is prominent at Site A.

Grade Distribution

Grade distribution from assay results obtained from all wells shows a trend that is roughly parallel to the main fracture orientation and consistent with the rest of the Kapunda ore body (see figures below).

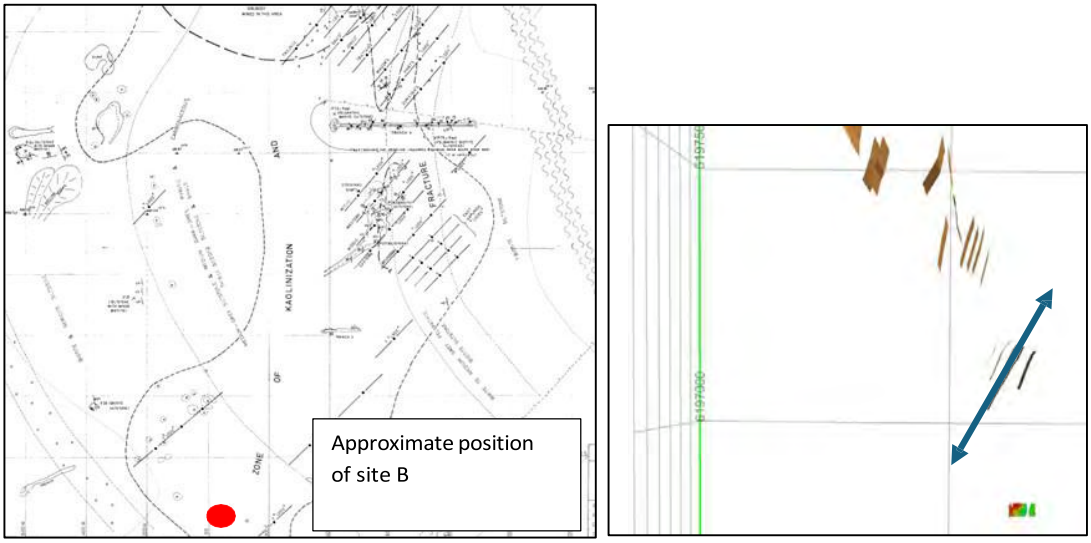


Figure 18: Excerpt of Northland geology map (taken from historic envelopes) showing orientations of various Kapunda lodes and map showing lode structures relative to site B.

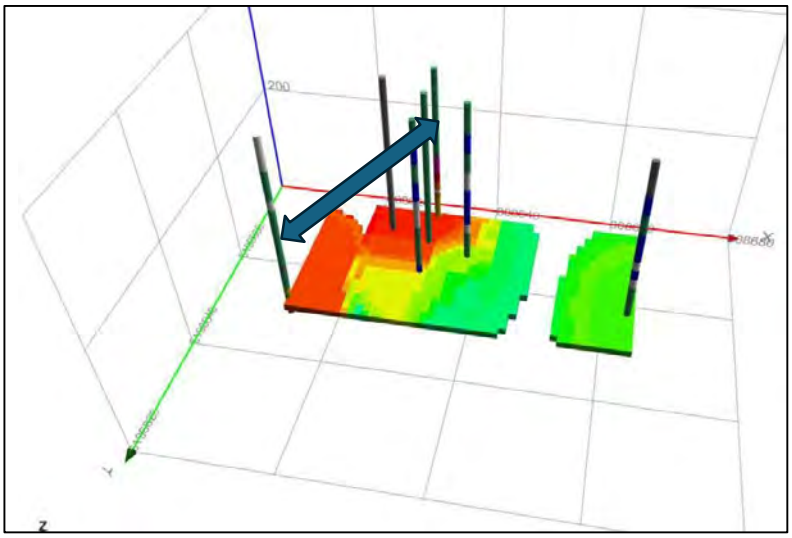
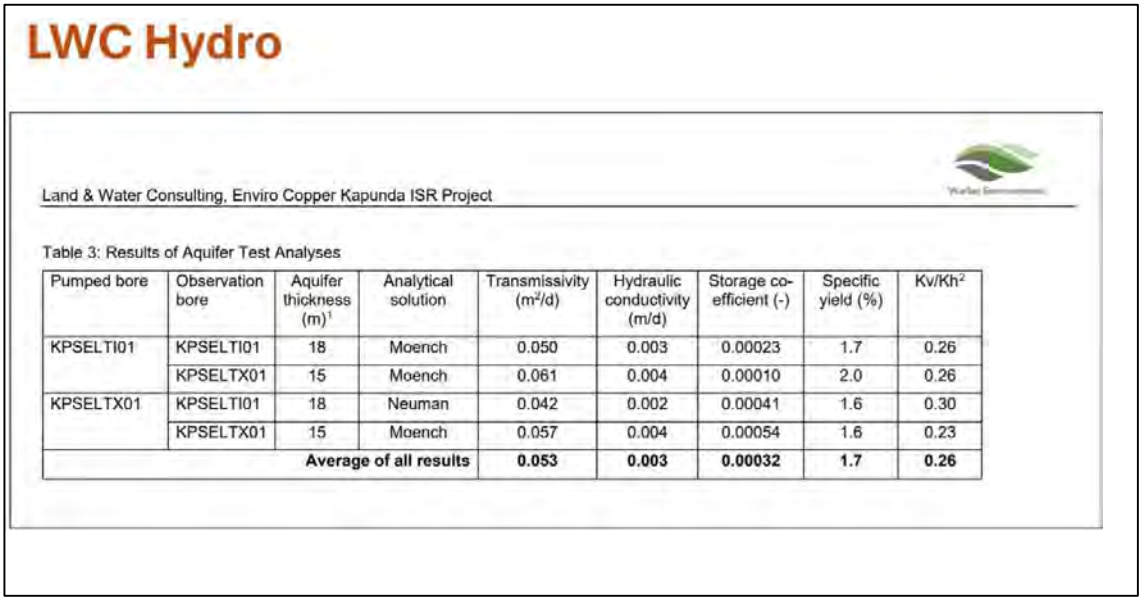


Figure 19: Diagram showing copper grade block model for screened area and Site B wells highlighting mineralisation direction.

Hydrogeological Comparison

In March 2024 Land and Water Consulting conducted pump testing on the planned extraction bore KPSELTX01 and injection bore KPSELTI01 at Site B, this confirmed hydraulic connectivity between the two.



LWC Hydro

Land & Water Consulting, Enviro Copper Kapunda ISR Project

Table 3: Results of Aquifer Test Analyses

Pumped bore	Observation bore	Aquifer thickness (m)[1]	Analytical solution	Transmissivity (m^2/d)	Hydraulic conductivity (m/d)	Storage co-efficient (-)	Specific yield (%)	Kv/Kh^2
KPSELTI01	KPSELTI01	18	Moench	0.050	0.003	0.00023	1.7	0.26
	KPSELTX01	15	Moench	0.061	0.004	0.00010	2.0	0.26
KPSELTX01	KPSELTI01	18	Neuman	0.042	0.002	0.00041	1.6	0.30
	KPSELTX01	15	Moench	0.057	0.004	0.00054	1.6	0.23
			Average of all results	**0.053**	**0.003**	**0.00032**	**1.7**	**0.26**

Figure 20: Table showing results of LWC pump testing of injection and extraction bores.

It can be seen from the comparison table below that the transmissivity at Site B is considerably lower than Site A but the specific yield appears to be higher.

	Site B KPSELTEXT01	Site A KPFRT02
Transmissivity	0.06	0.36
Specific Yield	0.02	0.01

Table2 showing comparison of results from site A and site B pump testing.

Summary of hydrogeological testing

Looking at the data, there is nothing to suggest that fluid will move further or faster than at Site A (in fact the lower transmissivity would suggest a slower groundwater movement) and the modelling suggests the same, so a similar monitor network installation spacing is suggested.

Site B Tracer Test

Land and Water Consulting carried out a tracer test at site B in August 2024, they injected a sodium bromide solution into KPSELTX01and then sampled from the proposed injection wells (KPSELTI01, I02, I03 & I04) to measure the time it took to reach them.

The time to reach KPSELTI01 was around 170 minutes which is comparable to the tracer test result on site A (the distance between wells for the tracer tests at site A and site B are directly comparable ~9m vs ~7m). This implies that the transmissivity at both sites is similar.

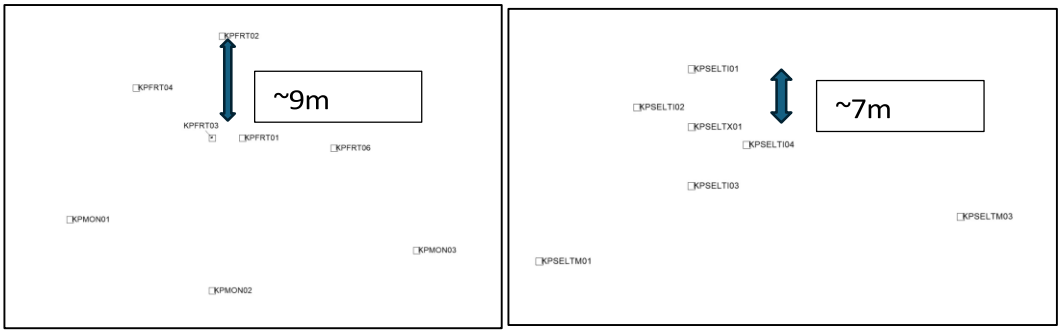


Figure 21: Diagram showing relative distance between wells for tracer test at site A (left) and site B (right)

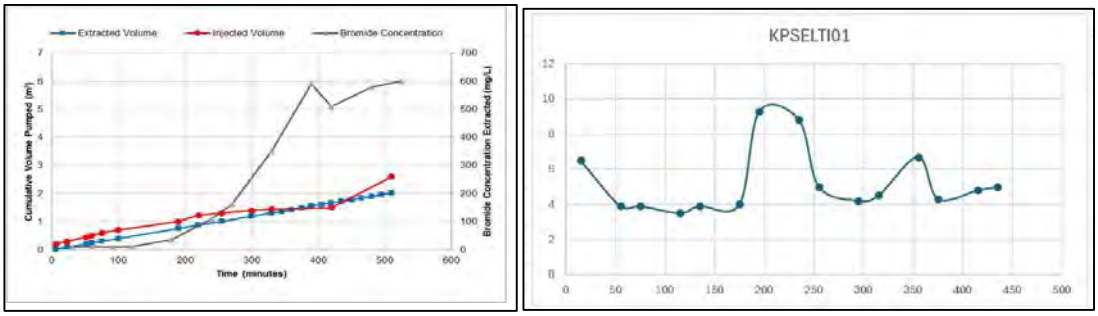


Figure 22: Diagram showing Bromide concentration over time for site A (left) and site B (right)

Analysis of results for KPSELTI02 and I04 suggested severe silting up of wells (see figure 22 below)

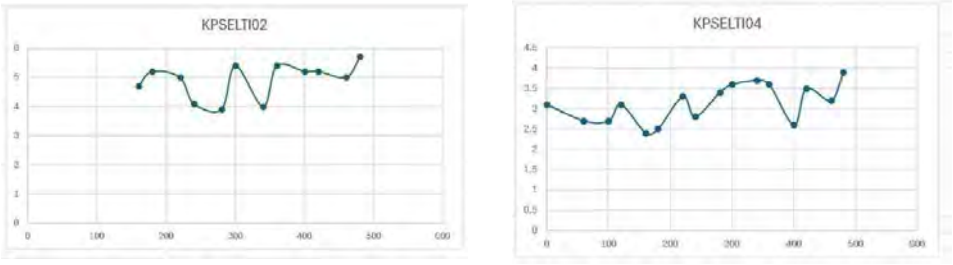


Figure 23: Diagram showing Bromide concentration over time for KPSELTI02 (left) and KPSELTI04 (right)

Dipping of the wells confirmed silting up in I02, I03 and I04 (see Figure 24). A pump test of the wells was then undertaken which confirmed blockage of I02 and I04, so they were subsequently air lifted. The results of the second pump test show that subsequently air lifted and showed marked improvement in hydraulic conductivity.

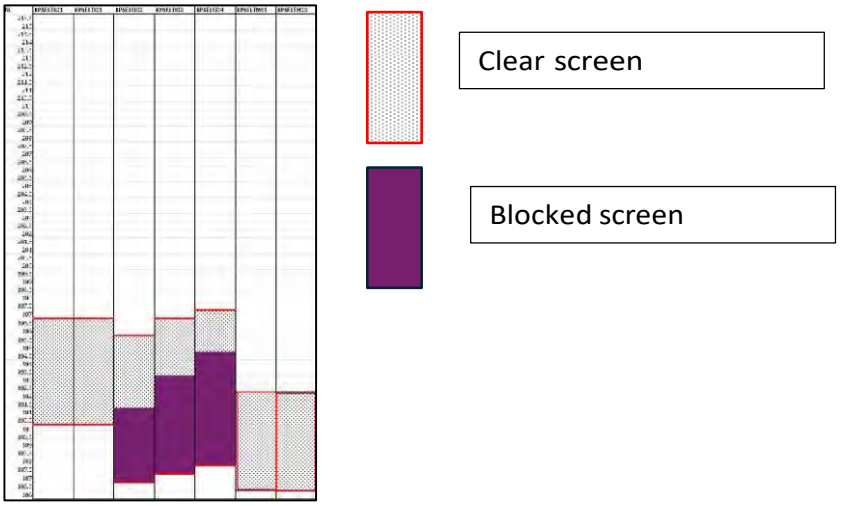


Figure 24: Diagram showing results of dipping wells-red lines are screened interval, purple areas are silted up.

ECL conducted a pump testing confirmed blockage (see figure 25) with I02 and I04 showing little drawdown and very slow recharge rate, with these two not recharging to baseline water level after 24 hours. Another pump test was conducted after the blockage was cleared (see Figure 26) showing an improved recharge rate.

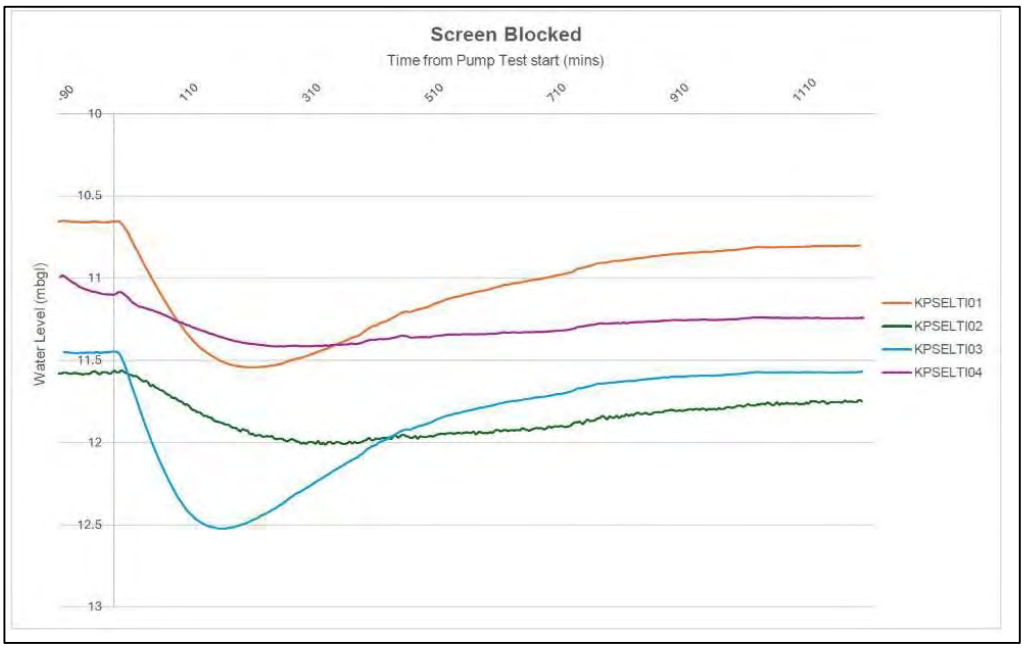


Figure 25: Graph showing pump test results with silted up wells.

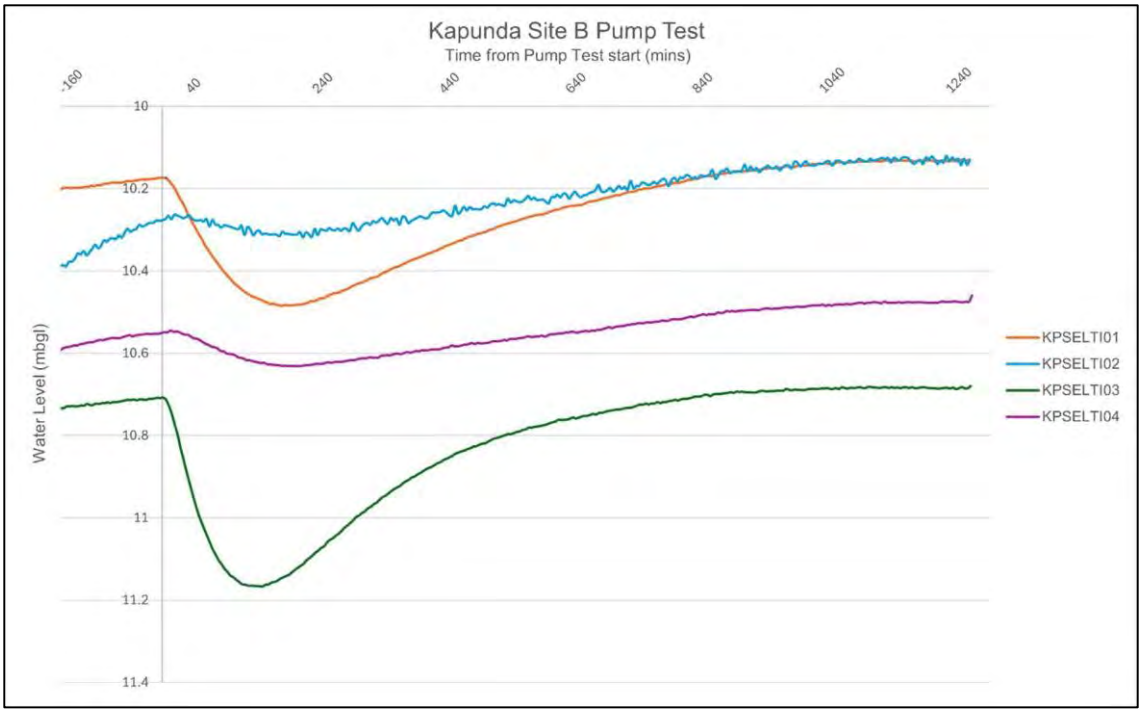


Figure 26: Graph showing results of pump testing of wells post airlifting with improvement in I02 and I 04

Electro Seismic Data

A comparison of hydraulic parameters determine via electro seismic measurements indicates little difference between the 2 sites, pore space yield being the only significant difference.

Electro Seismic Estimates		
	Site B ATS Eelctro Seismic (2023)	Site A ATS Eelctro Seismic (2023)
Hydraulic Conductivity (m/d)	0.002904	0.00285
Transmissivity (m2/day)	0.000317	0.00027
Specific Yield (%)		
Permeability (Darcy)	3.48	3.421
Porosity	0.17	0.18
Pore space Yield (L/s)	0.0037	0.262
ET	0.56	0.49
Apparent Resistivity (ohm/m)		

Figure 27: Table showing comparison of electro seismic results for Site A and Site b

By and large, the similarities between the measurements reinforce the view that there is no significant difference in a hydrogeological sense between the 2 sites.

Conclusions

A number of conclusions can be made regarding Site A and Site B including:

- Transmissivities are similar at Site A and Site B
- Material at Site B is slightly less porous than Site A
- Slight difference in fracture sets as predominately north-south group not present at Site B therefore we suggest that a 3rd monitoring bore along this fracture orientation is not required.

By and large, the similarities between the measurements reinforce the view that there is no significant difference in a hydrogeological sense between the 2 sites, and overall, we expect Site B to behave in a hydro geologically similar way to Site A.

Appendix A: location Map

Australia's National
Science Agency

Community perceptions of potential renewed copper mining, Kapunda, S.A.

Town identity & views towards Copper In-Situ Recovery methods

Tom Measham, Simone Carr-Cornish and Andrea Walton
30 October, 2019

Cooperative Research Centre Project- Kapunda In-situ Copper and Gold Field Recovery Trial

Citation

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Contents

Acknowledgments....4

Executive summary....5

1 Introduction....6

1.1 Location....6

1.2 In-situ recovery....7

1.3 Social licence....7

2 Aim of this research....9

3 Methods....10

3.1 Qualitative design....10

3.2 Analysis....10

4 Results....12

4.1 Town identity and community values....12

4.2 Procedural fairness....14

4.3 Distributional fairness....15

4.4 Confidence in governance....16

4.5 Trust....17

4.6 Perceived benefits....18

4.7 Perceived impacts....19

4.8 Knowledge of ISR and the proposed development....20

4.9 Communication....21

5 Discussion and conclusions....22

5.1 What does it mean for the town?....22

5.2 What does it mean for the proponents?....23

5.3 What does it mean for research?....26

5.4 Conclusion....26

6 References....28

Appendix 1: Guiding questions for focus groups and interviews....31

Figures

Figure 1 Location map showing Kapunda and Adelaide, South Australia 6

Figure 2 Model of social licence dimensions adapted from Moffat et al 2017 8

Figure 3 Kapunda Historical Mine Site and site of potential renewed mining. Photo author: A.C Thiele of Kapunda. 9

Figure 4 View of Kapunda township. Photo author: A.C Thiele of Kapunda. 13

Figure 5 Relationship between interview themes.....22

Figure 6 Levels of impact and interest for communication 25

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Executive summary

This report presents the findings of social research to investigate how residents of Kapunda, South Australia view the mining sector in general and how it fits with town identity. It considers the extent to which a renewed mining industry would align to existing values, and explores the residents' concerns and perceived benefits relating to the potential use of In-situ Recovery (ISR) methods to extract copper from a historic deposit in the town.

The research presented in this report is based on qualitative analysis of focus groups conducted to understand how residents view the mining sector in general, its fit with town identity and the extent to which a renewed mining industry aligns to existing values. It presents the findings on residents' perceived benefits and concerns, relating specifically to ISR methods, as part of a wider portfolio of projects on the social, technical and environmental feasibility of ISR in Kapunda.

The research employed a social licence framework to consider the inter-relationships between different factors which contribute to trust in and acceptance of extractive industries. This framework was originally developed by CSIRO in relation to the mining industry and has since been refined and customised to multiple industries. The framework considers impacts and benefits, procedural fairness, distributional fairness and confidence in governance. The results are not intended to be representative in a statistical sense. Rather, the qualitative methods employed in this research enable a deep understanding of the different issues and dimensions that participants have in focus when considering a potential new development. The research provided a deliberative process for participants to reflect on and share their perspectives on perceived concerns and opportunities related to In-Situ Recovery and the mining industry in general.

The research demonstrated that ISR was seen to have potential for the town. Data highlighted several tangible and intangible benefits. Participants indicated that putting Kapunda 'on the map' as the first Australian ISR Copper mine was appealing and resonated strongly with the town's historical identity as the country's first ever copper mine. Other perceived benefits included contributing to the local economy with participants expressing that even modest increases to employment would be welcome. The study also raised perceived concerns, in particular around visual amenity and disruption to a historic site.

The degree to which a new ISR mining operation in Kapunda would be ultimately accepted depends on following a rigorous, evidence-based research and assessment process and maintaining transparent communication to show that any potential environmental impacts were understood and managed effectively.

1 Introduction

1.1 Location

Kapunda is a town of around 3,000 people (ABS 2016) located approximately 80 kilometres from State capital of Adelaide on the Thiele Highway, north of the Barossa Valley. Mining was central to the early development of the town during the 1840s where Australia's first commercially successful copper mine was established and operated for several decades and played an important role in the State economy. The town developed adjacent to this mine and to this day the town is situated adjacent the historic mine. This mining history continues to play an important part in the town's identity. The pastoral industry also has an important role in the history and identity of the town. Sir Sydney Kidman, a pastoralist with extensive holdings across Australia, established his home and office in the town which served as his base from the 1880s to 1921. The economy of the town has changed over time and in the current era the economic sectors with the highest employment in town are wine making, aged care residential services, secondary education, pubs and road freight transport (ABS 2016). The town also produces stock feed products for domestic and export markets, as well as road base, concrete and land scaping materials from a nearby quarry.

Figure 1 Location map showing Kapunda and Adelaide, South Australia

1.2 In-situ recovery

In-situ recovery (ISR) is a form of extracting target metal from minerals without mining the rock that contains them. ISR has sometimes been referred to as 'keyhole mining': rather than removing ore from the ground, a solution is pumped underground through boreholes to dissolve the target mineral in place (hence in-situ) then the solution is pumped back to the surface where the metal (e.g. copper) is recovered (Kuhar et al 2018; Robinson and Kuhar, 2018). Because it is not necessary to remove the ore, there is considerably less surface disturbance compared with open pit mining, which avoids the creation of large voids, reduces dust and noise, removes the need for tailings dams and requires minimal infrastructure. ISR involves pumping a solution underground, which raises other potential issues (Lacey et al 2019). The solution that is used should be able to dissolve the target mineral (based on its chemical properties), and the solution composition is expected to vary from natural background groundwater compositions. Therefore, solution flow control and containment is required to retain solution within the mining area and prevent leakage. ISR mining is used commercially in Australia but has not yet been used for copper (Kuhar et al 2018; Robinson and Kuhar, 2018).

1.3 Social licence

Research at both local and national levels has demonstrated that procedural fairness, distributional fairness as well as confidence in governance, are critical in determining the social acceptance of prospective projects by local communities (Falck, 2016; Zhang, Measham and Moffat 2018; Lacey et al, 2017; Moffat & Zhang, 2014; Moffat et al. 2018). In the context of resource development at the local level, procedural fairness is about whether community members feel that their voice is heard and respected in the decision-making process. Community members' trust in a mining company represents their confidence that the mining company will act responsibly on issues that matter to them. Confidence in governance refers to whether community members believe that the regulatory and legislative arrangements are capable of ensuring responsible mining development. In contrast, distributional fairness reflects the idea that impacts and benefits are shared equitably. Distributional fairness can occur at local scale e.g. considering potentially different outcomes for segments within a host community, or at regional scale – e.g. whether whole regions receive a curse or blessing from their resource base (Fleming et al 2015). In addition, the role of perceived benefits and impacts has been commonly recognised as affecting acceptance of resources projects (Walton et al 2017; Moffat et al 2017; Measham and Zhang, 2019) as represented in figure 1.

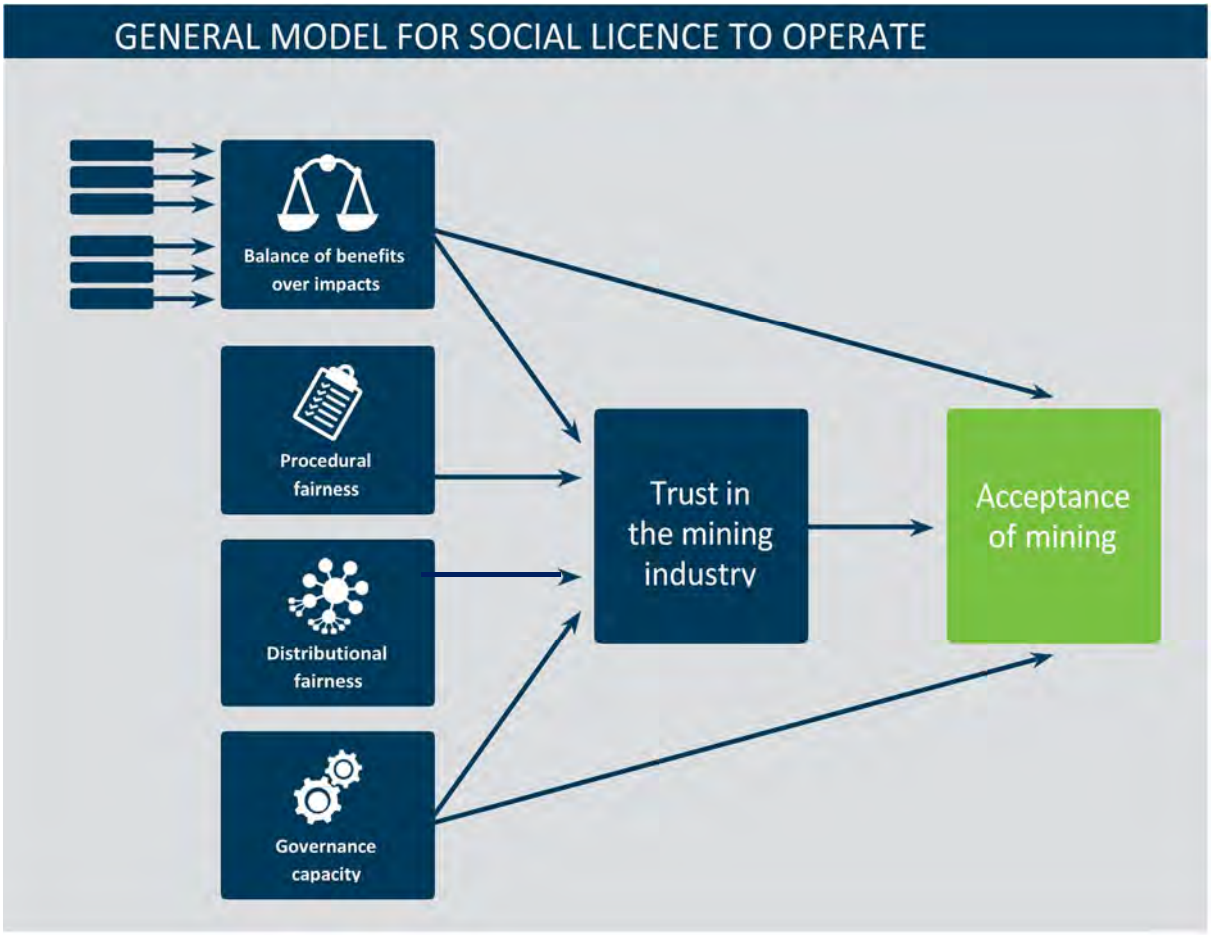

Figure 2 Model of social licence dimensions adapted from Moffat et al 2017

2 Aim of this research

The aim of this project was to understand how residents of Kapunda view the mining sector in general and how it fits with the identity of the town. Furthermore, the project aimed to clarify to what extent a renewed mining industry would align to existing values and identify any perceived concerns and benefits relating to in-situ recovery methods. More broadly the project sought to provide a deliberative process to reflect on and share perspectives among residents on perceived concerns and opportunities related to a potential ISR development on the site of the historic copper mine that was central to the establishment of the town. Understanding these issues and how they potentially related to general dimensions of social licence were seen to be important components of an integrated approach to considering the social, economic and environmental feasibility of copper ISR mining in Kapunda and in Australia more generally. The research was funded as part of a Cooperative Research Centre Project which also comprised research on groundwater flow, water and soil characteristics, chemistry of potential lixiviants (dissolving agents) and the geological structure of the remaining copper deposit in the town, shown in Figure 3, including hydrogeological characteristics. These components have been designed to develop an integrated approach to researching the feasibility of extracting copper through in-situ recovery methods in Kapunda.

Figure 3 Kapunda Historical Mine Site and site of potential renewed mining. Photo author: A.C Thiele of Kapunda.

3 Methods

3.1 Qualitative design

The data were collected at two focus groups and four key participant interviews. There was a total of 18 participants reflecting a wide range of people across different segments, seeking to represent a breadth of perspectives in line with qualitative research designs, rather than a statistically representative sample (Beitin, 2012). In the two focus groups there were respectively, 8 and 5 participants. Across the four interviews there were five participants, which included two participants in one interview. Despite invitations to approximately equal numbers of males and females, the sample was skewed towards males with 15 men and 3 women participating. Participants ages ranged from approximately 40 to 85 years. The participants represented a range of positions within the community, including Local Government Councillors, leaders of local groups and other key roles in the community, such as local business and educators. The participants also represented a range of connections with the site where potential mining operation would occur. Several of the participants had a connection to the historic mine site, either through their interest in local history, where they lived. or through their recreational activities which involved frequent visits to the site and its historical walking trail.

In line with the aims of the research, the guiding questions for the focus groups and interviews centred on the understanding the character and identity of the town and views of the mining sector in general. The focus groups were conducted in Kapunda by the authors' project team with skills in qualitative research methods and experience in facilitation of focus groups. This was followed by a technical presentation given by a mine processing chemistry expert about ISR mining in general and described examples of other ISR mining projects in other countries. The presentation provided information about the technical components of ISR and how the Cooperative Research Centre-Project is investigating how these could be applied in Kapunda. The presentation explained the dissolving process and discussed a range of potential dissolving agents (lixiviants) which could be employed, depending on the environmental characteristics of the site. This presentation was seen by participants as very helpful in developing an idea of what an ISR operation in Kapunda could look like. Following the technical presentation, the focus groups and interviews proceeded to discuss concerns and perceived benefits from a potential ISR operation in Kapunda. The full set of guiding questions from the focus groups and interviews is presented in Appendix 1.

3.2 Analysis

The interviews and focus groups were transcribed and imported into qualitative analysis software (NVivo v12). Analysis involved systematically grouping the responses into themes and then aggregating these themes. Employing the Adaptive Theory approach (Layder, 1998), the research team started with an initial model in mind based on the general model of social licence presented in Table 1 and adjusted based on the reflections recorded by the research team immediately after

the focus groups and interviews. Once the transcripts were entered into the software, the research team compared the emerging themes with the initial model to arrive at the final set of themes presented in this report. The coding was conducted individually by two members of the research team and then cross-checked by other team members to confirm the robustness of the coding process.

4 Results

4.1 Town identity and community values

Participants described Kapunda as a friendly and relaxed place to live. They emphasised it has having the dual advantages of a quiet country feel and a strong sense of community. At the same time they highlighted that Kapunda was relatively accessible to the State capital of Adelaide which is considered an easy drive. Participants depicted Kapunda as a quiet, safe place where most people knew each other and took the time to ask how they were going when they passed in the street. Participants stated a high regard for the infrastructure and services in the town. These included good medical facilities, emergency services, excellent schools, and high quality recreational and sporting opportunities.

Participants described the town's strong historical connections to both mining and pastoralism. They emphasised the town identity is strongly linked to mining, with the town being established as the first commercially successful copper mine in the country and played an important role in the prosperity of the State during the 19th Century. Participants also emphasised how the identity of the town was also strongly tied to the Kidman pastoral company. Sir Sydney Kidman established his headquarters in the town, subsequently donating the building to the Education Department when he retired.

Participants explained that many residents maintain a connection to the historic mine site, either through involvement in the local history society, as a place of recreation for walks or for business, with fitness classes operating at the mine site and places providing accommodation to visitors taking part in heritage tourism.

However, it was also noted that not all residents were interested in the history of the town. For some people Kapunda represents a convenient location. Many people who live in the town do so because it is a comfortable and affordable place to live and an easy commute to work in places such as the Barossa Valley, Gawler, Elizabeth and Adelaide.

"It has a lovely village feel about it…set in a very beautiful natural environment…

"…people say g'day to you, you pretty much know everybody"

"…the mining is huge. It's what the town was based on. The mine site is very important"

Participants conveyed that the town has been progressive in recent years, improving the streets and enhancing the visual amenity of the town through murals and signage that convey the history of the town and its links to both the mining and pastoral industries. Participants were upbeat about some of the developments in the town such as the opening of a brand-new supermarket and a new bakery. Over the years the school has grown and currently has around 500 students. The school has a special link to the history of the town as one of the buildings was formerly the home and office of Sir Sydney Kidman who donated the building to the school when he retired.

Some other aspects of the town were seen as limitations. Kapunda is lacking some services, especially retail options. A large proportion of shopping is conducted outside the town. Participants raised several examples of shops and cafes that had tried to establish themselves in the town but had closed not long after opening, due to having insufficient customers to pay the rent.

This related to another issue raised by participants: there are currently not many employment options in the town itself. This was particularly a concern for young people. Besides the stock-feed processing facility and a small number of shops there were not many places that local school leavers could find jobs.

Figure 4 View of Kapunda township. Photo author: A.C Thiele of Kapunda.

4.2 Procedural fairness

From the perspective of some participants, procedural fairness (i.e. having a voice, building relationships, being treated fairly) was high. In the focus groups and interviews participants described how the project proponents have made a commitment to making themselves available to the public through opening an office in the main street. The data from the focus groups and interviews also confirmed that the proponents have been highly engaged with Council and proactive about providing information and responding to queries. Some participants also mentioned that the proponents had built good relationships with those who could serve as potential suppliers or provide professional services to the project, if it goes ahead.

Other participants had never heard of the proponents and had no previous knowledge of the proposal for a new ISR mine prior to the focus groups. They came with an open mind and many questions about ISR methods and details of the project. For these participants there was an appetite for increased interaction, reflecting a need for expanding the range of people who have been engaged on the project. For these participants, procedural fairness was neither low nor high.

Other participants raised concerns about procedural fairness, in particular they thought they may have received a 'sanitised' version of the benefits and risks. Although they didn't articulate a tangible problem, the feeling of not quite receiving the full picture led to a sense of suspicion for those participants. It is important to emphasise that this is an issue of understanding and genuinely listening to people's concerns. Whether or not those concerns are based in fact is a separate issue. We also know from other research elsewhere that it may not be possible to satisfy everybody (e.g., Moffat et al 2017). The crucial part of procedural fairness is that people have a voice and that their concerns are genuinely considered.

We've been involved a fair bit, and there's a few points that have gotten raised.

I think they need to... invite the general public...not just a select few... this is what we're doing, come and listen

4.3 Distributional fairness

The focus groups and interviews highlighted that a new mining operation in the form of In-Situ Recovery would be generally beneficial to the town, with a wide range of benefits summarised in section 4.6. However, it was also acknowledge that renewed mining could affect some people differently from others. In particular, the downsides to a new operation could be unevenly spread across the town population. Social science refers to this as 'distributional fairness'.

The first aspect of distribution fairness is that some sectors of the economy may lose more than others. This was particularly a concern for the tourism sector, notably those operators servicing heritage tourism. If the heritage appeal of the site was diminished, or the site was closed for a prolonged period, then this could have a negative impact on those businesses. It was also noted that some businesses provide fitness classes at the mine site, and these would also be affected more than other businesses.

A second dimension to distributional fairness was the spatial concentration of impacts within a particular area. There was a concern that those people living close to that area could be more affected by potential issues such as noise, dust and visual impacts particularly during the construction phase which could involve truck movements, fence construction and other types of disruption. This issue was raised across both focus groups and interviews, including those who are not physically close to the site, but had concern for those people who were close.

The third way that distributional fairness arose during the research was through recreation. Participants identified communities of joggers and dog walkers use the site for recreation. These people would be proportionally more disrupted compared to others.

In considering the issue of distributional fairness, it is clear that timeframes are an important factor. Participants conveyed that a relatively short term disruption (e.g. up to a few months) would be an inconvenience that residents, businesses and recreationists should be able to tolerate. Conversely, a longer duration (e.g. years) would represent an unfair burden on those members of town who would bear the brunt of the impacts.

I can see enormous benefits for the town... the only thing I could see as being a problem is those people who are affected by that particular area

let's say we close your mine site for five years... some people would say 'don't care' and others, the joggers, the fitness classes... dog walkers ...would be well put out...

4.4 Confidence in governance

The focus groups clearly demonstrated that the vast majority felt the approval processes were rigorous and evidence-based. There was a strong sense that the project would only proceed following careful assessment at local and State levels drawing on rigorous research provided by University of Adelaide and CSIRO.

Confidence in governance could be strengthened further by providing more information about the steps in the decision making process, leading to increased trust. Some research participants had questions over decision making procedures, particularly around the sequence and timelines for steps in the decision-making process.

The issue of maintaining independence was also raised, particularly for monitoring. In order to maintain confidence in decision making, some participants emphasised that certain tasks should not be completed by the proponents in order to rule out any potential conflict of interest. Participants found the idea of an environmental 'scorecard' appealing, however they sought confirmation that reputable third parties were responsible for both preparing and updating the scorecard based on independent measurements. The ongoing monitoring of environmental effects is very important and ensuring independent monitoring from the outset is an important component of maintaining confidence in governance.

Another issue for maintaining confidence in governance is transparency about financial gains. For example, if residents suspected that one of the decision making bodies (such as Council or State Government) became focused on revenues coming from the project, then this would reduce confidence in governance. Thus, it is important to maintain transparency in decision making.

Providing that all the safeguards are met, I'm certainly in favour of the project

I am convinced [by] the process that we are going through in terms of the research and the approval process... it won't go ahead unless it's safe.

4.5 Trust

A range of factors emerged through the focus groups and interviews that contributed to trust in the industry. Some were factors that contribute to increasing trust and others to reducing trust. For some, trust was created through getting to know the proponents and seeing them as part of the town. This included establishing a physical presence in the main street, frequenting local businesses and regular interaction with Council.

trust is an issue...do we gild the lily somewhat? ... understate the dangers and overstate the potential?

The Cooperative Research Centre Project associated with the feasibility of ISR methods and their potential application in Kapunda was seen to be thorough, independent and multi-dimensional. All of these aspects were raised by participants as contributing to trust. The provision of technical information about ISR mining methods during the focus groups reinforced confidence in the wider goals of the research program and that Kapunda project is part of broader research initiative. An important aspect to building trust was that a decision whether to applying for permitting for a potential Kapunda operation would only occur after key research questions had been answered and findings considered and incorporated into a development application. In addition, when participants were informed about the multi-stage assessment process prior to any approval by government, they were further reassured. Part of this is recognising that residents are not locked in to any outcome.

Conversely, participants felt that trust was undermined when there was not full disclosure about the project. This included information related to what is happening, expected timeframes and the scope of the development. Participants understood the uncertainty around some of the issues but still felt it was important to be kept informed. Others were less concerned about receiving regular updates and more interested when conclusive information was available. In each case, adjusting the level and type of engagement is central to building and maintaining trust. Providing honest information about possible benefits and risks was identified as important to maintaining trust.

4.6 Perceived benefits

The focus groups and interviews raised a broad range of perceived benefits from the proposed development. Some of these were tangible benefits such as direct employment. Participants' views on the numbers for potential jobs stemming from the project varied, but tended to be modest, with estimates up to a maximum of 25 jobs. Some participants indicated they need these benefits to be clearly quantified prior to deciding on whether the net value of the project outweighs the disadvantages from their perspective.

There was a sense that, in small town where local school leavers had limited options any growth in employment, beyond existing industries, was seen to be valuable. Participants also thought there would be indirect benefits in the form of stimulus to local businesses due to increased demand for local goods and services. This was sometimes expressed as 'more feet on the street' and would be welcome by shops currently struggling to stay open. Another hypothetical benefit was seen to be revenue to council potentially in the form of royalties or lease fees (e.g., for site access) which could be reinvested in the town.

Some of the perceived benefits were intangible. Participants expressed that they were proud of their mining heritage and that Kaunda had once played an important role in supporting the State's economy. Several participants thought that the original mine was the first commercial mine in operation in Australia and formed a big part of the Town's identity. Opening the first copper ISR operation was seen by many as good for the town's image and would put Kapunda 'on the map' once again. This was partly symbolic – in terms of renewing the mining identity of the mine, and partly practical, in terms of attracting visitors to come and view the operation and put money through the local economy.

A broader societal perceived benefit related to education and development of world leading technologies. The advancement of knowledge relating to ISR methods and environmentally friendly mining methods was seen as beneficial for the town and revenues to the State. In this regard the CRC project that brought together University of Adelaide, CSIRO and mining companies would produce valuable insights, even if the Kapunda ISR mine doesn't proceed.

it's a great thing for our town…an in-situ business… would be of worldwide interest… we want to be on the map…

it brings more feet to Kapunda and our main street in particular, and business here need more feet.

4.7 Perceived impacts

Some participants were concerned about the potential for negative impacts on other sectors, particularly tourism. A new ISR operation would be located on the same site as the original mine which is now a heritage site. Visitors are drawn to the town to visit the historic mine providing a source of business for food and accommodation providers in the town. Participants expected that access to the site would be impacted and this could lead to reduced demand for businesses servicing the tourism industry. Participants noted the previous investment made by Council in making the site suitable for visitors and there was a concern an ISR mine could negate this investment.

A related issue could be that the visual amenity of the site could be reduced, for example through unappealing fencing or unsightly or noisy infrastructure, vehicles and plant equipment. A key consideration here would be the expected duration and extension of disruption to the existing amenity of the site. These issues could also affect fitness classes which currently occur at the site.

The amenity of the site is not only an economic issue affecting other industries. The site is valued as a place of recreation, exercise and where people go to admire the beauty of the coloured water that accumulates in the voids from the heritage mine.

A further set of potential perceived impacts related to the natural environment, in particular the possibility of polluting the aquifer or downstream water quality and possible subsidence. Even so, participants were generally confident that the risk of potential impacts to the natural environment would be managed through the research, approval and assessment process.

A concern was raised that the project may evolve into something bigger or different. For example, the proponents commence by extracting copper however over time they proceed to extracting gold. This could have greater impacts because gold extraction may require different processing and different lixiviants which carry greater risks. A related concern was that the project starts out small with a handful of wells but ends up much bigger in terms of number of drill holes and impact on the landscape. Participants sought reassurance that the opportunity to say 'no' wouldn't become reduced if the scope of the project changed over time.

I think there's some scepticism in the town as to whether tourism and mining can coexist in one big happy family

Can it be done without any damage to the aquifer or ground water?...

4.8 Knowledge of ISR and the proposed development

Participants had diverse levels of understanding about ISR methods from none through to moderate levels. Those with knowledge about ISR had gained their understanding through presentations given by the proponents, internet searches and discussions with other residents. For some participants, the presentation provided by the research team during the focus groups and interviews was their only source of information about the proposed development and ISR mining in general.

Those with some knowledge about ISR methods thought that ISR mining would involve less noise, dust and disruption compared to conventional mining, and avoid creating mining voids. These participants felt that range of lixiviants considered for the Kapunda proposal would be low risk, yet they thought other residents be concerned due to problems that had occurred in overseas using different lixiviants.

One important knowledge gap for participants was the physical properties of ISR mining. In particular, what happens when you remove the copper from the ground? does this leave gaps that could lead to subsidence? Having technical expertise on hand during the focus groups and interviewed allowed the research team to answer these questions on the day.

The interviews highlighted a general lack of clarity around size and scope of project and the timeframes involved. This largely reflects the fact that these details are generally not yet known due to the early stage. Some people did find this frustrating, because it is more difficult to form a view about a potential development when the details are not yet concrete.

Most participants were comfortable in the knowledge that these details would emerge in due course as a proposal takes shape and the research results come to light. These participants tended to reserve judgment about the project until the facts were in. A variation on this was that some participants expected the project would be a net gain for the town, thinking it was likely that the specifications for the project would be conducive to the town. Other participants were more sceptical and thought that the lack of detail was a sign of withholding information.

in-situ recovery is different ... if it was conventional mining. You would have people up in arms...”

do we know whether this is going to be viable?

they’re going to take all this stuff out, what are they going to put back in?

4.9 Communication

The focus groups and interviews indicated that, for those who had reached out to the proponents and those participants who had been approached by the proponents directly, communications had been effective to date. However, several of the participants had no prior knowledge of the proposed development and found out about it for the first time when invited to the focus groups.

Participants suggested that as the proposal takes shape it will be important to develop new lines of communication. The focus groups emphasised that different segments of the community have different information and communication needs. These are discussed in more detail in section 5.2.

In terms of communication channels, the focus groups and interviews highlighted that many Kapunda residents are not comfortable using computers and not accustomed to gaining information about the town through this mechanism. Many prefer newspapers and physical brochures as ways to get information about things that affect them in the town.

Visual information will be important for understanding what is happening sub-surface. It will also be useful for explaining the steps in the approval process which many people were not very familiar with.

It was also suggested that there should be ways to ask questions in an anonymous way. Some participants said they had been reluctant to ask questions because they didn't want to reveal their lack of knowledge in front of others. Providing a low risk 'there are no stupid questions' approach would help some residents to help resolve their concerns or express their aspirations. In addition, posting a 'Frequently Asked Questions' statement in the company's shop window and providing paper copies to interest groups would be helpful for those who are not able to access these details information on the company website.

There needs to be more information out there as the thing progresses.

I was going to ask... but I thought they're going to think I'm stupid.

5 Discussion and conclusions

The themes from the interviews are grouped in Figure 5. It shows that there are clusters of themes which relate to established science of social licence, namely procedural fairness, distributional fairness and confidence in governance which serve as preconditions for trust (Zhang et al 2018; Moffat and Zhang, 2014). Impacts and benefits are also generalised as having a separate effect on acceptance. In addition, knowledge of ISR methods and the fit with the town identity are context-specific factors affecting acceptance.

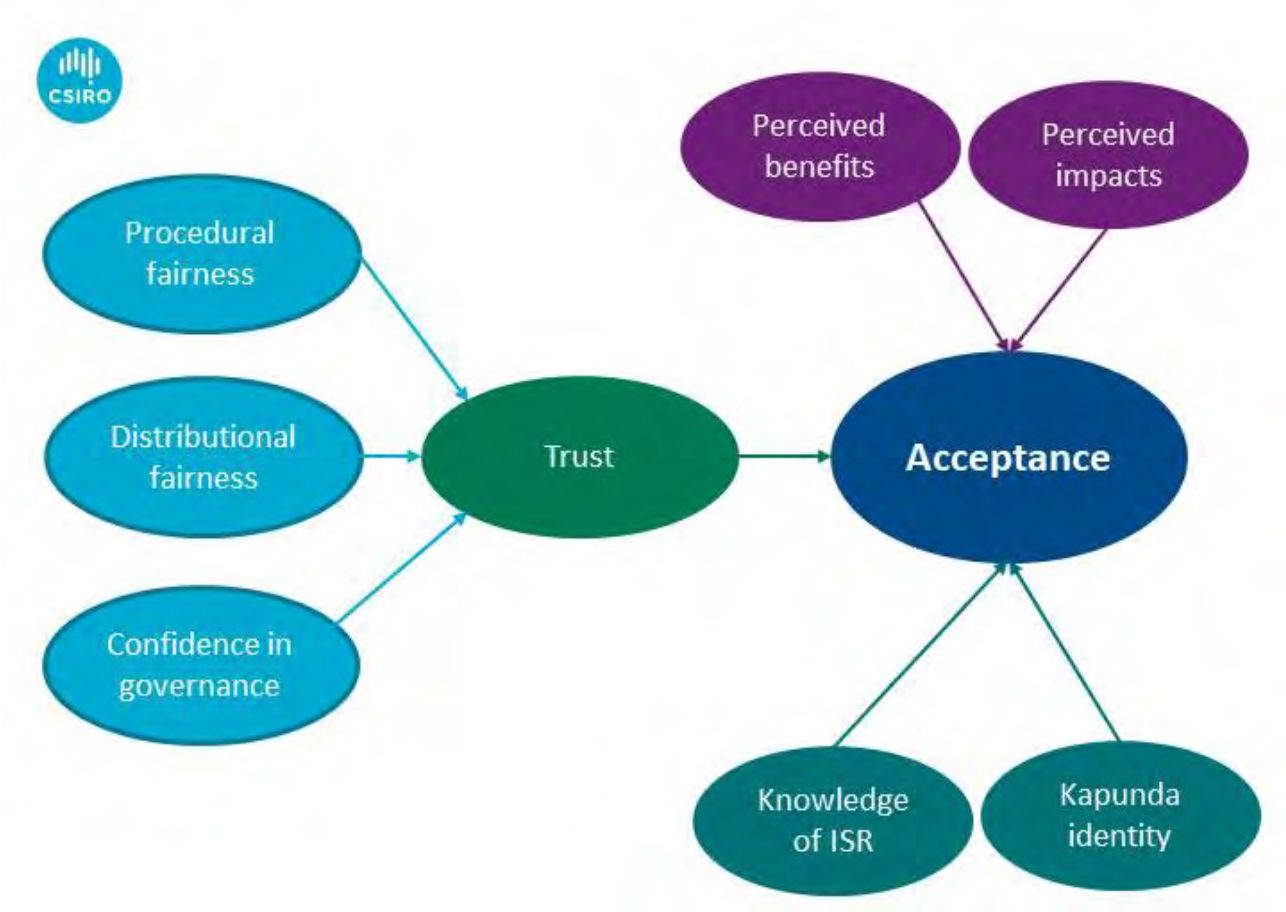

Figure 5 Relationship between interview themes

5.1 What does it mean for the town?

The research demonstrated that, in principle, a renewed mining industry would align to the existing values of residents. The identity of the town is strongly connected to historical roots in the mining industry (as well as the pastoral industry). However, the results also emphasised that the relaxed and friendly character of the town is very important so any mining activity would need to

be consistent with this character. It is mining heritage that is important to the people of Kapunda rather than the mining industry as it exists today. This heritage is expressed in memories, photographs and embodied in the former mine site. Renewed mining activity is welcome if it resonates with this heritage and if it doesn't interfere with tranquillity and charm of the town as it stands today.

The sense of pride in the town is also important. The opportunity to be the first copper ISR operation in Australia was seen by many as good for the town's image, provided it was safe and environmentally responsible. It was also thought that hosting the first copper ISR operation would attract a range of visitors -from school students to international study tours- and that this would be good for the economy of the town. There was also an expectation for modest employment opportunities for the town and modest indirect benefits in the form of additional demand for local goods and services.

A number of potential concerns were raised through the interviews and focus groups. These were particularly focused on the potential for disturbance of the current site and reduced visual amenity. Many residents are fond of the historic mine site and would not want it heavily modified or to be faced with large fences, machinery and equipment. These concerns were shared by those who work in tourism and those who use the site for recreation purposes. A key factor here was the expected duration and magnitude of any potential disruption. Some participants also raised concerns about the potential for noise, dust, increased vehicle movements, subsidence and protection of aquifers from any chemicals used in the extraction process. For most participants this was a matter of re-assuring them that these issues were being avoided or managed effectively.

5.2 What does it mean for the proponents?

Most participants were cautiously receptive

The data from the social research process demonstrate that most participants are open to the prospect of a new copper ISR operation, provided it is well managed and environmentally responsible. Participants generally conveyed a high degree of confidence in the research process currently being undertaken and in the assessment processes conducted by regulators such that the mine would only go ahead if it met all appropriate safeguards.

Listening to concerns

The research demonstrated that only a minority of the town had heard about the potential new copper ISR operation. Among those who had heard of it, most could see benefits for the town in general and/or individual businesses which may benefit in the supply chain by providing goods and services to the operation. Others had never heard of the proposed Copper ISR operations but were happy enough to consider something that could be good for the town. Some who had heard of the potential Copper ISR operation and raised concerns either in terms of socio-economic

effects or environmental effects. The science of social licence clearly demonstrates the importance of early and effective community engagement and listening to the concerns of all residents are important, whether or not the proponents agree with the concerns (Zhang et al 2018). The science of social licence also clearly shows that attempting to address those concerns in a way that meets community expectations is crucial to maintaining a social licence. Where it is unfeasible to address concerns that meets local expectations, it is important to recognise the concern and explain why the proponents have taken a particular course of action. Residents may not like a certain course of action, but they are more likely to accept it if they know that their voice has been heard and there is a reasonable explanation for the course of action taken.

Communication

Different members of the community have different levels of interest as reflected in Figure 6. One of the most affected groups are those residents living close to the site for the proposed ISR operation. These people will have distinct concerns and need to be listened to and communicated with separately.

Other members of the community who are interested but not directly affected are seeking updates on what's happening with regard to science information, field trials and the approvals process. People in this segment would like to be kept informed particularly once something conclusive becomes known about the viability or characteristics of the project.

A third segment are those who are not very interested and not much affected. These people may not have strong views on the proposed new development either way. Even though they may not seek much information about the project they may like to have the option to find out more, knowing that the information is available if they want it. They would generally only become more interested if things were to proceed. A considerable proportion of the population may fall into this category.

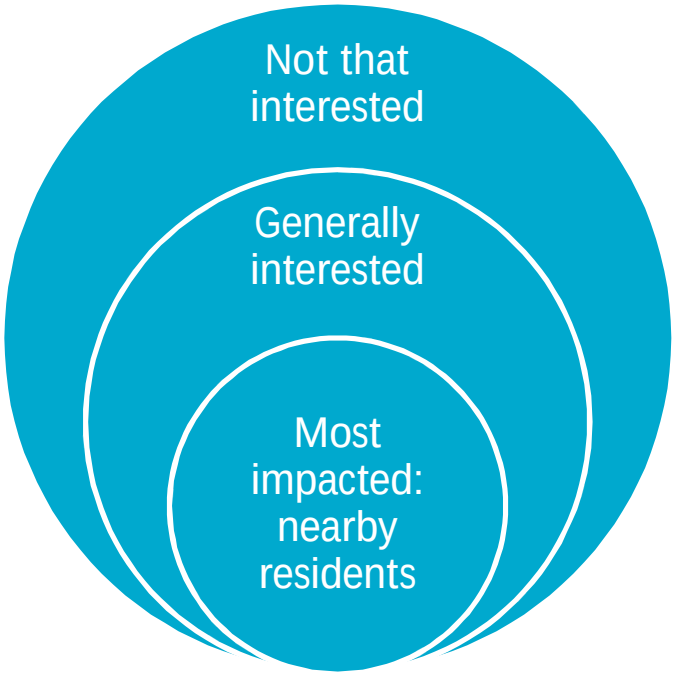

Figure 6 Levels of impact and interest for communication

Avoid overstating benefits and minimising risks

Most participants had a sense of realism about the potential for economic effects and conveyed a sense that even modest benefits would contribute to maintaining the prosperity of the town. There were some exceptions: some participants were concerned that the proponents may have overstated the benefits and understated the risks. This perception seemed to stem from a perception that the proponents had been selective about their engagement with residents, allegedly favouring those who stood to gain from the proposed mine. To address this concern (regardless of whether it is accurate or not) the key issue is to be clear in stating the expected effects and not overstating benefits nor belittling risks. As discussed in the previous section, the science of social licence shows that recognising perceived concerns and being clear about how they are being managed contributes to building trust (Moffat and Zhang, 2014).

The physical proximity of the site, which is located close to the centre of town, places greater attention to the potential environmental implications of the proposed development, particularly for issues such as dust, noise and vehicle movements. In addition to technical solutions, managing these issues requires a high levels of trust in the science, the assessment process and the proponents. Maintaining this trust will be aided by being transparent about the findings from the research process and through effective and ongoing community engagement processes to understand any emerging issues or changing concerns. A key part of trust in a small community such as Kapunda is whether the community believes that the way different members of the community are treated is fair.

5.3 What does it mean for research?

From a social science perspective, it is Important to recognise that the proponents are seeking to engage early on the social, economic and environmental feasibility of In Situ Recovery, well before a development application is on the drafting blocks. This aligns well with the principle of 'engage early and effectively' (Hartley and Wood, 2005; Zhang et al. 2018). In principle, the advantage of this approach is that it provides more time for the proponents of developments to consider the views, aspirations and potential concerns of residents and other stakeholders, and to adjust their plans to align to those views. Alternatively, if there are irreconcilable differences in views and it does not make sense to proceed with a development, then there is a lower opportunity cost ceasing a development earlier rather than later in the development process. The advantage of early and effective engagement for residents and stakeholders is that there is a greater chance to influence the way an emerging development takes shape and have their concerns and aspirations addressed along the way. What this case study highlights is that early engagement is also important from the perspective of starting from a position of relative trust. Generally, most participants were either supportive or indifferent to the proposed development and expected that any concerns that emerge will be addressed during the research, assessment and approval process. There was a strong sense with this project that the outcome is far from decided and would only proceed if appropriate conditions were in place.

The disadvantage of early engagement is the degree of uncertainty about the potential implications of future development. Some participants were seeking concrete answers to questions about timeframes, logistics and environmental specifications. For example, the selection of lixiviant is an important consideration in ISR methods with diverse implications depending on the chemistry involved. At the time of conducting the research it was only possible to consider general responses to these types of questions and ask the participants about their perspectives on the issue. This was sometimes frustrating for participants who favoured hard and fast answers. However, such frustrations were few and overall most participants were cautiously optimistic towards the potential development with an eagerness to learn more as the research process proceeds.

5.4 Conclusion

The focus groups and interviews demonstrated that renewed mining activity in the town of Kapunda would generally align to town existing values and identity provided it was done in a way that maintained the character of the town, including the historical links to mining, the sense of pride in the town, and friendly and relaxed lifestyle that locals value. Furthermore, the data showed that participants are generally open to the potential for ISR methods to be employed provided all the necessary science had been completed and impacts managed. A wide range of potential benefits were identified, some of which were tangible, such as modest employment. Other perceived benefits were intangible, such as a sense of pride and renewing the town's mining heritage by being the first ISR copper mine in Australia. The research also brought attention to a number of concerns. Some of these were widely recognised issues that arise across diverse mining projects, such as potential for noise and dust. Other concerns were quite specific to ISR mining,

such as what sort of lixiviant may be used and how it may affect the groundwater. Overall, community confidence in the research, assessment and approval processes surrounding the project was high, and residents generally felt that the project would only proceed if concerns were adequately addressed. To maintain this level of confidence, it will be important for the proponents to be transparent about the findings of the research program and their plans. It will be important to engage with different segments of the community as the proposed development evolves.

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Appendix 1: Guiding questions for focus groups and interviews

Topics	Roles	Time (focus groups/ interviews)
Initial identity exploration *What do you like about living here in Kapunda?* *What's not so good?* *How do you generally view the mining sector?* *How does mining fit with the town's identity?* *How would a renewed mining industry align with town values?*	Facilitated by senior CSIRO social scientist	45 min/20 min
Introduction to proposed renewed activity, including ISR technology Presentation about I*SR technology* *The CRC and proposed activity in Kapunda*	By senior CSIRO scientist with geology and chemistry background	15 min/15 min
Focus groups only: 10 minutes break in proceedings		
Exploration of perceptions of ISR Do you have concerns about ISR: *In general?* *As part of renewed mining activity in Kapunda?* Do you see benefits from ISR: *In general?* *As part of renewed mining activity in Kapunda?*	Facilitated by senior CSIRO social scientist	45 min/20 min
Concluding interactions Do you have any other comments: *About Kapunda?* *Mining in general?* *ISR?* *The proposed mining activity for Kapunda, using ISR?* Summary of what happens next: *The social research process* *Sharing results with participants and other audiences, including the CRC*	Facilitated by senior CSIRO social scientist	10 min/5 min

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Land and Water Consulting

Conceptual Site Model and Predictive Assessment

Kapunda ISR Hydrogeochemistry Support for SELT

EnviroCopper

August 2021

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EXECUTIVE SUMMARY

Context

Land & Water Consulting (LWC) was engaged by Enviro Copper Recovery (ECR) to establish a conceptual site model (CSM) and undertake a predictive hydrogeochemistry assessment for a test trial associated with Enviro Copper's Kapunda In-Situ Copper Recovery (ISR) project (the Project).

The first phase of the project is a Site Environmental Lixiviant Trial (SELT) to assess the extent of the ISR copper deposit. According to Enviro Copper, this is a Push/ Pull Test using KP_PP1.

The Site

The proposed location of the SELT is referred to by ECR as Site A. Site A is located on privately owned land, approximately 1.3km south of the centre of the Kapunda Township, adjacent to the intersection of Perry Road and East Terrace, and just south of the Historic Kapunda Copper Mine. It is described by the following Certificate of Title:

- Volume 5750 Folio 912, Filed Plan 199322, Allotment 92

Generally, the Site and surrounds are grazing and agricultural land uses. The nearest property is located 130m to the north east and is used for rural farming purposes. The Historic Kapunda Mine Site is located 750m to the north west of the proposed Site.

In Situ Recovery of Copper

ECR aims to utilise In-Situ Recovery (ISR) to extract copper from underground mineral deposits. ISR involves injecting a specifically selected lixiviant through a well into the desired ore body to leach the copper into a soluble form. This solution is then pumped to the surface where the concentrated copper can be recovered for processing (USNRC 2021).

Methane Sulphonic Acid (MSA) has been selected by Enviro Copper as a suitable lixiviant as it works in acidic conditions, is readily biodegradable, and will target the intended metals.

It is expected that recovered copper solutions from the Kapunda area will be in the region of 2000 ppm.

The first phase of the project is a Site Environmental Lixiviant Trial (SELT) to assess the extent of the ISR copper deposit. According to Enviro Copper, this is a Push/ Pull Test using KP_PP1.

The test will consist of pumping around 5,000 L (5 m^3) of lixiviant into well KP_PP1, allowing it to equilibrate in the copper ore zone for 14 days. Groundwater will then be pumped out at a rate of around 5 m^3 per day.

The groundwater trial area is defined as a 50 m radius around KP_PP1. This will allow for a lixiviant plume of approximately 7m to form, and then for remediation of the lixiviant within one year. The water table is expected to rise during injection and a cone of depression form during extraction, before returning to equilibrium overtime.

The baseline groundwater is acidic with pH in the range of 4. The groundwater exhibits elevated metals (copper, zinc, nickel).

The water is not suited for drinking, stock watering or irrigation and is suited only to industrial use including mining, as the beneficial use of groundwater is constrained by the elevated metals.

Source-Pathway-Receptor Linkage

A source term was derived by applying background (baseline) groundwater concentrations and freshwater ecosystem criteria (ANZG 2018) to the maximum concentrations of column leach test solutions.

The source term comprised the metals Ag, Mo, Cr and V and several rare earth elements (REE) along with low pH.

A total of 1 linkage was identified, being the generation of certain metals (Source term A), low pH / acidity and rare earth elements via addition of MSA to the 8 m thick Cu ore zone, with potential for solute escape along fractures in the rock aquifer, to the Light River, ~585 m south-south east.

The significance of this linkage was tested using predictive geochemical react transport modelling.

Predictive Reactive Geochemical Modelling (PRGM)

1-D modelling of the current baseline system supports the attenuation of solutes (metals) within the Eudunda Arkose via sorption to iron-oxy-hydroxides, which are present in abundance in that system.

The water within the Eudunda Arkose (location of Site A) is likely geochemically different to the sentinel well water down hydraulic gradient, which is representative of the Tapley Hill Formation.

The fractured rock Eudunda Arkose likely has significantly more presence/ density of pyrites (e.g. chalcopyrite) which creates the low pH conditions via oxidation of sulfidic minerals (pyrites, itself a simple yet complex process which is not the remit of this assessment). The micro scale cycling of pH around pH 4 will generate amorphous iron oxy hydroxide and infers solutes in groundwater within the Eudunda Arkose are essentially 'trapped' by sorption to colloidal or assemblage amorphous iron oxy hydroxide phases. Modelling of such scenario using only Fe inherent in the KPFRT02 system and K_d modelling supports this theory.

The specifics of the push pull test were mimicked using two dimensional reactive fate and transport modelling.

Key findings

1. Modelling of push pull test fits existing predictions in terms of lateral migration and relevant solutes / low pH are not predicted to reach proposed monitoring wells KP_MON01 – MON03 located 25 m laterally, when using specified gradient (nor the observation well KPFRT02).
2. Source Term A-1 solutes are not predicted to migrate laterally to the extent where they are seen at concentrations above laboratory limit of reporting nor relevant water quality screening criteria in the observation well KPFRT02 (5.3 m lateral from the push pull well).
3. Assessment of copper mineral dissolution in the injection bubble hints at pH rise due to hydroxide alkalinity (when using ferric-cu as representative of copper oxide mineral phases) or carbonate alkalinity (when using malachite as representative of copper carbonate mineral phases). This may cause increased acid consumption over current estimates.

CONTENTS

EXECUTIVE SUMMARY II

1 INTRODUCTION 8
1.1 Overview 8
1.2 Context 8
1.3 Objective 8
1.4 Scope of Works 9

2 SITE CONCEPTUALISATION (TASK A) 10
2.1 The Site and Surrounding Land Use 10
2.2 Climate 10
2.3 Geology 10
2.4 Hydrology 14
2.4.1 Topography and Surface Water 14
2.4.2 The Light River 14
2.5 Hydrogeology 15
2.6 Hydrogeochemistry 17
2.6.1 Context 17
2.6.2 Baseline Groundwater 18
2.6.3 Baseline Speciation 21
2.6.4 Stability 25
2.7 Environmental Values 27
2.7.1 Overview 27
2.7.2 Determination of Protected Environmental Values 27
2.7.3 Application of a Buffer Distance for Protection of Surface Waters 29
2.7.4 Review of Available Groundwater Data Using Water Connect 29
2.7.5 Actual or Potential Harm to Water That is Not Trivial – Application of EPA Recognised Criteria 30
2.7.6 Summary of Environmental Values Assessment 32
2.8 In-Situ Recovery (ISR) Mining 33
2.8.1 Process 33
2.8.2 Column Leach Tests 35

3 CONCEPTUAL SITE MODEL (TASK B) 36
3.1 Overview 36
3.2 Sources 37
3.3 Pathways 41
3.4 Receptors 41
3.5 Potential Impact Linkages 42

4 PREDICTIVE RISK ASSESSMENT (TASK C) 43
4.1 Concept 43
4.2 Geochemists Work Bench Modelling 43
4.2.1 Existing system 43
4.2.2 Tracer Calibration 46
4.2.3 Push Pull Test Modelling 47
4.2.4 Source Term A-1 54
5 DISCUSSION 55
5.1 Conceptual Site Model 55
5.2 Geochemical System and Proposed Action 55
5.3 Push Pull Test Findings 56
5.4 REE 56
6 REFERENCES 57

APPENDICES

APPENDIX A SPECIATION OF KPFRT02 58
APPENDIX B SOURCE TERM A-1 MODEL OUTPUTS 59
APPENDIX C REPORT LIMITATIONS 60

FIGURES (IN TEXT)

Figure 2-1: Geological Formations Under the Project Site (Enviro Copper PEPR) 11
Figure 2-2: North-South Geological Cross-Section (Enviro Copper PEPR) 11
Figure 2-3: Surface Copper Concentrations in the Surrounding Area (Enviro Copper PEPR) 12
Figure 2-4 Copper distribution, structural geology and nuclear magnetic resonance (NMR) logs for the proposed test area 13
Figure 2-5 QEMSCAN Analysis (sample ECR 26-29) 13
Figure 2-6: SA EPA Kapunda Bridge Monitoring Site 14
Figure 2-7: Light River Monitoring Pools (Enviro Copper PEPR) 15
Figure 2-8: Bedding and Fracture Orientations (Enviro Copper PEPR) 16
Figure 2-9: Site Wells and Background Monitoring Bores (Enviro Copper PEPR) 18
Figure 2-10: Graphs of Inorganics and Metal Concentrations in Wells Up and Down Gradient of Site (data from Enviro Copper PEPR) 21
Figure 2-11 Mineralogy of rock samples from Site A 23
Figure 2-12 Minerals forming ECR 26-29 (sulfate + low Eh) 24
Figure 2-13 Stabilities of copper oxides (tenorite and cuprite) and carbonates (malachite and azurite) as a function of fO_2 and fCO_2 (Hazen, 2013) 25
Figure 2-14 Stability plot of the KPFRT02 'system' assuming 28 mg/L bicarbonate alkalinity (blue area is $Cu_{(aq)}$) at pH 4.5 26
Figure 2-15 Process to determine environmental values of groundwater at a site 27

Figure 2-16 Table 1 of EPA 2019: application of the WQEPP to determine protected environmental values of groundwater 27
Figure 2-17 Third party bores (after Groundwater Science, 2020) 28
Figure 2-18 Table 2 of EPA 2019: application of a buffer distance for protection of surface waters 29
Figure 2-19 Table 3 of EPA 2019: application of Waterconnect (groundwater data) to determine environmental values of groundwater 30
Figure 2-20: The Push/ Pull Test (lixiviant = purple arrows, rock fractures = grey arrows) 34
Figure 2-21 Stability plot (a) pre injection of lixiviant and (b) post injection, causing the dissolution of mineral assemblages and aqueous un-complexed copper being dominant above log fO_2 -60 35
Figure 3-1 CSM37
Figure 3-2 Source term derivation process (chemical) 38
Figure 4-1 Push pull test layout 44
Figure 4-2 Copper in fluid, current system, 100 year model 45
Figure 4-3 Predictive modelling of bromide tracer from the push pull well 46
Figure 4-4 reaction modelling of ferric-cu as a function of pH in the KPFRT02 system 48
Figure 4-5 pH change when reacting malachite in 1 L pH 1 water 50

Figure 4-6 Bicarbonate released through malachite dissolution by acid (1 L water) 51
Figure 4-7 Predicted groundwater pH distribution in push-pull test 52
Figure 4-8 Predicted copper distribution in push pull test as function of Cu mineralogy reaction 53

TABLES (IN TEXT)

Table 2-1: Light River Background Conditions 15
Table 2-2 Summary of key hydrogeological parameters 17
Table 2-3 Baseline groundwater chemistry (mg/L) 19
Table 2-4 Comparison of metal/ metalloid chemistry in water from KPFRT02 (Groundwater Science, 2020) 20
Table 2-5 Predicted KPFRT02 mineral phases in low sulfate system based on groundwater from KPFRT02 – represents ECR 8-18 interval 22
Table 2-6: Summary of Registered Well Parameter Details – 2 km Radius 29
Table 2-7: Summary of Environmental Values of Underground Waters as per the WQ EPP 2015 30
Table 2-8: Summary of Environmental Values and Likelihood of Such Use - Groundwater 32
Table 2-9 LPCT columns and solutions 35
Table 3-1 Source term derivation Steps 1 – 4 (all values are µg/L except % RPD) 39
Table 3-2 Source term A (all values are µg/L other than % RPD, green shade = minor RPD) – blue shade retained for source S1 40
Table 3-3 Source term A-1 (all values are µg/L) 40
Table 3-4 Comment provided by ANZG on the criterion 41
Table 3-5: Summary of Identified Sources 41
Table 3-6: Summary of Identified Pathways 41
Table 3-7: Summary of Identified Receptors 41
Table 3-8: Potential Impact Linkage 42
Table 4-1 Model predictions for key parameters pH and copper 49

1 INTRODUCTION

1.1 Overview

Land & Water Consulting (LWC) was engaged by Enviro Copper to establish a conceptual site model (CSM) and undertake a predictive hydro-geochemistry assessment for a test trial associated with Enviro Copper's Kapunda In-Situ Copper Recovery (ISR) project (the Project).

The first phase of the project is a Site Environmental Lixiviant Trial (SELT) to assess the extent of the ISR copper deposit. According to Enviro Copper, this is a Push/ Pull Test using KP_PP1.

1.2 Context

In response to regulator comments on the mining proposal, and in direct relation to the next stage of the ISR field test at 'Site A', a predictive assessment of the Project's hydrogeochemical environment was required in relation to reactive fate and transport of copper and other metals / metalloids in groundwater, associated with the ISR process.

The following is understood:

- The field trial will involve injection of barren lixiviant to the fractured rock environment and be extracted to assess performance of the lixiviant in copper leach and recovery.
- Monitoring wells will be installed to assess potential lateral migration along fractures (nominally 25 m distal from the point of injection – estimated maximum lateral migration is considered to be in the order of 7 m prior to this assessment).
- The field trial and the Project in general is 600 m from the Light River. This is within Environment Protection Authority's (EPA) 2 km buffer zone for the identification of surface water features in relation to site assessment (EPA, 2019).
- Background groundwater within the actual former Kapunda mine site has copper concentrations as high as 1,000 mg/L, though in the field trial area the concentrations are ~40 mg/L (water sampled from observation well KPFRT02 reported 70 mg/L in February 2020).
- Assessment data exists in relation to leach chemistry of the rock, river water quality data and X-ray Diffraction (XRD) data of subsurface materials.

Regulatory review of mining application (EPA) queried fate and transport of metals from the Project area to sensitive receptors (surface water) following cessation of activities.

1.3 Objective

The objective of the predictive hydrogeochemical assessment was to establish an environmental conceptual site model of the Project and environs (including processes) and use this CSM as the basis to predict the fate and transport of Project associated solutes (copper and other pH sensitive metals / metalloids) using a robust and justified source term.

1.4 Scope of Works

The scope was divided into 4 Tasks as detailed below:

1. Task A

Existing information was formulated to create a Conceptual Site Model (CSM) (source – pathway – receptor) that aligned with language and intent of EPA Guidelines for the Assessment and Remediation of Site Contamination (2018, updated Nov 2019) and provided specific contaminant linkages that can be 'tested'.

A crucial component was the establishment of Environmental Values (EV) for the Project and the screening of background groundwater data, leach column data and river and down hydraulic gradient groundwater data with EV based relevant water quality criteria. This was completed with the existing dataset / information and identified elements that are above relevant EV criteria in all solutions relevant to the Project.

2. Task B

A tiered risk approach with respect to the specific formulation of the applied criteria.

For example, freshwater ecosystem criteria would be expected by EPA to be used for the Light River, but can relevant metal criteria be modified based on water hardness (for example), and does such modification eliminate any 'exceedances' of criteria.

Ultimately Task A and B aimed to refine the source term to as few elements as possible using background offset and criteria modification.

3. Task C

The source term defined in Tasks A and B (i.e. elements unable to be 'ruled out') was assessed with respect to fate (within the reactive zone and along the flow path) and transport (processes occurring along the flow path) using the predictive reactive transport 1-D and 2-D models X1t and X2t applications within Geochemists Work Bench (GWB).

Project specific geochemical detail is factored into the model to assess the possible fate mechanisms.

4. Task D

The formation of a hydrogeochemical risk document that is set out in accordance with the EPA Guidelines for the Assessment and Remediation of Site Contamination (2018, updated Nov 2019) – specifically ensuring the narrative meets content expectation of Appendix 4 of said document. This includes modelling information, relevant plots from GWB, background data and information (as relevant), source term definition and appropriate supporting CSM cross section.

2 SITE CONCEPTUALISATION (TASK A)

2.1 The Site and Surrounding Land Use

The proposed Site is located on privately owned land, approximately 1.3km south of the centre of the Kapunda Township, adjacent to the intersection of Perry Road and East Terrace, and just south of the Historic Kapunda Copper Mine. It is described by the following Certificate of Title:

- Volume 5750 Folio 912, Filed Plan 199322, Allotment 92

Generally, the Site and surrounds are grazing and agricultural land uses. The nearest property is located 130m to the northeast and is used for rural farming purposes. The Historic Kapunda Mine Site is located 750m to the northwest of the proposed Site.

The Site has a slight general slope from north to south, towards the Light River which is located approximately 600 m southeast.

2.2 Climate

The Site is located within a temperate region that experiences cool, wet winters and hot dry summers.

A review of climate data for Kapunda from the Bureau of Meteorology (BOM) was undertaken:

- the annual average rainfall is 491.6 mm (years 1861 – 2021).
- The mean maximum temperature is 21.6°C (years 1885 – 1965).
- The mean minimum temperature is 9.8°C (years 1885 – 1965).

2.3 Geology

LocationSA (2021) classifies the regional geology as loam over poorly structured red clay. The Environment Protection and Rehabilitation (PEPR) report provided by Enviro Copper states that the general surface is sandy loam topsoil with a yellow-brown clay sub-soil.

The Kapunda Township is located within the fractured rock aquifer system of the Adelaide Geosyncline, a major geological zone in central South Australia. The main geological formations in the Site area include the Tapley Hill Formation, Brighton Limestone, and the Eudunda Arkose Member (see Figure 2-1 below). A cross section of the geology is provided in Figure 2-2, sourced from the PEPR.

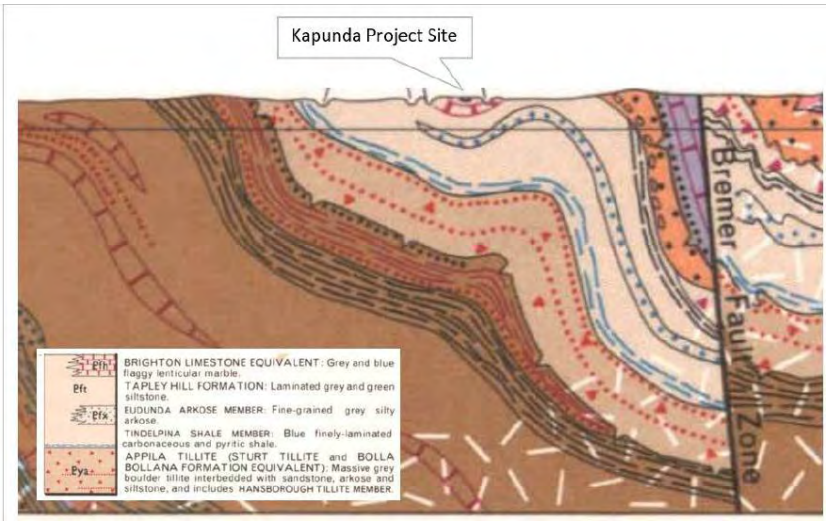

Figure 2-1: Geological Formations Under the Project Site (Enviro Copper PEPR)

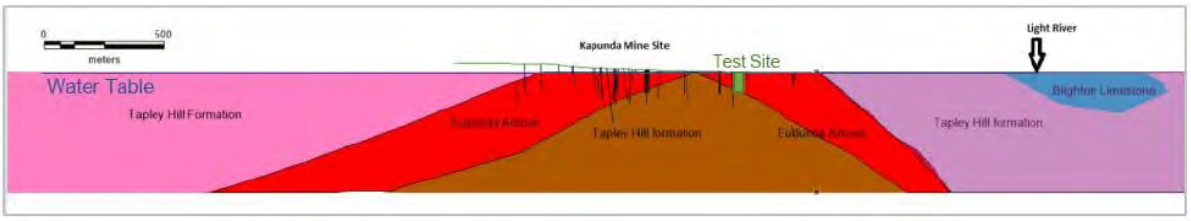

Figure 2-2: North-South Geological Cross-Section (Enviro Copper PEPR)

The Eudunda Arkose Member is a significant copper enriched zone with several copper mineral species including copper oxides (azurite, malachite, and cuprite) and copper sulphides (chalcocite and covellite). Other common minerals include feldspars, kaolinite (clay), and quartz, with pyrite and rutile occurring at depth.

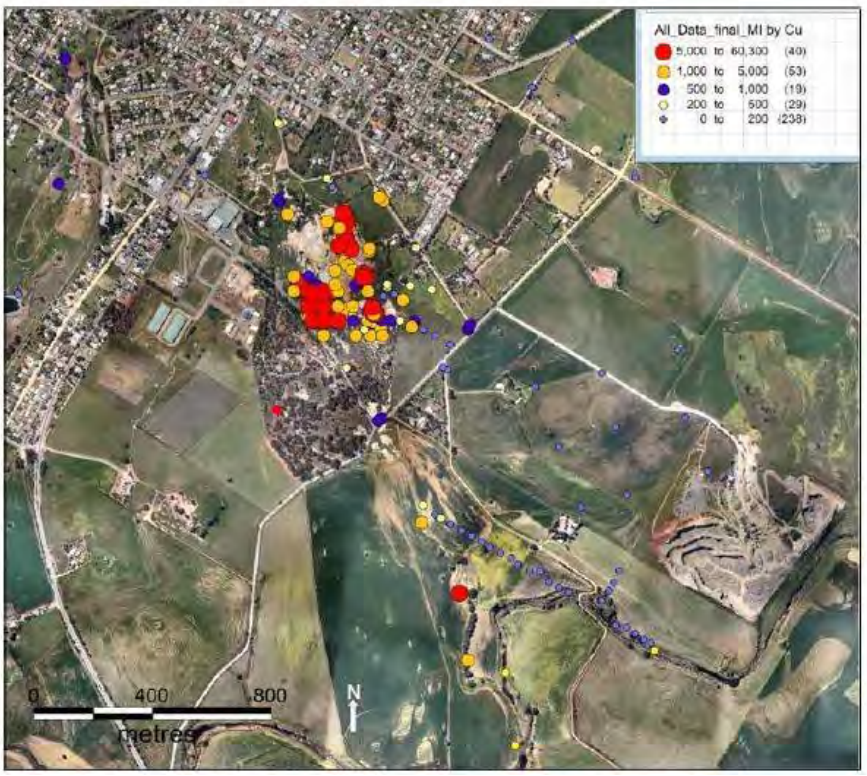

Figure 2-3: Surface Copper Concentrations in the Surrounding Area (Enviro Copper PEPR)

Historical mining activities have disturbed the regional geology and the soil structures may be susceptible to water logging, erosion, and compaction. Concentrations of copper and other metalloids within surface soils and surrounding surface water drainage have also increased due to historical mining activities. Enviro Copper says that proposed site activities will have temporary sediment traps to reduce surface soil sediment travel during rainfall events.

The (target) copper is present in a ~8 m thick interval beneath the water-table, just beneath the oxide zone (Figure 2-4). The geology comprises fractured rock with joint spacing 0.038 m (2.6 structures per m).

XRD QEMSCAN analysis reports copper present as several mineral phases (Figure 2-5), as well as an abundance of iron (Fe) oxy-hydroxide). Principal phases comprising the geological unit (host) are quartz and feldspars, with kaolinite (clay). Given the abundance of Fe, ferric copper mineral assemblages can be assumed, e.g. ferric-cu as a precursor to minerals like tenorite (i.e. tenorite not listed but may form within this system).

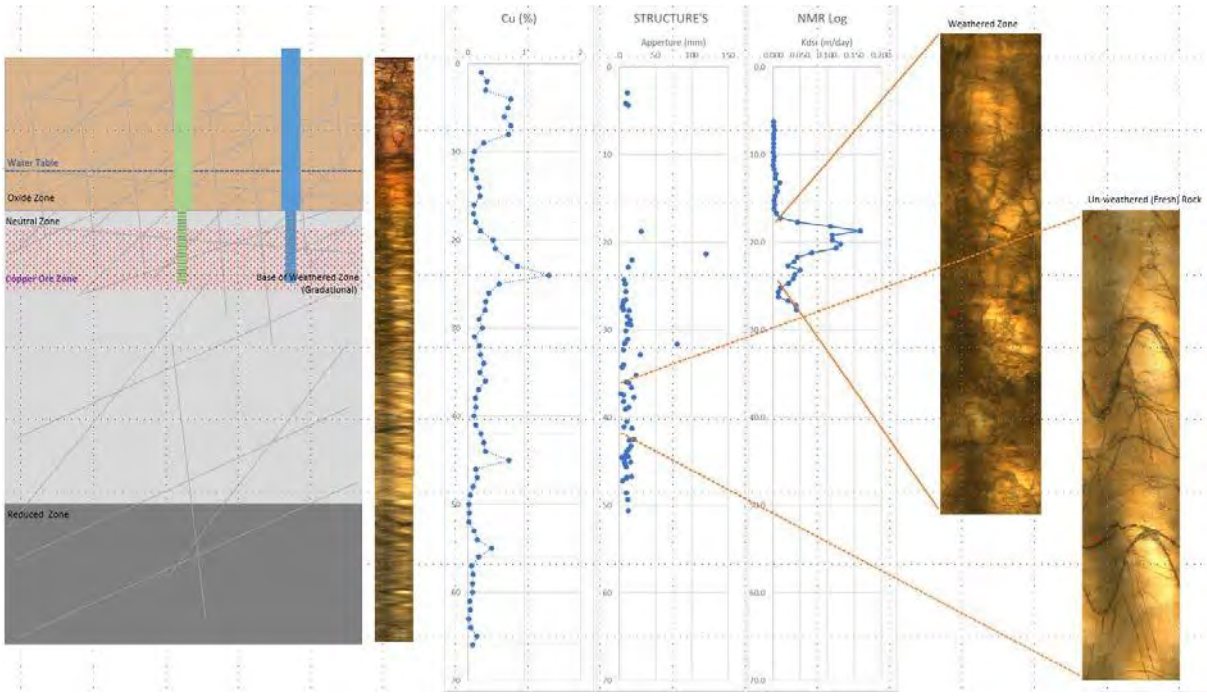

Figure 2-4 Copper distribution, structural geology and nuclear magnetic resonance (NMR) logs for the proposed test area

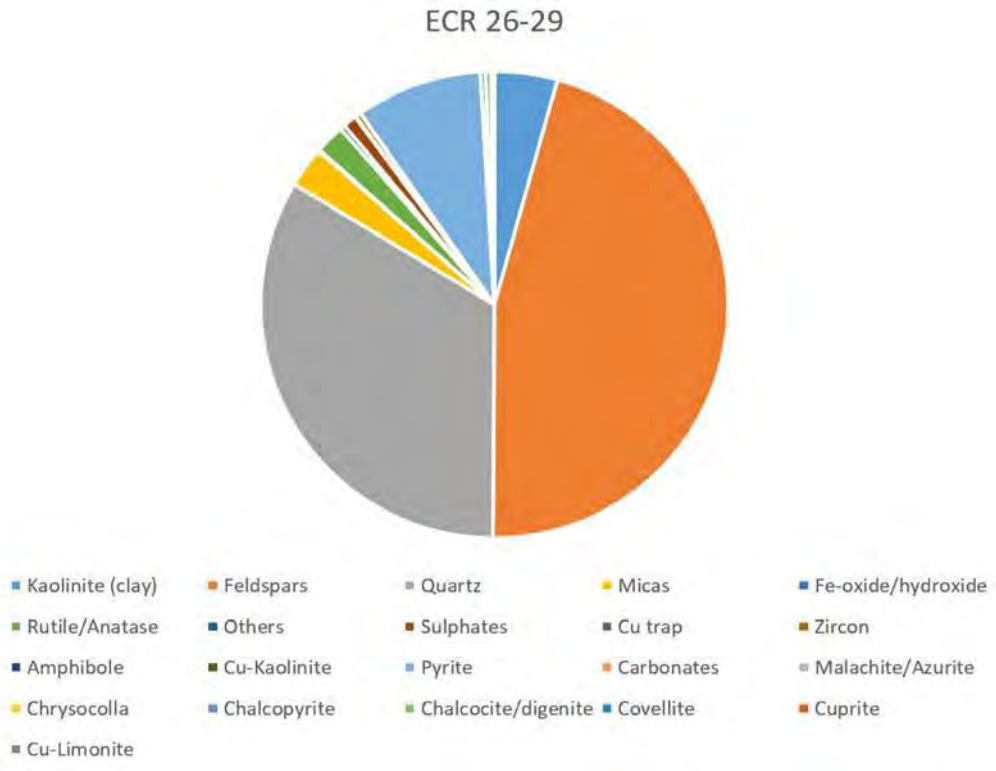

Figure 2-5 QEMSCAN Analysis (sample ECR 26-29)

2.4 Hydrology

2.4.1 Topography and Surface Water

Surface runoff flows south towards the Light River by ephemeral stream channels. The report '*Kapunda Copper Project – Summary of Existing Environmental Reports, Environmental Copper Recovery 2018'*, indicates that historical contamination from the Historic Kapunda Mine may have been distributed by run-off along the ephemeral streams. The stream channels located near the Site therefore may have elevated levels of copper and other contaminants; the streams are potentially showing stress from the presence of low pH acid mine drainage.

During proposed site activities, all produced water will be stored in above-ground tanks and either taken off site for disposal or re-injected into the groundwater well (refer Drainage Discharge Licence) to avoid water flowing off site into drainage lines.

2.4.2 The Light River

The SA EPA (2016) provides data from a monitoring site on the Light River at the Kapunda Bridge, downstream from Site and approximately 2km south of Kapunda (see Figure 2-7). The following geochemistry was noted:

- pH recordings of 7.49 to 8.35,
- salinity ranged from 5,266 to 5,741 mg/L,
- generally moderate to high concentrations of nutrients such as phosphorus (0.023 to 0.024 mg/L) and nitrogen (0.69 to 0.81 mg/L).

This location was given a poor rating by the EPA due to evidence of human disturbance, resulting in major changes in ecosystem structure. These disturbances included nutrient enrichment, salinisation and invasive species in the riparian zone. Only saline tolerant aquatic macroinvertebrates, fish and plants were recorded at the monitoring site (SA EPA 2016).

Figure 2-6: SA EPA Kapunda Bridge Monitoring Site

Sampling of several ponds along the Light River was conducted by Enviro Copper in June and July 2020. Pool 18 and 13 are upstream and downstream of the Site respectively (Figure 2-8). As shown

in Table 2-1, the pH is neutral and there are low concentrations of metals and sulphur currently present in the river system.

Figure 2-7: Light River Monitoring Pools (Enviro Copper PEPR)

Table 2-1: Light River Background Conditions

Pool ID	pH	S (mg/L)	Fe (ug/L)	Cu (ug/L)
18	8.5	190	55	2.7
16	8.2	195	44	2.3
13	8.3	198	37	3.0

A change in these conditions would provide evidence of lateral migration from the Site activities.

2.5 Hydrogeology

The Site is located within the Light River Catchment and outside a water protection area as defined by the South Australian Environmental Protection Authority (SA EPA).

The Tapley Hill Formation and Eudunda Arkose Member are both unconfined fractured rock aquifers. Figure 2-4 below from the PEPR shows the orientation of these fractures and beddings. It is expected that the Tapley Hill Formation would have a lower permeability due to its finer grainsizes, while the coarser Eudunda Arkose would likely have a higher permeability.

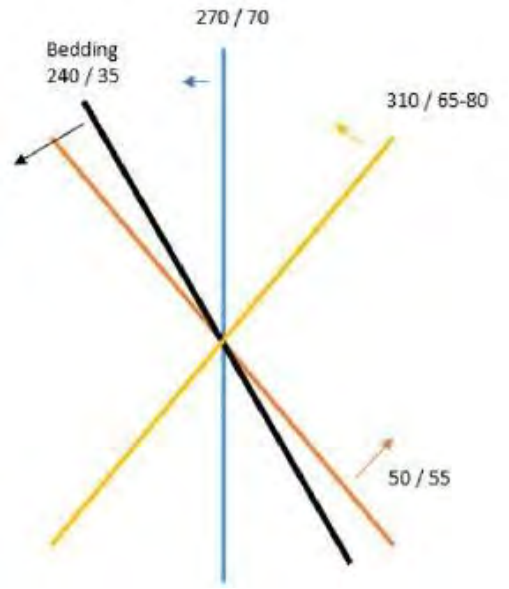

Figure 2-8: Bedding and Fracture Orientations (Enviro Copper PEPR)

The fractured rock aquifer at the Site is unconfined – there is no overlying or underlying aquifer.

Groundwater will move latterly through the fractures towards the Light River (approximately 585 m down hydraulic gradient (DHG) of Site A), where the fractured rock aquifer discharges.

According to the PEPR provided by Enviro Copper, flow velocity estimates range from 0.3 m per year up to a maximum of 15 m per year. These values are derived by the Darcy equation from the measured hydraulic gradient of 0.004 mm, the bulk hydraulic conductivity estimate of 0.1 m/day and an effective porosity estimate of 1% (assuming partially filled fracture porosity of 1.7%). This analysis treats the aquifer as a porous media equivalent.

These numbers were utilised to find an estimation on the time for groundwater to migrate from the Site to the Light River.

If the lower estimation of 0.3 m per year is applied, and it assumed the Light River is 600 m from Site at the closest point, it could take 2000 years for groundwater to reach the River. Meanwhile, at 15 m per year, it would take 40 years.

The effect of this migration on background conditions is discussed further in Section 2.6 below.

A search of wells within 2km of the Site was undertaken utilising the Department for Environment and Water (DEW) WaterConnect database. 204 wells were identified between 1949 and 2021, and these wells were categorised as drainage, exploration, foundations, industrial, investigation, irrigation, monitoring and stock purposes.

Groundwater levels ranged from 5.4 to 50.29 m below ground level (BGL) and had a mean of 18 m bgl. Salinity, measured in Total Dissolved Solids, ranged from 560 mg/L to 8,269 mg/L, with an average of 4,206 mg/L. According to the *Environment Protection (Water Quality) Policy 2015* (WQEPP), the groundwater is potentially suitable for potable use.

Table 2-2 Summary of key hydrogeological parameters

Parameter	Value	Basis
Bulk Hydraulic Conductivity	0.05-0.1 m/day	Constant Rate pumping tests on test bores
Total Porosity	0.3	Neutron Logs run on Pilot Hole
Effective Porosity	0.01 to 0.02%	Fracture Frequency from Optical Borehole Logs
Fracture Orientation and spacing	Joint spacing 0.038m (2.6 structures per m) For Orientation See table below	Optical Borehole Logs Hangs site wide Fracture analysis work
Hydraulic Gradient	0.004 toward the south.	Potentiometric surface

2.6 Hydrogeochemistry

2.6.1 Context

As a result of historical mining activities upgradient of Site, the background groundwater conditions are saline, acidic, and high in metals and sulphate. The beneficial use of groundwater is restricted to industrial uses only, due to the metal concentrations.

The PEPR reports that the historic mine pits directly north of Site A retain water during winter but not during summer. The water is understood to be rainfall run off. The historic mine pit is considered neither a marked groundwater discharge nor groundwater recharge feature. Some enhanced recharge from the pond water at the base of the ponds is possible but this is likely to be minor as there is no groundwater level mounding evident around the pits.

Monitoring data from six wells is provided in the PEPR and summarised here. Wells KP001 and KP009 are located upgradient of Site and cross gradient of the Historic Kapunda Mine, while KP060 is located down hydraulic gradient between the Site and the Light River. The Site's trial/ observation wells are KPFRT02 and KPFRT03 (see Figure 2-5 below).

Key Points

Monitoring well KP060 is considered a sentinel well between Site A and the Light River.

The three monitoring wells KP_MON01, KP_MON02 and KP_MON03 are the proposed groundwater monitoring wells at a distance of 25 m from the push pull test well.

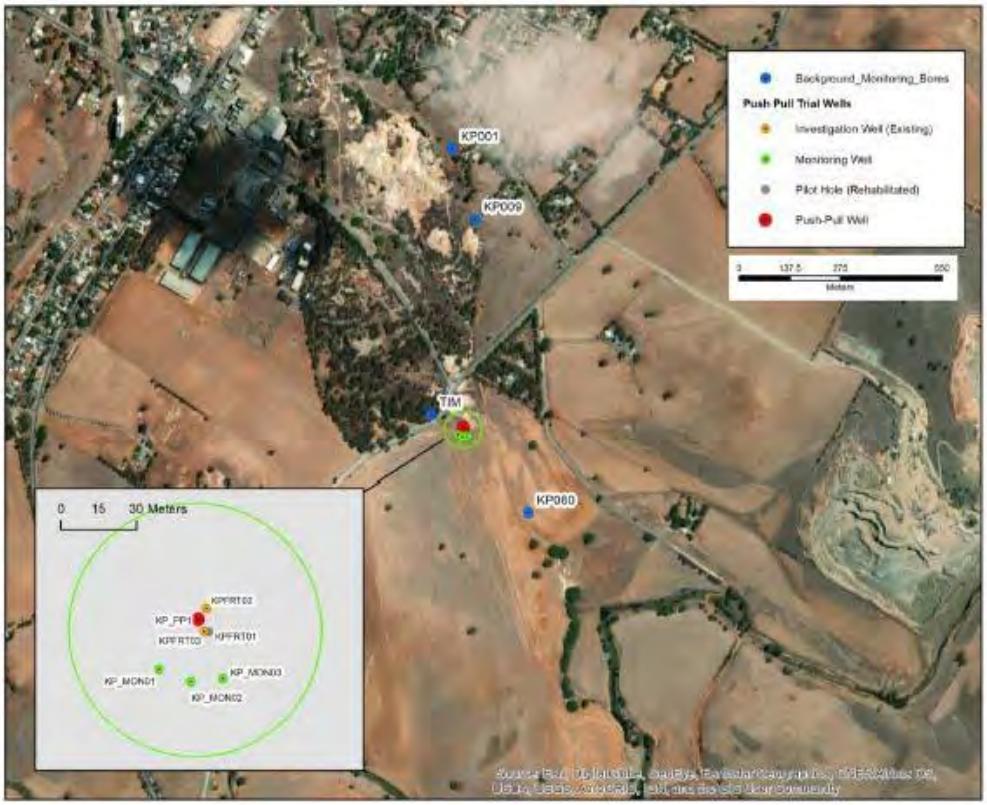

Figure 2-9: Site Wells and Background Monitoring Bores (Enviro Copper PEPR)

2.6.2 Baseline Groundwater

Multi element and major ion chemistry for the wells shown in Figure 2-9 are presented as Table 2-3. Of note, sulfate is relatively high in groundwater from Site A (~3,180 – 5,460 mg/L).

Table 2-3 Baseline groundwater chemistry (mg/L)

	Background				Site A						
Well ID	**KP001**	**KP060**	**KP060**	**KP009**	**KPFRT02**	**KPFRT02**	**KPFRT02**	**KPFRT03**	**KPFRT03**	**KPFRT02**	**KPFRT02**
Sample Date	12 Dec 2017	8 Apr 2019	1 Dec 2020	3 Oct 2019	4 Feb 2020	4 Feb 2020	4 Feb 2020	28 Nov 2019	1 Dec 2020	9 Dec 2019	1 Dec 2020
Lab Report	578446-W	651012-W	CSIRO Spreads heet	*977206*	Metals: 703174-W Br: 708682-W pH and Salinity from field results			*977206*	CSIRO Spread sheet	Field Results	CSIRO Spread sheet
pH	8.7	7.8			4.22	4.22	3.9			3.9	
Salinity (TDS)	6300	4500		11738	9555	9555	9458	7730		9500	
Na	2600	1600	1360	3300				1600	1750		1590
Ca	36	44	42.5	210				320	334		627
Mg	330	230	221	510				330	268		393
K	55	34	14.3	70				52	19.9		33
Cl	4000	2600									
Br					10	11	11				
SO4	990	370	351						3180		5460
Carbonate Alkalinity	28	< 10									
Bicarbonate Alkalinity	140	92									
Hydroxide Alkalinity	< 10	< 20									
Total Alkalinity	160	92									
Ammonia			0.114						0.553		1.05
Nitrate + Nitrite			<0.1						<0.1		<0.1
Aluminium	< 0.05	< 0.05	0.00987	0.2	18	16	16	2	1.05		1.63
Arsenic	< 0.001	< 0.001	<0.0004		0.06	0.048	0.046		0.002		0.007
Boron	1.4	0.81	0.659	3	2.7	2.6	2.6	1	1.08		1.67
Barium	< 0.02	< 0.02		<0.1	< 0.05	< 0.05	< 0.05	<0.1			
Beryllium	< 0.001	< 0.001			< 0.01	< 0.01	< 0.01				
Cadmium	< 0.0002	< 0.0002	<0.0002	<0.1	0.069	0.064	0.063	<0.1	0.014		0.04
Chromium	< 0.001	0.001	<0.0004	<0.1	< 0.01	< 0.01	< 0.01	0.7	0.0007		0.0009
Cobalt	< 0.001	< 0.001	0.002		6.1	5.8	5.8		1.92		4.79
Copper	< 0.001	< 0.001	0.002	0.2	70	49	46	0.4	1.05		15.2
Gold					< 1	< 1	< 1				
Iron	< 0.05	11	0.377	<0.1	1600	1300	1200	570	459		1110
Lead	< 0.001	< 0.001	<0.0002	<0.1	0.047	0.043	0.042	<0.1	0.001		0.0004
Mercury	< 0.0001	< 0.0001			< 0.001	< 0.001	< 0.001				
Manganese	0.28	0.72	0.38	<0.1	2.6	2.5	2.5	0.1	0.865		2.2
Molybdenum	< 0.005	< 0.005	<0.0003	<0.1	< 0.05	< 0.05	< 0.05	<0.1	0.004		0.00062
Selenium	< 0.001	0.002	<0.0004		0.025	0.02	0.018		0.002		0.0068
Strontium			0.292						2.84		4.85
Uranium	< 0.005	< 0.005			0.2	0.18	0.17				
Vanadium	< 0.005	< 0.005		<0.1	< 0.05	< 0.05	< 0.05	<0.1			

DRAFT

	Background				Site A						
Well ID	**KP001**	**KP060**	**KP060**	**KP009**	**KPFRT02**	**KPFRT02**	**KPFRT02**	**KPFRT03**	**KPFRT03**	**KPFRT02**	**KPFRT02**
Sample Date	12 Dec 2017	8 Apr 2019	1 Dec 2020	3 Oct 2019	4 Feb 2020	4 Feb 2020	4 Feb 2020	28 Nov 2019	1 Dec 2020	9 Dec 2019	1 Dec 2020
Nickel			0.003	0.2	9.8	9.3	9.3	4	2.85		7.22
Zinc	< 0.005	< 0.005	0.016	<0.1	110	87	82	39	31.8		65.2
Silicon			<0.2	12	67	64	63	35	21.8		28.8
Antimony			<0.0004						<0.0004		<0.0004

Table 2-4 Comparison of metal/ metalloid chemistry in water from KPFRT02 (Groundwater Science, 2020)

Minutes into Test	45	105	165	210	255	300	360	405	450	510	Beneficial Use Limits		
											ADWG	Irrigation	Livestock
Silicon	67	64	63	63	63	54	64	61	69	65			
Heavy Metals													
Aluminium	18	16	16	17	16	17	16	16	15	17	7	20	5
Arsenic	0.06	0.048	0.046	0.051	0.044	0.03	0.04	0.053	0.024	0.027	0.01	2.0	0.05
Barium	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	2		
Beryllium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		0.05	
Boron	2.7	2.6	2.6	2.9	2.7	2.8	2.7	2.7	2.7	3	4	0.5	5
Cadmium	0.069	0.064	0.063	0.065	0.062	0.063	0.058	0.06	0.058	0.064	0.002	0.05	0.01
Chromium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		1	
Cobalt	6.1	5.8	5.8	6.1	5.8	5.9	5.5	5.7	5.6	6.2		0.1	1
Copper	70	49	46	52	48	49	47	46	43	50	2	5	0.4
Gold	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1			
Iron	1600	1300	1200	1300	1300	1200	1200	1100	1200	1300		10	
Lead	0.047	0.043	0.042	0.045	0.042	0.042	0.04	0.041	0.039	0.044	0.01	5	0.1
Manganese	2.6	2.5	2.5	2.6	2.5	2.5	2.4	2.4	2.4	2.7	0.5	10	
Mercury	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		0.002	
Molybdenum	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.05	
Nickel	9.8	9.3	9.3	9.8	9.3	9.5	9	9.1	9	10	0.5	2	1
Selenium	0.025	0.02	0.018	0.019	0.015	0.019	0.016	0.017	0.015	0.017	0.1	0.05	0.02
Silver	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
Uranium	0.2	0.18	0.17	0.18	0.17	0.17	0.16	0.17	0.16	0.18	0.02	0.1	0.2
Vanadium	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.5	
Zinc	110	87	82	91	86	86	81	78	80	92		5	20

Note that the groundwater is acidic with pH in the range of 4. The groundwater exhibits elevated metals with 48 mg/L copper, 85 mg/L zinc, 9 mg/L nickel and 1,200 mg/L.

Groundwater Science (2020) reported that the water is not suited for drinking, stock watering or irrigation and is suited only to industrial use including mining, as the beneficial use of groundwater is constrained by the elevated metals.

The graphs in Figure 2-6 demonstrate that groundwater composition at Site A (baseline) is not observed in water sampled from the sentinel well, KP060 (and be extension, the Light River).

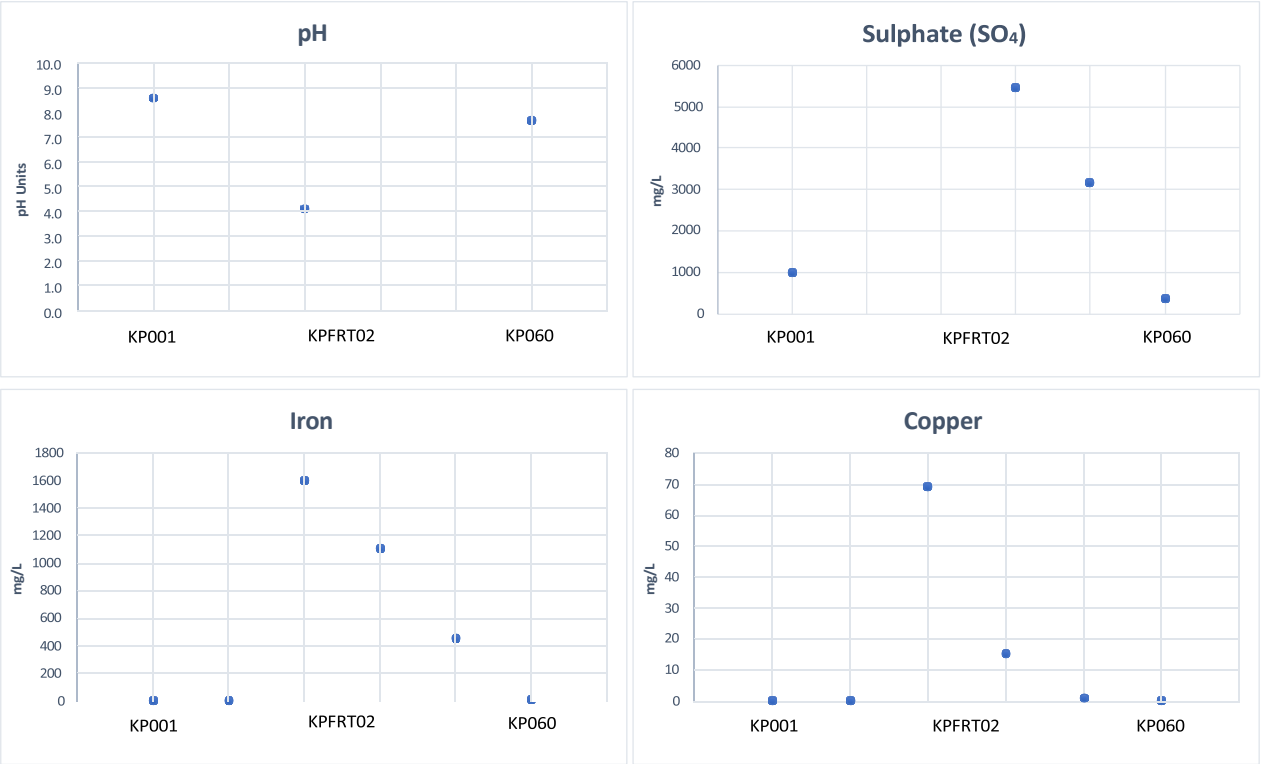

Figure 2-10: Graphs of Inorganics and Metal Concentrations in Wells Up and Down Gradient of Site (data from Enviro Copper PEPR)

2.6.3 Baseline Speciation

Groundwater collected from observation well KPFRT02 was processed using the SpecE8 application of Geochemists Work Bench (GWB, version 11.06) to speciate the groundwater. Regardless of speciation, the broad characteristics of the water *at baseline* (pre-mining or test) are:

- Low pH (3.9 – 4.5)
- High metals (aluminium (Al), copper (Cu), nickel (Ni), zinc (Zn)) relative to up-hydraulic gradient (i.e. KP001) and down hydraulic gradient (i.e. KP060)).
- High sulfate
- High Fe
- Unknown alkalinity (not analysed) – note that KP001 has 140 mg/L bicarbonate alkalinity.

Chloride was not analysed for in this analysis – chloride was assigned as the charge balance species (SpecE8 predicts 0.3 mol Cl^- to balance the charge of the water – water is electro-neutral).

The analytical composition of KPFRT02 is shown in Table 2-3. The speciation of this water as per SpecE8 is given as Appendix A.

Predicted mineral phases are given in Table 2-5. Note the dominance of copper oxide phases ferrite-cu (tenorite?), $CuFeO_2$ and tenorite itself. Malachite and azurite are also predicted albeit undersaturated. Iron is present as hematite, goethite and magnetite but also amorphous iron oxy-hydroxide (here as $Fe(OH)_3$ (ppd)). Note also Figure 2-11, which is the copper minerology of samples

used for the large particle column leach tests (LPCT). Note the copper minerology includes the copper carbonates malachite and azurite.

Some chalcopyrite is present, driven by sulfate. Increasing sulfate to concentrations reported at Site A can have the effect of eliminating the copper carbonates from the predicted speciation of the system - at one end of the system scale choosing a low sulfate water then we get predicted mineral phases as set out in Table 2-5. Introducing sulfate incrementally we need to achieve a balance of chalcopyrite without elimination of the malachite / azurite.

In effect this differentiation may be a result of differing mineral formation over depth, with the copper carbonates dominating in ECR 8-18, but copper sulfides dominant in ECR 26-29. Therefore two system speciations may exist (and be relevant) in tandem, over a depth profile. For purposes of assessment in terms of target zone and overall mass recovery, ECR 8-18 and speciation in Table 2-5 is more relevant.

Table 2-5 Predicted KPFRT02 mineral phases in low sulfate system based on groundwater from KPFRT02 – represents ECR 8-18 interval

Mineral saturation states

	log Q/K		log Q/K
Co(FeO2)2	18.8008s/sat	Malachite	-5.4631
Hematite	15.4814s/sat	Rhodochrosite	-5.7259
Ferrite-Cu	10.3692s/sat	Siderite	-7.4680
Goethite	7.2624s/sat	Co(OH)2(s,pink)	-8.2135
Magnetite	7.2515s/sat	FeO(c)	-9.3390
CuFeO2(c)	3.5744s/sat	CoO	-9.4713
Fe(OH)3(ppd)	2.8733s/sat	Wustite	-9.8558
Gibbsite	0.7722s/sat	Hercynite	-9.9522
Diaspore	-0.0192	Fe(OH)2(ppd)	-10.8277
Boehmite	-0.8636	Mn(OH)2(am)	-11.5550
Tenorite	-2.5626	Azurite	-13.3017
Corundum	-3.9187	Manganosite	-14.1820
CoCO3	-5.2262		

When introducing sulfate at ~5,000 mg/L (KPFRT02), then copper sulfates are produced, not to any great extent, and there are no copper sulfides, which is anomalous to sample ECR 26-29. Clearly ECR 26-29 is sub-oxic or reduced, hence chalcopyrite being present. Thus to form chalcopyrite and covellite the Eh of the system must be dropped significantly, to around a log fugacity O_2 of -65, which gives a close to zero Eh. Its important also to eliminate the valence of Fe in any computation, as oxidation state will fight the requirement to decrease the Eh of the system.

When these conditions are met, the copper sulfides are seen in the system, matching ECR 26-29.

Therefore speciation of the water in and of itself will produce an accurate speciation for the shallow system represented by ECR 8-18 and the specific water chemistry as sampled from KPFRT02.

The deeper sample ECR 26-29 (and groundwater, which isn't sampled at this depth) can be made to recreate the conditions forming ECR 26-29 when forcing the Eh low to ~zero, which is probably the actual (or thereabouts) Eh at such depth, although there is no specific water chemistry (and none needed)).

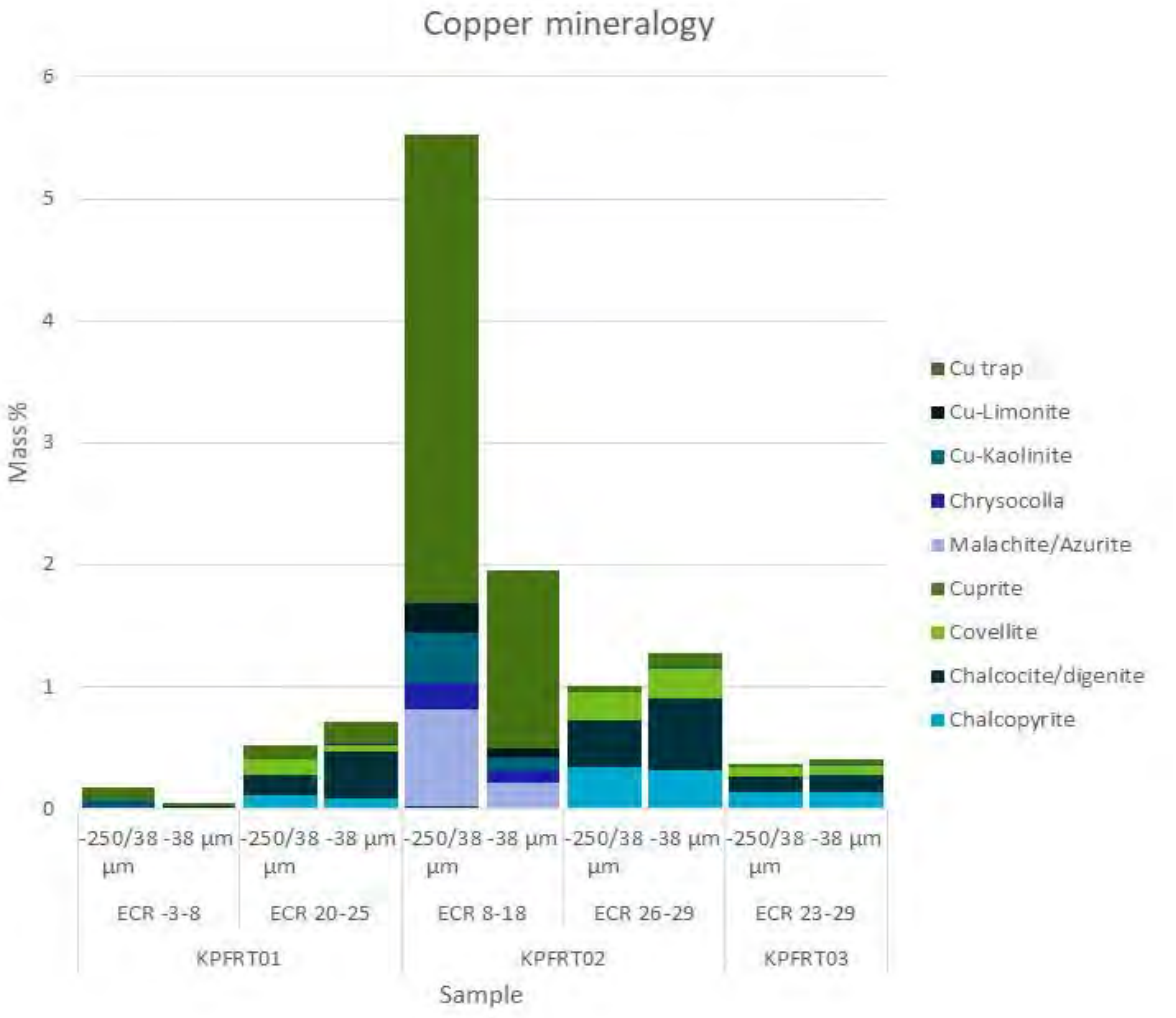

Figure 2-11 Mineralogy of rock samples from Site A

Mineral saturation states	log Q/K
Co(FeO2)2	16.3633s/sat
Covellite	14.1316s/sat
Hematite	13.9315s/sat
Chalcopyrite	12.6091s/sat
Jarosite-K	10.8374s/sat
Linnaeite	10.1353s/sat
Ni3S4	8.9731s/sat
Jarosite-Na	8.7567s/sat
Cattierite	7.7021s/sat
NiFe2O4	7.6476s/sat
Ferrite-Cu	7.3847s/sat
Ferrite-Zn	6.6011s/sat
Goethite	6.4871s/sat
NiS2	6.0686s/sat
Magnetite	4.7542s/sat
Sphalerite	3.3761s/sat
Fe(OH)3(ppd)	2.0971s/sat
Pyrite	1.6689s/sat
CuFeO2(c)	1.1924s/sat
Wurtzite	1.0766s/sat

Figure 2-12 Minerals forming ECR 26-29 (sulfate + low Eh)

Key Points

- Low sulfate system predicts copper oxides and copper carbonates along with abundance of amorphous iron oxy-hydroxide.
- This aligns with minerology ECR 8-18 in Figure 2-11.
- Forcing KPFRT02 water to have a low almost -ve Eh will recreate the conditions required to form the copper sulfides present ECR 26-29.
- As the oxic zone is the ore zone, ECR 8-18 is of more relevance (and the water chemistry required to create this environment).
- The copper sulfides appear more trace at ECR 8-18 interval, where copper carbonates are present.
- If ISR occurs deeper commensurate with ECR 26-29 then copper sulfides are of more relevance.

2.6.4 Stability

The composition of the KPFRT02 'system' was interrogated using the Act2 application in GWB. This is an important step in assessing if the water as speciated (and ultimately as modelled) represents the actual mineral phase system as defined via XRD analysis.

A standard stability diagram (i.e. Eh and pH) of the KPFRT02 'system' is unable to reproduce mineralogy observed in the XRD data (i.e. malachite and azurite) and will favour tenorite and cuprite.

Tenorite (in this case we are assuming ferric-cu is the precursor) and cuprite are of course present in the XRD data and are predicted to be oversaturated in the speciation modelling (i.e. present as a mineral phase), however there is no indication of the other mineralogy until bicarbonate (HCO_3^-) is introduced to the system (as malachite and azurite are carbonate based copper mineral phases).

KPFRT02 water was not analysed for carbonate, therefore an assumptive concentration of 28 mg/L (equal to the carbonate alkalinity in water sampled from KP001) was used, but this was converted to $CO_{2\ (aq)}$ as log fugacity. Noting the findings of Hazen (Figure 2-13) O_2 fugacity was used to constrain the y axis of the stability plot. Approaching system plotting from a carbonate based approach the produces malachite and azurite.

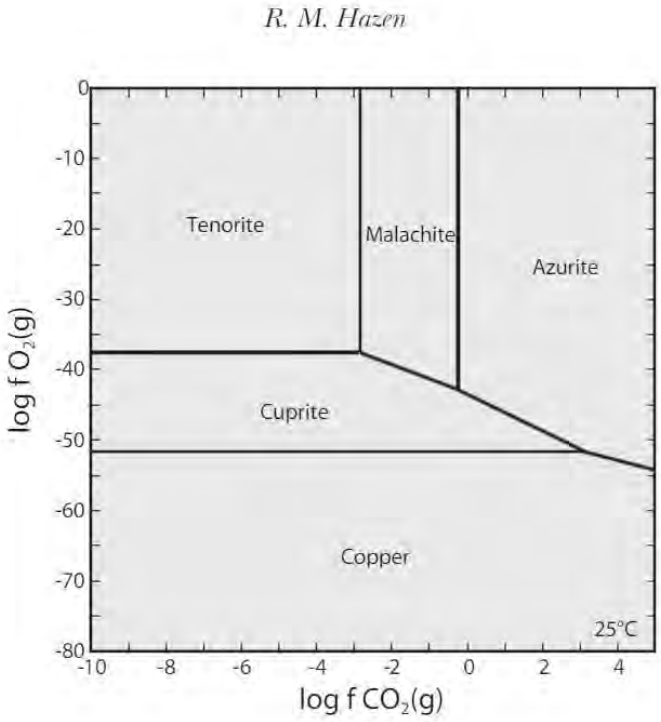

Figure 2-13 Stabilities of copper oxides (tenorite and cuprite) and carbonates (malachite and azurite) as a function of fO_2 and fCO_2 (Hazen, 2013)

Note that the work produced by Hazen shows tenorite and cuprite to be part of the same system as malachite and azurite, common copper carbonates. These carbonates require log fO_2 >-43 at standard temperature and pressure (STP), assuming log fCO_2 <-2.

Our KPFRT02 plot is established on a (as measured) pH of 4.5 which will alter the solubility of copper (i.e. copper more soluble and thus present in water at this pH than at neutral pH – this forms the basis for ISR). The resulting stability diagram is shown as Figure 2-14.

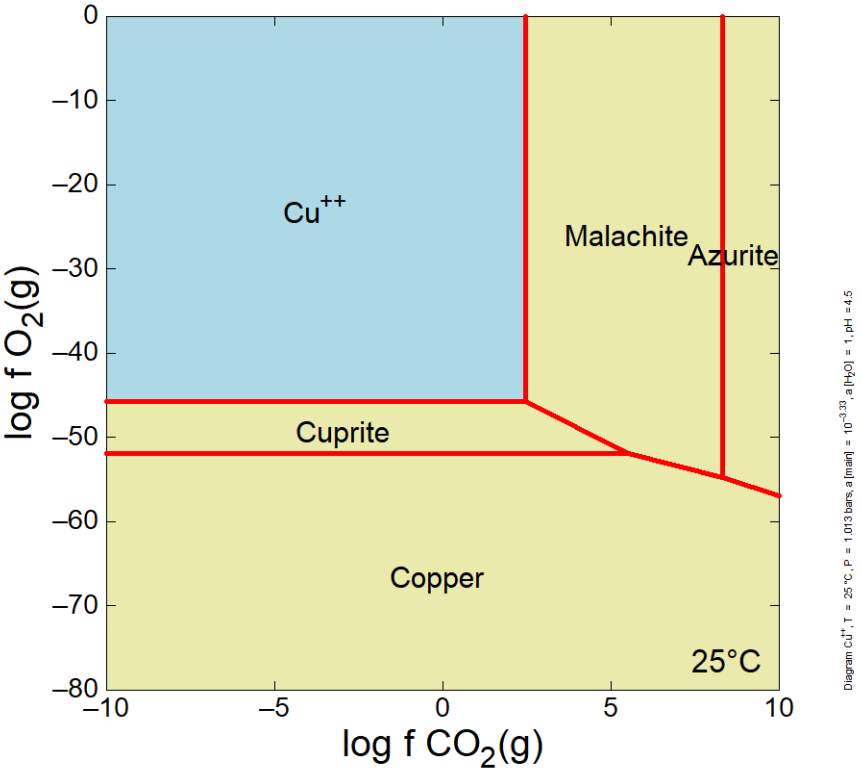

Figure 2-14 Stability plot of the KPFRT02 'system' assuming 28 mg/L bicarbonate alkalinity (blue area is $Cu_{(aq)}$) at pH 4.5

2.7 Environmental Values

2.7.1 Overview

When determining whether there is actual or potential harm to water that is not trivial, environmental values of water need to be considered, as prescribed in *Environment Protection (Water Quality) Policy* 2015 (WQEPP). The EPA acknowledges the importance of being clear on the approach to make determinations of 'actual or potential harm to water that is not trivial' and has developed a process to simplify making determinations of environmental values of groundwater at a site (Figure 2-15). For conservatism, where multiple environmental values of groundwater are identified, the most sensitive environmental value is used.

Figure 2-15 Process to determine environmental values of groundwater at a site

The first step in determining the environmental values of groundwater at the site, requires an initial groundwater assessment at the site. This is an assessment of the salinity, measured in total dissolved solids (TDS) in milligrams per litre (mg/L), so as to apply the table to clause 3 of Schedule 1 of the WQEPP to determine the environmental values.

2.7.2 Determination of Protected Environmental Values

As per above, Step 1 includes the determination of protected environmental values of groundwater using the WQEPP. The WQEPP provides for the identification of protected environmental values of groundwater on the basis of salinity **in TDS ranges**, which is presented in the table to clause 3, schedule 1 of the WQEPP.

When making a determination of the environmental values of groundwater associated with a site, the TDS mg/L in groundwater at a site is compared to the TDS ranges provided in the table to clause 3, schedule 1 of the WQEPP.

Note that GR10 of EPA 2019 states that the EPA considers an appropriate approach to an adequate assessment of the salinity of groundwater at a site is a combination of field measurements and laboratory analysis, with results reported in TDS mg/L.

Environmental value	Notes
Drinking water - human	Determination is based on TDS ranges shown in clause 3, Schedule 1 of the WQEPP: • selection of the most conservative salinity level • salinity measured by an accredited analytical laboratory and reported in TDS mg/L.
Primary industry – irrigation and general use	
Primary industry – livestock drinking water	
Primary industry - aquaculture	

Figure 2-16 Table 1 of EPA 2019: application of the WQEPP to determine protected environmental values of groundwater

A review of all third-party bores in proximity to the site was undertaken. Bore records were downloaded from WaterConnect and filtered to exclude records described as; mineral exploration holes (MW), or water points (WP), and to exclude records where the status was described as; backfilled or abandoned. The remaining records are presented in Section H - Maps, Map J “Third Party Bores” of the EPEPR and Table 7.1 of Groundwater Science (2020) report. The status of these bores was followed up by site inspection and enquiry by Groundwater Science.

Site A is not in a Prescribed Wells Area or Prescribed Water Resources Area.

The only bores in use for water supply are located in Mantina Quarry approximately 1 km to the south east of the site.

Note that the groundwater is acidic with pH in the range of 4. The groundwater exhibits elevated metals with 70 mg/L copper, 110 mg/L zinc, ~9 mg/L nickel.

The beneficial use of groundwater is constrained by the elevated metals. Groundwater Science (2020) reported that the water is not suited for drinking, stock watering or irrigation and is suited only to industrial use including mining.

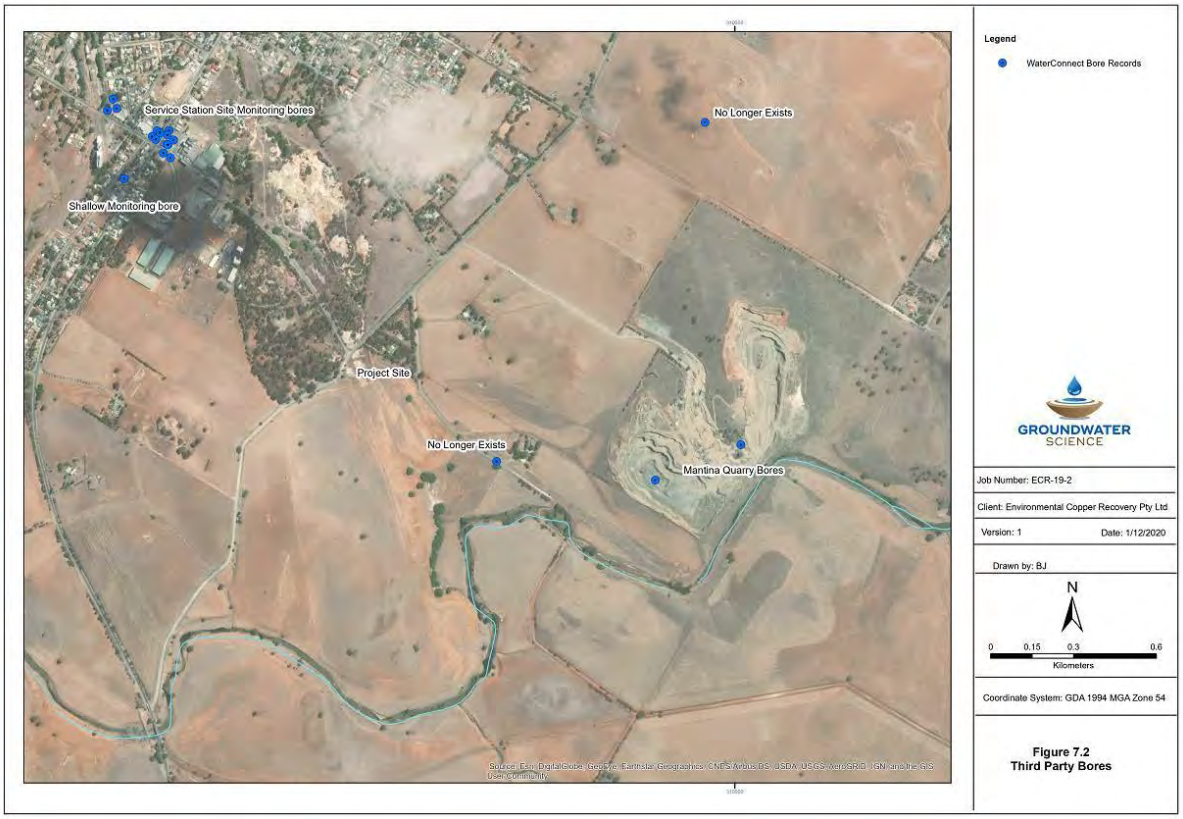

Figure 2-17 Third party bores (after Groundwater Science, 2020)

The remaining bore records are monitoring bores associated with a service station in Kapunda (up hydraulic gradient), a single shallow **monitoring** bore within Kapunda and two bores that no longer exist.

Table 2-6 presents a summary of the data (including TDS results) obtained from the WaterConnect database for active wells installed targeting the primary groundwater within a 2 km radius (total of 53 wells).

Table 2-6: Summary of Registered Well Parameter Details – 2 km Radius

Registered Use	Number	Depth Range (m BGL)	TDS Range (mg/L)	SWL (m BGL) Range
Drainage				
Investigation				
Monitoring				
Observation				

2.7.3 Application of a Buffer Distance for Protection of Surface Waters

As per above, Step 2 addresses the application of a buffer distance for protection of surface waters.

Table 2 of EPA 2019 has been devised so as to offer a practical approach for the consideration of surface water impacts when making a determination of the environmental values of groundwater.

Some chemical substances, such as chlorinated hydrocarbons, are highly mobile when present as a dissolved phase and can migrate in groundwater over large distances (aerially) and depths (vertically). The EPA recommends that a 2-km radius of the site be set to establish a 'buffer distance', largely on this basis. This is illustrated in Table 2 of the GAR (2019) – reproduced as Figure 2-18 Table 2 of EPA 2019: application of a buffer distance for protection of surface waters.

The 2-km buffer distance is considered a practical approach to provide a protection for surface waters but to also make adequate determinations of the environmental value of groundwater for the surface water receptors, as identified in Table 2 (Figure 2-17) of the guideline.

Environmental value	Notes
Aquatic ecosystems (fresh)	The environmental value is determined based on proximity to the nearest surface water body as the receptor, where the 'buffer distance' is represented by a 2-km radius of the site.
Aquatic ecosystems (marine)	
Recreational (non-domestic)	

Figure 2-18 Table 2 of EPA 2019: application of a buffer distance for protection of surface waters

Based on the above the following is noted:

- The nearest surface waterbody is identified as the Light River located approximately 585 m south east of the Site at its closest point.
- Groundwater beneath the Site is expected to flow in a south/ south easterly direction towards the Light River.
- There are no known groundwater abstraction points for recreational use DHG of the Site.

2.7.4 Review of Available Groundwater Data Using Water Connect

Using the 2-km buffer distance established in Step 2, registered bore users are identified via the WaterConnect database. Such is applied as per Table 3 of EPA 2018, reproduced as Figure 2-19.

Registered use[45]	Notes
Domestic (DOM)	The environmental value of groundwater should be determined based on registered groundwater wells (bore) for extractive uses, where the status is either active or unknown. Information and data from abandoned or decommissioned bores is not recommended. DOM registered bores can be used as a potable water supply by residential properties. Drinking water would be the applicable environmental value for domestic registered bores. TWS bores are likely to be used for potable water supply. Drinking water would be the applicable environmental value for town water supply registered bores. Monitoring and investigation registered bores have no environmental value that requires protection; rather, the data associated with these registered bores may be useful in determining the environmental values of groundwater ie by using salinity information.
Town water supply (TWS)	
Recreational/aesthetics (IRR)	
Industrial (IND) (IRR)	

Figure 2-19 Table 3 of EPA 2019: application of Waterconnect (groundwater data) to determine environmental values of groundwater

2.7.5 Actual or Potential Harm to Water That is Not Trivial – Application of EPA Recognised Criteria

As per above, Step 4 includes the actual or potential harm to water that is not trivial and the application of EPA recognised criteria. Following the completion of the previous steps in this process, it is possible to identify the environmental values of groundwater at a site. EPA considers that it is likely that more than one environmental value of groundwater will be identified.

In addition, of note, Schedule 1 of the WQEPP, stipulates the environmental values of groundwater based on background salinity levels. These are summarised in Table 2-7.

Table 2-7: Summary of Environmental Values of Underground Waters as per the WQ EPP 2015

Salinity levels of underground waters	Aquatic ecosystem	Recreation and aesthetics	Drinking water for human consumption	Primary industries—irrigation and general water uses	Primary industries—livestock drinking water	Primary industries—aquaculture and human consumption of aquatic foods
Background TDS level of **less than 1,200 mg/L**	N/A	N/A	**Yes**	**Yes**	**Yes**	**Yes**
Background TDS level of **1,200 mg/L or more, but less than 3,000 mg/L**	N/A	N/A	N/A	**Yes**	**Yes**	**Yes**
Background TDS level of **3,000 mg/L or more, but less than 13,000 mg/L**	N/A	N/A	N/A	N/A	**Yes**	**Yes**

The background salinity of groundwater ranges from 6,300 mg/L (KP001, 12 December 2017) to 11,738 mg/L KP009, (3 October 2019) when adopting the mine related background wells.

KP060 has a salinity of 4,500 mg/L.

Site A has a baseline salinity ranging from 7.730 mg/L to 9,555 mg/L (KPFRT02 and KPFRT03) this being in the background range of KP001 and KP009.

The salinity of the water is compared to the Environmental Values of Underground Waters as per the WQ EPP 2015 (Table 2-7) and the outcome is discussed in Table 2-8 with respect to Environmental Values of water at and down hydraulic gradient (DHG) of the Site.

Table 2-8: Summary of Environmental Values and Likelihood of Such Use - Groundwater

Environmental Values	Likelihood of Realising Environmental Values (Current & Realistic Future Potential)	
	On-Site	Off-Site (DHG)
Drinking Water - Human	**UNLIKELY** The quality of groundwater beneath the Site is not suitable for potable use based on salinity.	**UNLIKELY** The quality of groundwater DHG is not suitable for potable use. A reticulated water supply is available and there are no domestic bores or town water supply bores recorded within the 2km buffer, the potential use of groundwater for potable purposes is considered to be low.
Recreation and aesthetics	**UNLIKELY** The Site will not be used for recreational and aesthetics (i.e., topping up swimming pools) so this is not significant.	**UNLIKELY** No registered abstraction point used for recreational and aesthetics (i.e., topping up swimming pools) so this is not significant.
Primary industries - Irrigation and General Water Uses	**UNLIKELY** The quality of groundwater beneath the Site is not suitable for this use based on salinity.	**UNLIKELY** The quality of groundwater DHG from the Site is not suitable for this use based on salinity.
Primary Industries - Livestock Drinking Water	**UNLIKELY** This use is not being considered for the site.	**LOW** Rural area with agricultural properties present, however no stock bores (STK) were recorded within the 2km buffer. TDS is suitable
Primary Industries - Aquaculture and Human Consumption of Aquatic Foods	**UNLIKELY** This use is not being considered for the site.	**UNLIKELY** Rural area with agricultural properties present, however no stock bores (STK) were recorded within the 2km buffer. TDS is suitable.
Maintenance of Aquatic Ecosystems (Fresh Water)	**UNLIKELY** There are no freshwater ecosystems on the site.	**HIGH** The Light River is a freshwater ecosystem located 585 m south / south east.
Maintenance of Aquatic Ecosystems (Marine Water)	**UNLIKELY** There are no marine ecosystems onsite.	**UNLIKELY** No marine ecosystems were reported within the 2km buffer distance.
Environmental Values not prescribed in WQEPP but included for completeness of assessment		
Human Health in Non-Use of Groundwater Scenarios (i.e., Vapour Flux) if volatiles present	**UNLIKELY** There are no sensitive receptors onsite.	**UNLIKELY** There are no sensitive receptors DHG between the Site and the river.

2.7.6 Summary of Environmental Values Assessment

According to the four-step process to determine environmental values of groundwater from the WQEPP, the 'most sensitive' for the Site is:

- Maintenance of Aquatic Ecosystems (Freshwater)

2.8 In-Situ Recovery (ISR) Mining

2.8.1 Process

Enviro Copper aims to utilise In-Situ Recovery (ISR) to extract copper from underground mineral deposits. ISR involves injecting a specifically selected lixiviant through a well into the desired ore body to leach the copper into a soluble form. This solution is then pumped to the surface where the concentrated copper can be recovered for processing (USNRC 2021).

Methane Sulphonic Acid (MSA) has been selected by Enviro Copper as a suitable lixiviant as it works in acidic conditions, is readily biodegradable, and will target the intended metals.

Studies by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) have found that copper leaches easily into solution. Concentrations of 800 to 1500 ppm are required for the project to be economic; the PEPR reports that the expected copper solutions from the Kapunda area will be up to 2000 ppm.

The first phase of the project is a Site Environmental Lixiviant Trial (SELT) to assess the extent of the ISR copper deposit. According to Enviro Copper, this is a Push/ Pull Test using KP_PP1.

The test will consist of pumping around 5,000 L (5 m^3) of lixiviant into well KP_PP1, allowing it to equilibrate in the copper ore zone for 14 days. Groundwater will then be pumped out at a rate of around 5 m^3 per day.

The groundwater trial area is defined as a 50 m radius around KP_PP1. This will allow for a lixiviant plume of approximately 7m to form, and then for remediation of the lixiviant within one year. This test is shown in Figure 2-20; the water table is expected to rise during injection and a cone of depression form during extraction, before returning to equilibrium overtime.

The lixiviant (Lutropur™) has a pH of ~1.0. Ultimately the specific geochemical process that occurs where the purple arrows travel in Figure 2-19: The Push/ Pull Test (lixiviant = purple arrows, rock fractures = grey arrows) is demonstrated by the two stability plots shown as Figure 2-20. In plot (a) we have the baseline system at pH 4.5, and in plot (b) we have the system at pH 1.3, after addition of the lixiviant. The dominance of aqueous copper is clear at the lower pH, as a function of dissolution of the copper mineral phases.

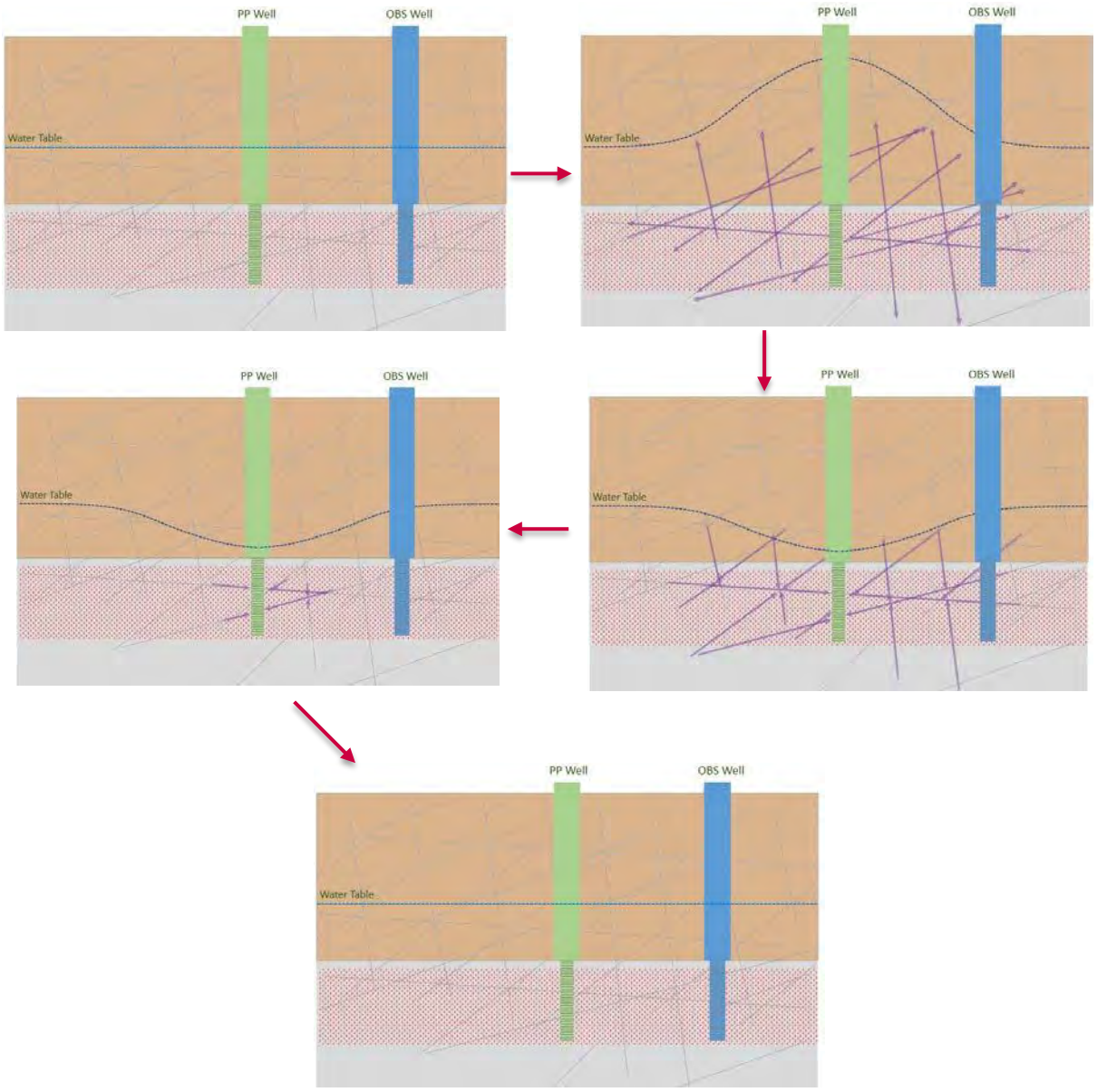

Figure 2-20: The Push/ Pull Test (lixiviant = purple arrows, rock fractures = grey arrows)

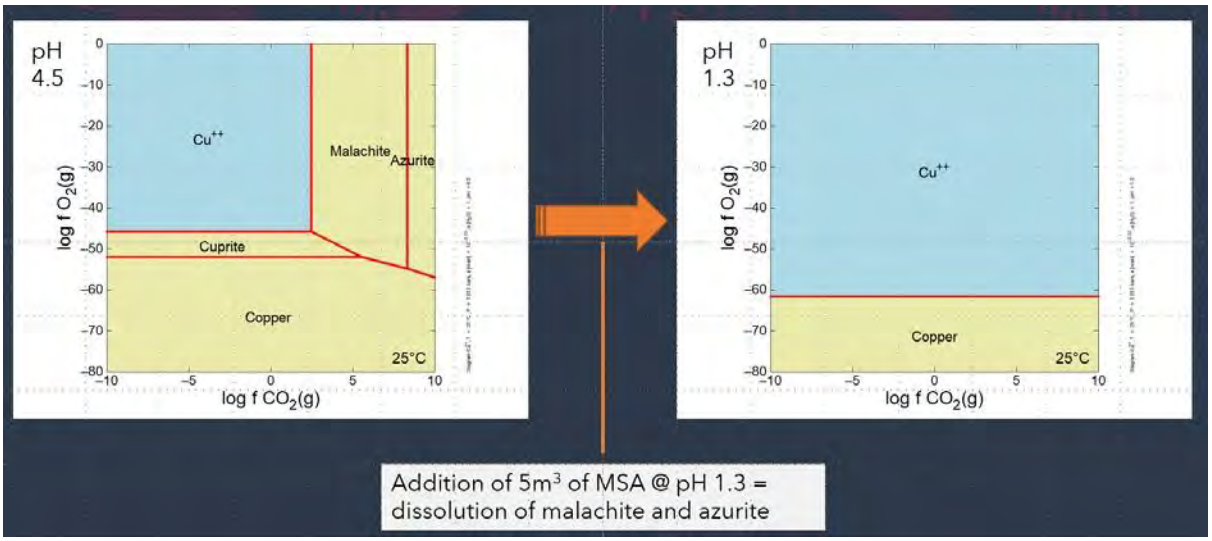

Figure 2-21 Stability plot (a) pre injection of lixiviant and (b) post injection, causing the dissolution of mineral assemblages and aqueous un-complexed copper being dominant above log fO_2 -60

2.8.2 Column Leach Tests

Several laboratory analyses phases have been commissioned to assess copper recovery, i.e. bottle roll tests, mini column leach tests and then large particle column leach (LPCT) tests.

The LPCT used seven individual columns. Each column was trialled with differing lixiviant including the favoured MSA (Table 2-9).

Table 2-9 LPCT columns and solutions

Description	Sample	Configuration	Solutions used
Green	KPFRT01-3-8	Single-pass vertical upflow column	Site water, 0.1 M H_2SO_4, 0.1 M Fe^{3+}/0.1 M H_2SO_4, 0.5 M Fe^{3+}/0.1 M H_2SO_4
Blue	KPFRT01-20-25	Single-pass vertical upflow column	Site water, 0.1 M H_2SO_4, 0.1 M Fe^{3+}/0.1 M H_2SO_4, 0.5 M Fe^{3+}/0.1 M H_2SO_4
Purple	KPFRT02-8-13	Single-pass vertical upflow column	Site water, 0.1 M H_2SO_4, 0.1 M Fe^{3+}/0.1 M H_2SO_4
Red	KPFRT02-26-29	Single-pass vertical upflow column	Site water, 0.1 M H_2SO_4, 0.1 M Fe^{3+}/0.1 M H_2SO_4, 0.5 M Fe^{3+}/0.1 M H_2SO_4
Recirculating	KPFRT01-3-8		0.1 M H_2SO_4
H_2SO_4 IX	KPFRT01-3-8		0.1 M H_2SO_4
MSA IX	KPFRT01-3-8		0.1 M MSA

3 CONCEPTUAL SITE MODEL (TASK B)

3.1 Overview

The ASC NEPM (1999, as amended 2013) states that a conceptual site model (CSM) is a representation of site-related information regarding contamination sources and receptors, and potential exposure pathways between such sources and receptors. The development of a CSM is an essential part of all site assessments and provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future.

In the context of assessment of site contamination, there are three essential elements to any risk:

- Source (contaminant) – a substance which is located in, on or under the land and has the potential to cause harm to human health, water resources or the wider environment.
- Pathway – the means or route by which a source of contamination can migrate; an identified receptor can be exposed to or be affected by an identified source.
- Receptor – something which could come to harm, including human health, water resources, surface water courses or the wider environment.

Each of these elements can exist independently. They create a potential risk where they are linked together. The linked combination of “contaminant – pathway - receptor” is referred to as a contaminant linkage.

On any individual site, one single contaminant linkage or a number of different contaminant linkages may be present. Different contaminant linkages may also be related. The same receptor may be linked to a number of different contaminants via the same migration pathway. Contaminants can migrate to a receptor via more than one pathway and receptors maybe at risk from more than one source of contamination.

Without a contaminant linkage, there is not a risk – even if a contaminant is present. Where there is a contaminant linkage, and therefore some measure of risk, it is important to identify whether that risk is significant. The level of risk needs to justify the actions taken to deal with the risk.

In response to DEM (2020) requirements, a conceptual site model (CSM) has been developed to identify potential source(s), pathway(s) and receptor(s) associated with the geochemistry of the Site. The CSM contributes to an understanding of possible effects posed to environmental values (EVs).

The following sections establish each of the source-pathway-receptor assessment components as well as the potential linkages formed where these three components are present.

Figure 3-1 presents a figurative representation of the following information.

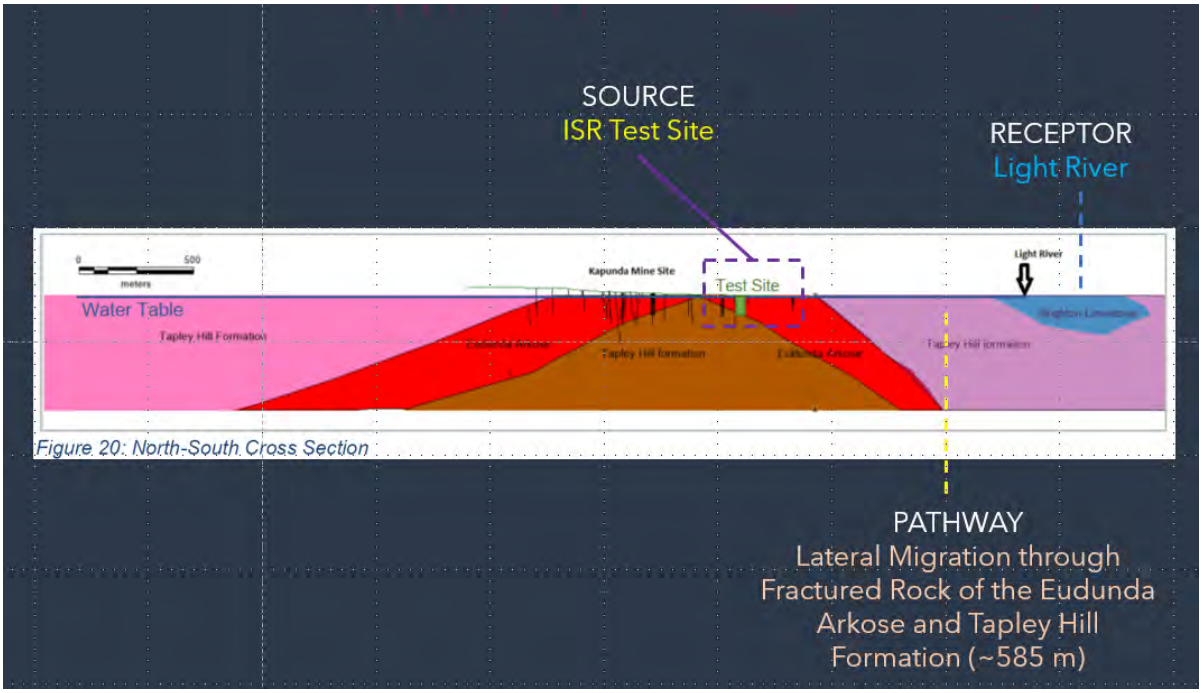

Figure 3-1 CSM

3.2 Sources

Proposed ISR activities and the geochemistry of the Site provide the sources of chemical substances of potential environment concern (CPEC). Based on the data provided in previous geochemical studies, natural enrichments of metals and metalloids are present in these geological materials.

The lixiviant (MSA) is almost entirely an acid, with little trace element composition except sulfate at around 20 ppm. Appendix B presents the brochure and Materials Safety Data Sheet for the lixiviant (Lutrapur).

The background groundwater is already acidic and contains high concentrations of heavy metals and metalloids. In order to define the source term (chemical substances), the concentrations of chemical substances in background groundwater must be accounted for (SA EPA 2018).

The process outlined in Figure 3-2 was followed to define the source term on the basis of chemicals of potential environmental concern (CPEC). This process essentially comprises:

1. Compare the maximum reported concentrations in the LPCT multi element leach (MSA column, as this is the favoured lixiviant) to the adopted tier 1 water quality criteria (environmental values based, being ANZG (2018) Tox LOSP 95) (at source in the first instance, conservatively ignoring the intervening flow path between Site A and the Light River).
2. Compare the maximum reported concentrations in the LPCT multi element leach (MSA column, as this is the favoured lixiviant) to background.
3. Compare the (baseline) background concentrations to the adopted tier 1 water quality criteria (environmental values based, being ANZG (2018) Tox LOSP 95).

4. Compare the maximum reported concentrations in the LPCT multi element leach (MSA column, as this is the favoured lixiviant) to background.

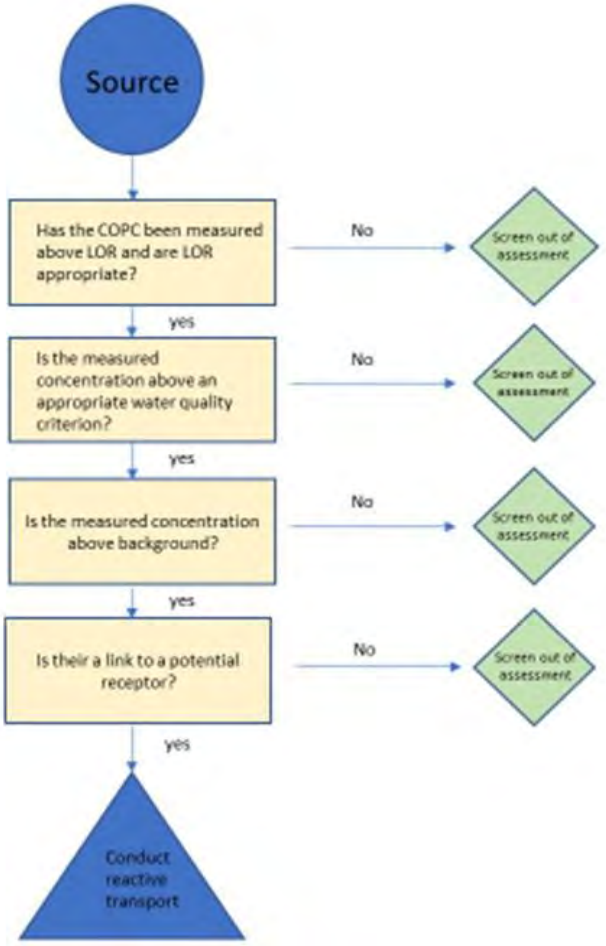

Figure 3-2 Source term derivation process (chemical)

Following this process, the initial CPEC are identified in Table 3-1 Source term derivation Steps 1 - 4.

Several elements in baseline water exceed ANZG (2018) criteria (Step 1). Most of these elements exceed ANZG (2018) criteria in the MSA LPCT (Step 2). Several elements are above background (Step 3). The elements above background are generally only marginally above, as indicated by the relative percent difference (Step 4).

Table 3-1 Source term derivation Steps 1 – 4 (all values are µg/L except % RPD)

Step 1	Step 2	Step 3	Step 4			
Exceeds ANZG	Exceeds ANZG	Exceeds Background				
Background	MSA LPCT Max	MSA LPCT Max	Background	**MSA**	**Difference**	**RPD%**
Ag	Ag	Ag	0	60	60	
Be	**Be**	Be	0	5	5	
Ce	**Ce**	Ce	1880	1890	10	-0.53
Co	Co	Co				
Cu	**Cu**	Cu				
Gd	**Gd**	Gd	153	167	13	-8.33
La	**La**	La	615	665	50	-7.81
Lu	**Lu**	Lu	0	12	12	
Mo	Mo	**Mo**	0	100	100	
Nd	**Nd**	Nd	765	975	210	-24.14
Ni	Ni	Ni				
Pr	**Pr**	Pr	167	233	67	-33.33
Sm	**Sm**	Sm	164	171	7	-4.18
Tb	**Tb**	Tb	18	22	3	-16.67
Tl	**Tl**	Tl				
Tm	**Tm**	Tm	6	8	2	-28.57
Y	**Y**	Y	560	690	130	-20.80
Zn	Zn	Zn				
Al	Al	Al	27500	60500	33000	-75.00
B	**B**	B				
Cr	Cr	Cr	0	30500	30500	
Mn	Mn	Mn	4000	4500	500	-11.76
Ti	**Ti**	Ti	200	1300	1100	-146.67
V	V	V	0	2000	2000	

Using Step 1 to 3 process, the source term can be summed as per Table 3-2 Source term A. The following metals exceed ANZG (2018) criteria (where such exists):

- Silver (Ag)
- Molybdenum (Mo)
- Chromium (Cr)
- Vanadium (V)

The robustness of the ANZG criteria applied is discussed in Table 3-4. Cr and V have low confidence in the value and ANZG suggest that these are 'interim' figures at best.

Many rare earth elements (REE) are left in the source term at this stage due to:

1. The lixiviant being comprised of site water + MSA.

2. No relevant freshwater ecosystem screening criteria.

3. Being above background in the leach solution – this due to use of site water already containing REE.

The relative percent difference between background concentration and MSA solution is provided in Table 3-2 and several REE have a low RPD which shows the insignificance of the difference between background and MSA LPCT (green shade) as they are both a function of using site water as the basis for the leach solution.

The revised source term (elimination of REE) is listed as Table 3-3.

Table 3-2 Source term A (all values are µg/L other than % RPD, green shade = minor RPD) – blue shade retained for source S1

	Exceeds ANZG	Exceeds Background					
CPEC	MSA Max	MSA Max	Background	MSA	Difference	RPD%	ANZG 2018
Ag	Ag	Ag	0	60	60		0.05
Be	**Be**	Be	0	5	5		
Ce	**Ce**	Ce	1880	1890	10	-0.5	
Gd	**Gd**	Gd	153	167	13	-8.3	
La	**La**	La	615	665	50	-7.8	
Mo	Mo	**Mo**	0	100	100		34
Nd	**Nd**	Nd	765	975	210	-24	
Pr	**Pr**	Pr	167	233	67	-33	
Sm	**Sm**	Sm	164	171	7	-4	
Tb	**Tb**	Tb	18	22	3	-17	
Tm	**Tm**	Tm	6	8	2	-29	
Y	**Y**	Y	560	690	130	-21	
Cr	Cr	Cr	0	30500	30500		3.3
Ti	**Ti**	Ti	200	1300	1100	-147	
V	V	V	0	2000	2000		6

Table 3-3 Source term A-1 (all values are µg/L)

	Exceeds ANZG	Exceeds Background				
CPEC	MSA Max	MSA Max	Background	MSA	Difference	ANZG 2018
Ag	Ag	Ag	0.0	60	60	0.05
Mo	Mo	Mo	0.0	100	100	34
Cr	Cr	Cr	0.0	30500	30500	3.3
V	V	V	0.0	2000	2000	6

Table 3-4 Comment provided by ANZG on the criterion

Metal	Comment provided by ANZG on the criterion
Ag	A freshwater high reliability trigger value of 0.05 µg/L was calculated for silver using the statistical distribution method with 95% protection.
Mo	There were not sufficient freshwater data for molybdenum to derive either a high or moderate reliability guideline trigger value by either the AF or statistical distribution methods. Hence a freshwater low reliability trigger value of 34 µg/L was calculated for molybdenum using an AF of 20 (because the limited data were chronic) on the *D. magna* figure.
Cr	A low reliability freshwater trigger value for chromium (III) of 3.3 µg/L was derived using the assessment factor (AF) method (a factor of 20 was applied to the lowest, *O. mykiss* figure, from a limited set of chronic data). This applies to low hardness water at 30 mg/L as $CaCO_3$. **This figure should only be used as an indicative interim working level.**
V	A freshwater low reliability trigger value of 6 µg/L was calculated for vanadium using an AF of 20 (applied to the lowest experimental chronic figure). **This should only be used as an indicative interim working level.**

Table 3-5: Summary of Identified Sources

Source ID	Name	Description	Associated CPEC
S1	Site A	Acid based dissolution of rock minerals producing solutes (In Situ Recovery process)	Acidity Low pH Ag Mo Cr V

3.3 Pathways

A pathway is the route along which a solute might move through the environment from its source to receptor. The only pathway identified is P1 (Table 3-6).

Table 3-6: Summary of Identified Pathways

Pathway ID	Name	Description
P1	Groundwater	Lateral migration of solutes in groundwater via fractured rock aquifer

3.4 Receptors

The main potential receptor for this project is the Light River (Table 3-7).

Table 3-7: Summary of Identified Receptors

Receptor ID	Name	Description
R1	Light River	Located 585 m DHG.

3.5 Potential Impact Linkages

The fundamental concept of the assessment is that first there should be an exposure pathway (which incorporates an exposure route) linking a source with a receptor. Where a linkage exists, an assessment of the nature and significance of the exposure pathway is required to determine the level of threat posed.

A total of 1 linkage is identified as being potentially relevant / significant (Table 3-8). This linkage is assessed in Section 4.

Table 3-8: Potential Impact Linkage

Linkage ID	Source	Pathway	Receptor	Discussion
L1	S1	P1 – Groundwater	R1 – Freshwater Ecosystems	Generation of certain metals (Source term A), low pH / acidity and rare earths via addition of MSA to 8 m thick Cu ore zone, with potential for solute escape along fractures in the rock aquifer, to the Light River, ~585 m south-southeast.

4 PREDICTIVE RISK ASSESSMENT (TASK C)

4.1 Concept

The key linkage of potential migration of test related solutes was assessed using the X1t and X2t models of GWB. The input water was the speciated KPFRT02. Although the actual receptor is the Light River, solute migration needs to be assessed / monitored and where occurring, mitigated, prior to reaching the receptor. For the purposes of the modelling, the 'breakthrough' receptors are the three proposed monitoring wells located 25 m down hydraulic gradient of the push pull test well (green symbols, Figure 4-1 Push pull test layout).

Preliminary estimation by ECR predicts the resulting injection bubble to expand no more than 7 m from point of injection – this would mean some change in water composition would be detected at the established observation wells KPFRT02 and KPFRT03 (located 5.3 m away from KP_PP1).

4.2 Geochemists Work Bench Modelling

4.2.1 Existing system

Noting the high metal concentrations and low pH of water in the observation wells KPFRT02 and 03, and absence of such at the down hydraulic gradient sentinel well (KP060), a one dimensional (1-D) assessment was undertaken of the existing system using speciated KPFRT02 water.

Without any form of attenuation (control), the copper concentration reported in water from KPFRT02 (70 mg/L, February 2020) travels straight along the gradient with no change in concentration. This obviously does not represent the real system, as such concentrations of copper are not reported in water from KP060.

There is an abundance of iron-oxy-hydroxide in the system as evidenced by water analysis and speciation showing an oversaturation of amorphous FeOH.

FeOH is a great sorption material for double valent metals (Millward and Moore, 1982). When sorption of copper is allowed for in the 1-D model (via K_d sorption site modelling using Fe inherent in the system – i.e. no further Fe added as reactant), the migration of copper in groundwater decreases significantly within ~50 m of Site A – i.e. is not predicted to reach KP060 which is ~300 m down hydraulic gradient. This modelling is presented as Appendix B at the 100 year interval.

The system therefore is judged to attenuate metal migration in groundwater via the abundance of amorphous iron-oxy-hydroxide.

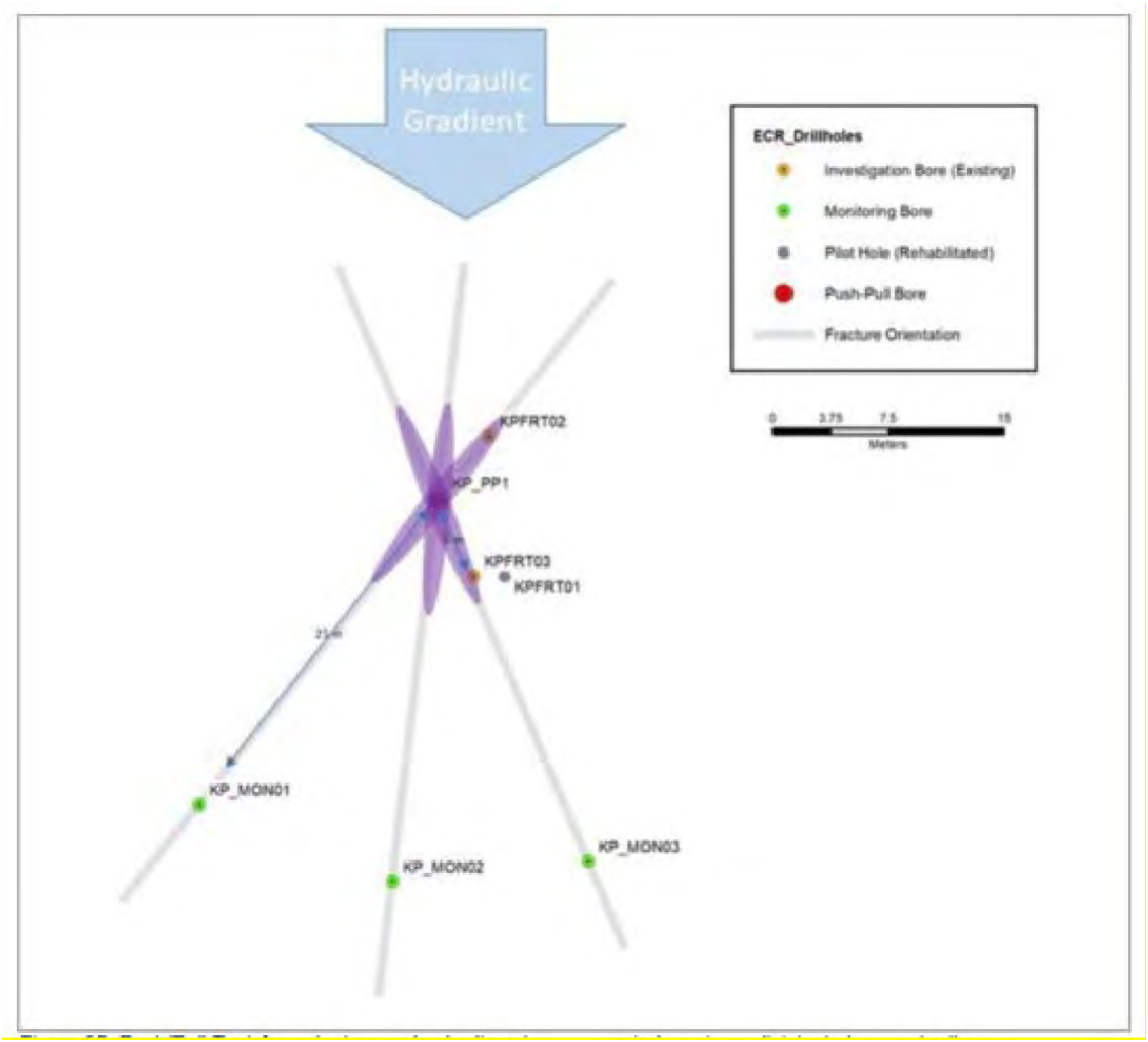

Figure 4-1 Push pull test layout

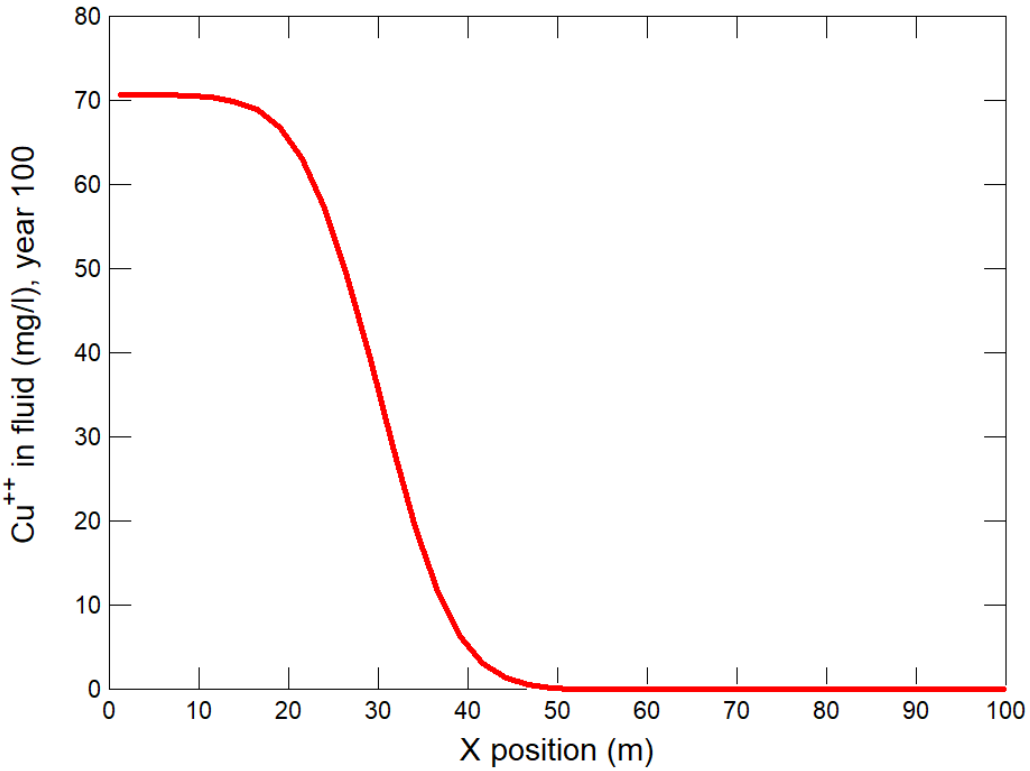

Figure 4-2 Copper in fluid, current system, 100 year model

4.2.2 Tracer Calibration

A tracer test using sodium bromide solution ($NaBr^-$) has been undertaken at Site A. The tracer was pumped into the push-pull well and water was continuously analysed at the observation well KPFRT02. A breakthrough of bromide (Br^-) was observed in around 3 hours from injection, although the hydraulic gradient was under artificial stress by extraction of groundwater at 10 m from the push pull well, thereby increasing the gradient. The concentration of bromide was estimated at 13 % of source at said time.

Bromide is a conservative element in that it is un-reactive (relatively) in a geochemical sense, and it is not amenable to changes in pH, nor retardation via sorption.

To calibrate the hydrogeochemical model, the particulars of the tracer test were applied to modelling runs using bromide. Essentially what we want to see is bromide arriving at the observation well (5.3 m distance from the push pull well) in the approximate time frame that was recorded for the actual field tracer test (~3 hours). A 1000 mg/L tracer was used with a days injection at 12 m^3 per day (this is more than double the proposed lixiviant volume for the push pull trial).

The model used the total porosity of 3% previously described but noting fractured rock, the void coefficient was set to mimic the effective porosity of 0.5%. This calibration resulted in the outer edge of the bromide tracer being detected at the observation well within 4.8 hours, at an approximate concentration of around 50% (Figure 4-3). This was considered to represent very reasonable calibration of the system, given the model is overpredicting a % concentration but the model time slice is ~1.8 hours over the 3 hours noted in the field test.

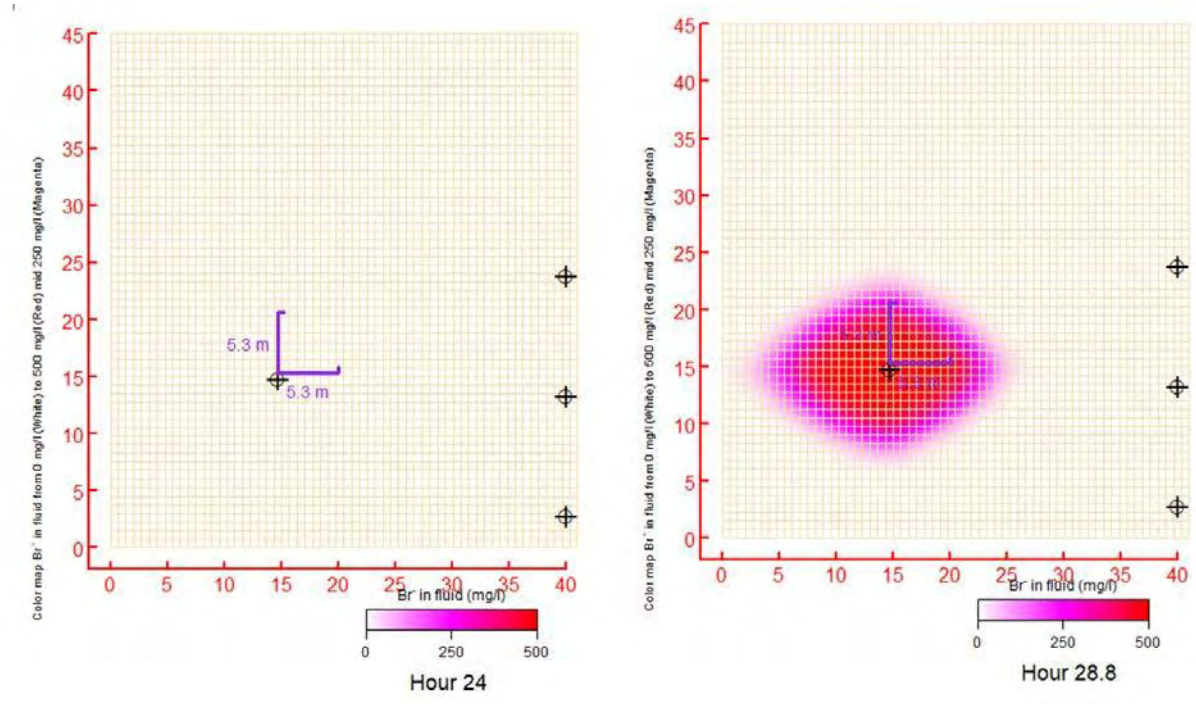

Figure 4-3 Predictive modelling of bromide tracer from the push pull well

4.2.3 Push Pull Test Modelling

As set out earlier, the push pull test will comprise:

1. Injection of 5 m^3 of Lutropur via KP_PP1
2. 14 day equilibration
3. Pump out via KP_PP1 at a rate of 5 m^3 day until no significant indication of copper rich solution / significantly different pH from baseline

Monitoring will occur at the observation wells KPFRT02 and 03 (5.3 m from KP_PP1) and also KP_MON01, MON02 and MON03 (25 m from KP_PP1)– these are treated as the receptor / sentinel wells.

The ambient water is KPFRT02 (speciated).

The lixiviant is based on the materials safety data sheet for Lutrapor, which of note has a pH of 1.0 and the only other chemical of note is sulfate (20 mg/L). This is injected at day 1 for 24 hours at said rate.

Copper dissolution is modelled by creating a node by node 'map' of ferric-cu, with all concentration being 0 mmol except the nodes around the injection well. If every node contained ferric-cu then the model would react and dissolve the mineral based on baseline pH, creating an abnormally high aqueous copper concentration that is not seen in real terms.

By defining (or limiting) the mineral to the area taken up by the change in pH (as indicated by the model), the effect of the acid on copper mineral dissolution can be inferred.

The 'concentration' of ferric-cu was estimated using reaction path modelling. The QEMSCAN notes ferric-cu at 4%. This amount would drive the pH very basic (pH 10) in the model in the area of injection, due to hydroxide alkalinity created via dissolution of the mineral. This pH is not seen in column tests, where pH stayed low during sequestration. A model based estimation of ferric-cu that keeps pH as low as observed in column tests is 0.06 mol (Figure 4-4).

When this amount of ferric-cu was adopted in the X2t model, the resulting concentration around KP_PP1 was ~1500 mg/L, which is very similar to column leach test copper concentration. Therefore 0.06 mol as a reactant mineral phase in the injection zone:

1. Keeps pH low (<1.5) (as per column leach tests)
2. Yields ~1500 mg/L $Cu_{(aq)}$ (as per column leach tests)

This amount of ferric-cu is therefore considered to be system representative for copper fate and transport processes. Note that an alternative (secondary approach) to this approach is to use a 'direct' copper concentration in the lixiviant solution (i.e. make copper present at 1500 mg/L in the solution being injected).

This secondary approach is useful for a 'quick screen' in terms of lateral migration but bypasses the geochemical evolution of the system.

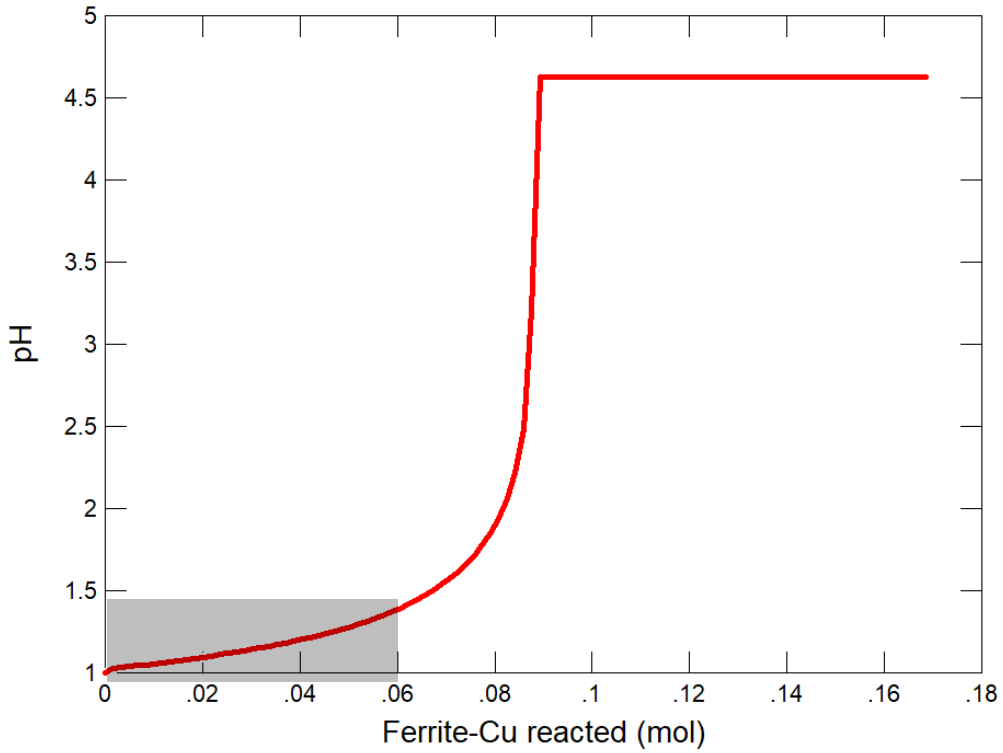

Figure 4-4 reaction modelling of ferric-cu as a function of pH in the KPFRT02 system

A similar pH rise phenomenon is seen when using malachite, which in this case is a copper carbonate mineral (Figure 4-5). Dissolution generates carbonate and thus in the presence of this mineralogy acid consumption will likely increase (Figure 4-6).

Predicted distribution of groundwater pH and copper are presented as Figure 4-7 and Figure 4-8.

Change in pH and copper is not predicted to be observable at the pilot observation location KPFRT02 (located ~5.3 m from the push-pull well). Note the resolution of the model is limited to certain timesteps depending on the duration of the model, however the resolution is considered satisfactory for the purposes of predictive modelling.

A summary of predictive model findings is presented as Table 4-1.

Table 4-1 Model predictions for key parameters pH and copper

Parameter	Model Predictions
pH	Please refer to Figure 4-7. The model predicts a relatively short spread of low pH as a function of lixiviant injection – relative to the observation well distance of 5.3 m. Key processes are buffering of acid lixiviant by ambient bicarbonate in the groundwater, which is expected to be lower than background (hence the low start pH observed in such water: pH 3.9 – 4.1), but primarily buffering is likely driven by mineral dissolution as seen in Figures 4-4 – 4-6. Where the mineral volume / distribution is higher than that modelled, then increased buffering will occur – this could be expected based on CSIRO comments on relatively higher than expected acid consumption. Conservative extraction rate of 5 m^3 per day was used, and the model predicts that the pH of the water begins to return to baseline almost instantaneously, and by day 24, pH is >3 (remembering the baseline pH is as low as 3.9 in water analysed from the observation wells). Some slight residual lower pH is predicted – relative to a baseline start in the model of 4.5 – realistic field pH is 3.9 – 4.1. The realistic baseline pH is predicted to be achieved between day 24 and 72, note the slight 'smudge' of pH 4 on the day 72 plot. Realistically any variation around this value (+/-) would not be detectable using even the best calibrated field pH probe (some variation of 0.1 or more is expected).
copper	Copper exhibits a similar distribution to the pH pattern, although this is expected as the pH drives the dissolution of the ferrite Cu used as the source of copper. The extent of increase (above baseline) in the concentration of copper in groundwater is therefore tied to the extent of the drop in pH, as would occur in the real system, and indeed is the entire 'pivot' of the purpose of addition to acid to the system. The predictive modelling shows a good extraction of copper within the early part of the extraction pumping, and the extent of copper concentration change is not seen in the observation well at 5.3 m distance from the push pull well. By the end of the model run, copper is at baseline, though the model predicts this to occur much sooner.

DRAFT

The predictions show that the pH and copper changes resulting from the push pull test would not be observable in the proposed monitoring wells nor the KPFRT02 and KPFRT03 observation wells.

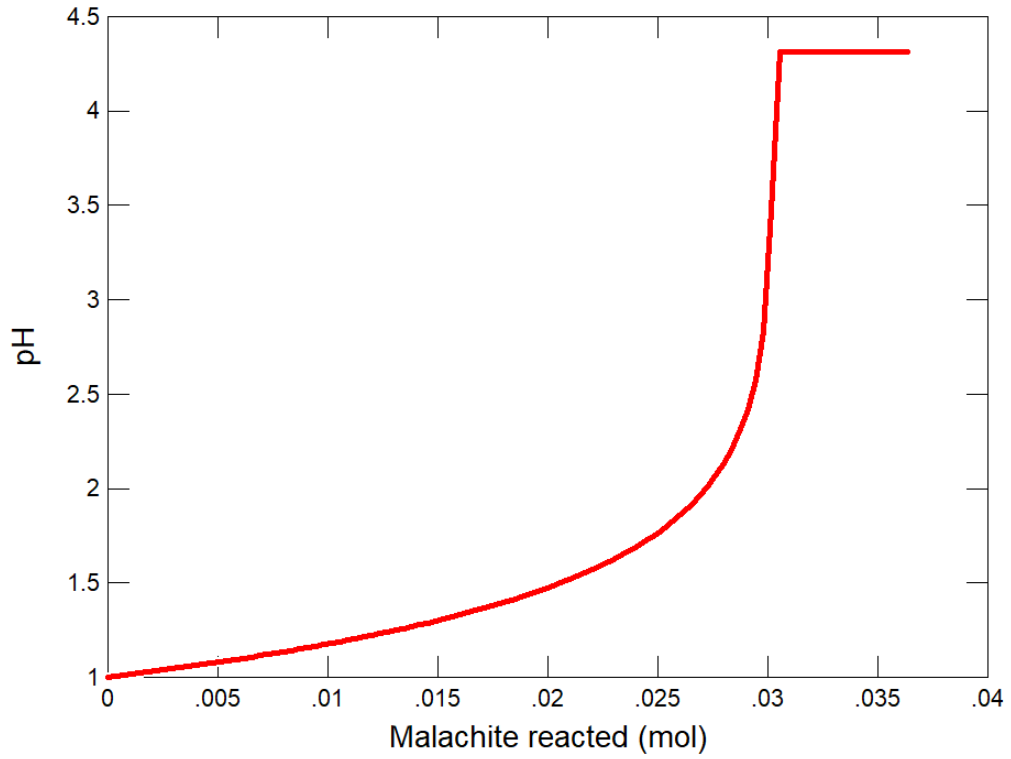

Figure 4-5 pH change when reacting malachite in 1 L pH 1 water

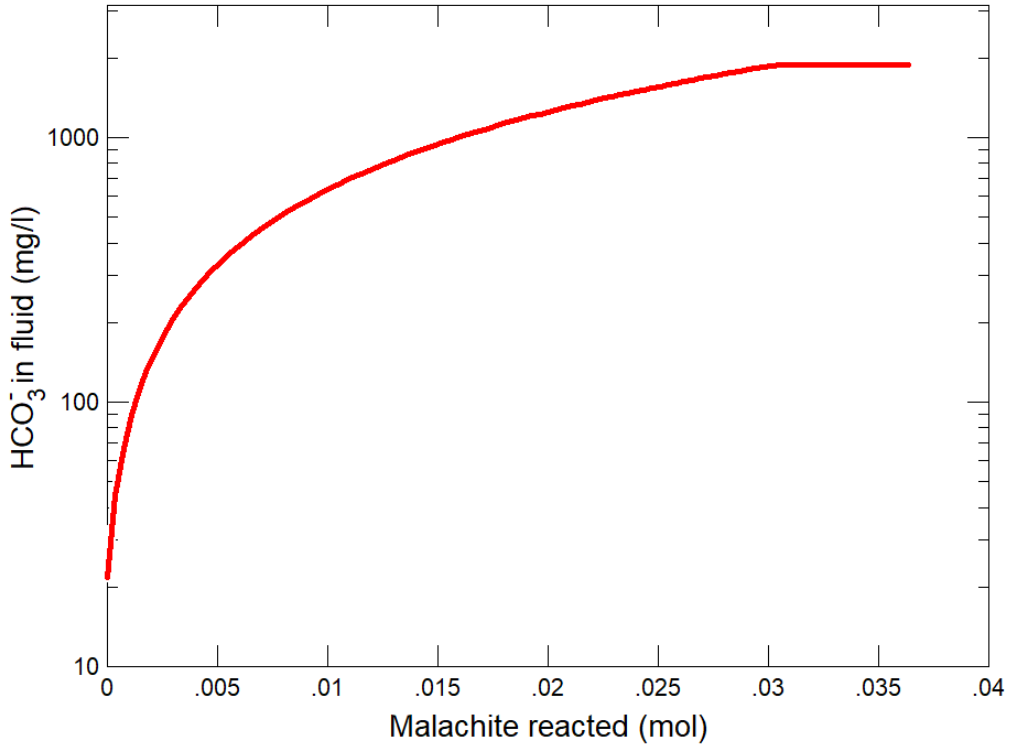

Figure 4-6 Bicarbonate released through malachite dissolution by acid (1 L water)

Note that precipitation, K_d sorption and colloidal sorbate were turned off for this modelling – i.e. the attenuation factors used (colloidal sorbate not used in the current system modelling) were conservatively ignored.

Concentrations at the push pull well itself can be inferred from Figures 4-7 and 4-8 for pH and copper respectively. pH is predicted to decrease to ~pH 1 commensurate with the addition of MSA lixiviant, and copper will increase to around 2,000 mg/L (2,000 ppm) depending on the specific magnitude/ distribution of the mineralogy reported.

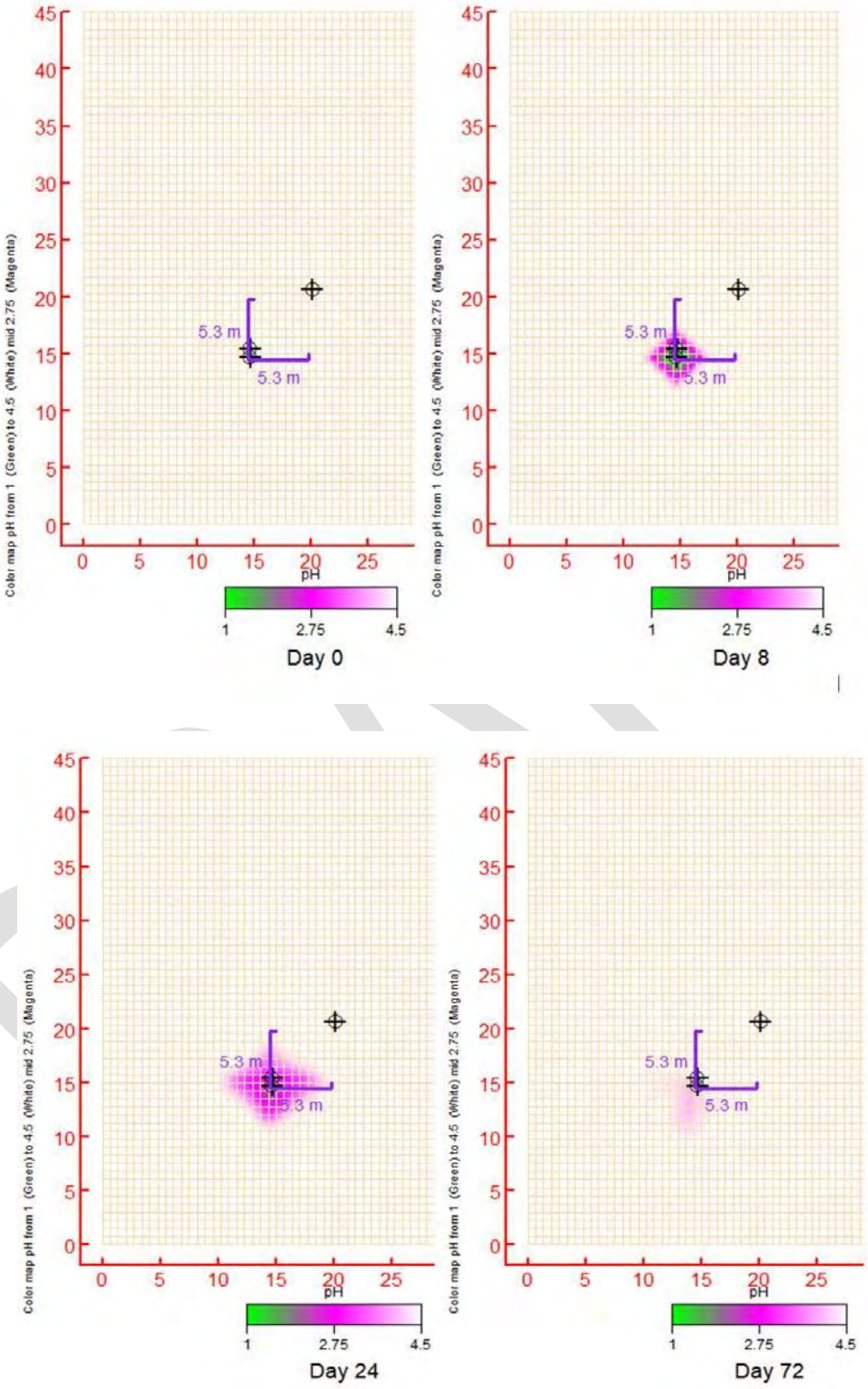

Figure 4-7 Predicted groundwater pH distribution in push-pull test

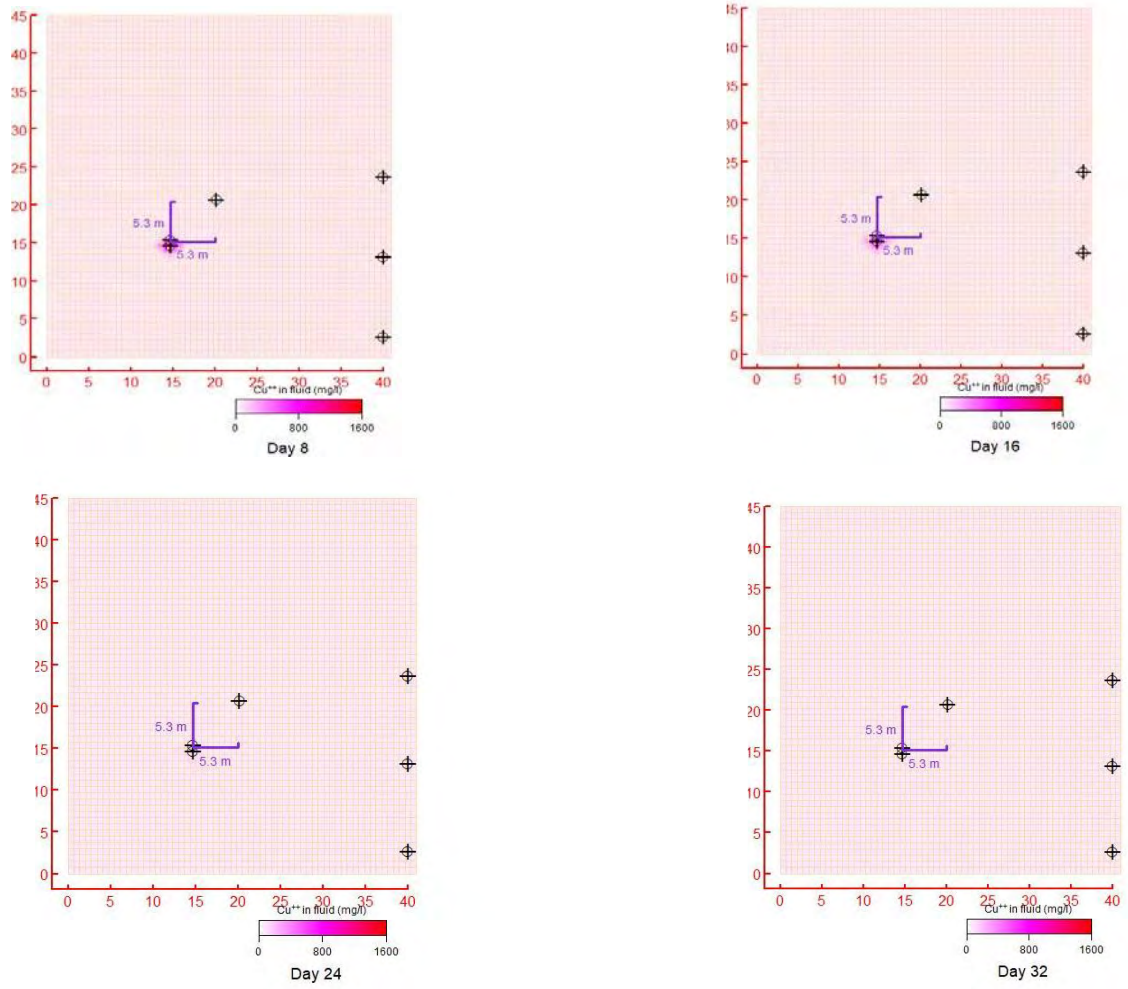

Figure 4-8 Predicted copper distribution in push pull test as function of Cu mineralogy reaction

4.2.4 Source Term A-1

Source Term A-1 was included in the push-pull monitoring – the modelling plots for silver, vanadium and chromium are shown in Appendix C. None of these elements are predicted to be observable above the laboratory limit of reporting at the observation well at 5.3 m distance from the push pull well.

Note that due to lack of robust thermodynamic data, molybdenum is not modelled. The maximum concentration of molybdenum reported was relatively trace compared to chromium and vanadium. It can be reasonably expected that molybdenum will be attenuated in a similar manner to the other Source Term A-1 elements noting retardation is not even applied to this scenario.

5 DISCUSSION

5.1 Conceptual Site Model

The proposed ISR process uses an acidic solution to generate dissolution of copper bearing minerals which will increase $Cu_{(aq)}$.

The Key Question is: Will test related solutes migrate to the Light River AND diminish water quality?

The baseline groundwater has notably very high concentrations of key metals ($Cu_{(aq)}$= 70 mg/L) and has a low pH (3.9 - 4.5).

Water sampled from the sentinel well (KP060) located ~300 m down hydraulic gradient of the test location does not report high concentrations of key metals and does not have a low pH. Some attenuation mechanism is therefore present between the test location and KP060.

1-D modelling of the current system supports attenuation of metals within the Eudunda Arkose via sorption to iron-oxy-hydroxides, which are present in abundance in that system. The water within the Eudunda Arkose (location of the test site) is likely geochemically different to the sentinel well water which is representative of the Tapley Hill Formation.

The fractured rock Eudunda Arkose likely has significantly more presence/ density of pyrites (e.g. chalcopyrite) which creates the low pH conditions via oxidation of sulfidic minerals (pyrites, itself a simple yet complex process which is not the remit of this assessment).

The micro scale cycling of pH around pH 4 will generate amorphous iron oxy hydroxide and infers that the solutes in groundwater within the Eudunda Arkose are essentially 'trapped' by sorption to colloidal or assemblage amorphous iron oxy hydroxide phases. Modelling of such scenario using only Fe inherent in the KPFRT02 system and K_d modelling supports this theory.

5.2 Geochemical System and Proposed Action

Speciation modelling as well as stability diagram formulation has helped establish the geochemical composition of the baseline system. Copper oxide and carbonate phases are present in the copper ore zone in addition to Fe phases. Water has high concentrations of copper, nickel and zinc as wells as aluminium due to gibbsite dissolution (normal at this pH).

The lixiviant comprises trace concentrations of elements/ compounds other than sulfate (20 mg/L) where baseline sulfate is ~5,000 mg/L. The purpose of the lixiviant is its acidity (represented by a pH of 1). Essentially the only change to the system on the introduction of the lixiviant is a drop in pH from around pH 4 to around pH 1 (represents an increase in acidity) which has the sole purpose of shifting the solubility of copper away from the mineral phase to the aqueous phase via dissolution of copper bearing minerals. Note that metals currently sorbed to iron oxy hydroxide phases will also enter solution within the low pH (~pH 1) 'bubble'.

The action of increasing the acidity will therefore of course mobilise metals – and this is the purpose, although the lixiviant itself is targeted to favouring copper.

Attenuating the lateral flow of metals in solution is the nature of fractured rock flow coupled to the aforementioned sorption to iron oxy hydroxide phases outside the low pH bubble (within the Eudunda

Arkose) in the same manner as the current attenuation of low pH metal rich water evident in the observation wells (KPFRT02) and associated absence in water from the sentinel well.

5.3 Push Pull Test Findings

The specifics of the push pull test were mimicked using two dimensional reactive fate and transport modelling. Note that precipitation, K_d sorption and colloidal sorbate were turned off for this modelling – i.e. the attenuation factors used (colloidal sorbate not used in the current system modelling) were conservatively ignored.

Key findings:

4. Modelling of push pull test fits existing predictions in terms of lateral migration and relevant solutes / low pH are not predicted to reach proposed monitoring wells KP_MON01 – MON03 located 25 m laterally, when using specified gradient (nor the observation well KPFRT02).
5. Source Term A-1 solutes are not predicted to migrate laterally to the extent where they are seen at concentrations above laboratory limit of reporting nor relevant water quality screening criteria in the observation well KPFRT02 (5.3 m lateral from the push pull well).
6. Assessment of copper mineral dissolution in the injection bubble hints at pH rise due to hydroxide alkalinity (when using ferric-cu as representative of copper oxide mineral phases) or carbonate alkalinity (when using malachite as representative of copper carbonate mineral phases). This may cause increased acid consumption over current estimates.

5.4 REE

REE are present in baseline site water - The source term identified REE above background concentrations when using site water and accounting for the leaching action. In most cases the RPD was very minor, probably within laboratory error.

Notwithstanding discussion is presented below with respect to fate of REE generally in a iron rich system.

Janssen and Verwij., (2003) identified that REE speciation in a shallow groundwater system in the Netherlands showed REE(3+), REE(SO(4))(+), REE(CO(3))(+) and REE(DOC) being the major species. Dissolution of pure REE precipitates and REE-enriched solid phases did not account for the observed REEs in groundwater. Regulation of REE concentrations were by adsorption-desorption processes to Fe(III)(OH)$_{(3)}$ and Al(OH)$_{(3)}$ minerals, which were calculated to be present in nearly all groundwaters.

The statistical approach (multiple linear regression) adopted by Janssen et al., (2003) showed that pH is by far the most significant groundwater characteristic which contributes to the variation in REE concentrations.

Also DOC, SO_4^{2-}, Fe and Al contributed significantly, although to a much lesser extent, to the variation in REE concentrations. This is in line with the calculated REE-species in solution and REE-adsorption to iron and aluminium (hydr)oxides.

6 REFERENCES

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APPENDIX A
SPECIATION OF KPFRT02

SpecE8_output_GSS_KPFRT02_{ FEB 20}

Temperature = 25.0 C Pressure = 1.013 bars
pH = 4.220

Ionic strength	=	0.081824
Charge imbalance	=	0.047185 eq/kg (99.98% error)
Activity of water	=	1.000000
Solvent mass	=	1.0000 kg
Solution mass	=	1.0024 kg
Mineral mass	=	0.00000 kg
Solution density	=	1.014 g/cm3
Solution viscosity	=	0.009 poise
Chlorinity	=	0.000000 molal
Dissolved solids	=	2432 mg/kg sol'n
Elect. conductivity	=	210.23 uS/cm (or umho/cm)
Hardness	=	0.00 mg/kg sol'n as CaCO3
carbonate	=	0.00 mg/kg sol'n as CaCO3
non-carbonate	=	0.00 mg/kg sol'n as CaCO3
Carbonate alkalinity	=	0.20 mg/kg sol'n as CaCO3
Water type	=	Fe3(OH)4(5-HCO3
Bulk volume	=	989. cm3
Fluid volume	=	989. cm3
Mineral volume	=	0.000 cm3
Inert volume	=	0.000 cm3
Porosity	=	100. %
Permeability	=	98.7 cm2

Nernst redox couples	Eh (volts)	pe
e- + Fe+++ = Fe++	0.8598	14.5342

No minerals in system.

Aqueous species	molality	mg/kg sol'n	act. coef.	log act.
Fe(OH)2+	0.009462	848.2	0.7897	-2.1266
Fe3(OH)4(5+)	0.004737	1113.	0.0163	-4.1123
FeOH++	0.003358	244.0	0.4045	-2.8671
Cu++	0.001095	69.40	0.4273	-3.3300
Fe2(OH)2++++	0.0006889	100.1	0.0719	-4.3048
Al+++	0.0006020	16.20	0.1963	-3.9275
CO2(aq)	0.0004527	19.87	1.0000	-3.3442
Co++	0.0001031	6.059	0.4273	-4.3562
H+	7.171e-05	0.07210	0.8403	-4.2200
Fe+++	6.448e-05	3.592	0.1963	-4.8977
AlOH++	5.638e-05	2.474	0.4045	-4.6420
Fe(OH)3	5.551e-05	5.917	1.0000	-4.2557
Mn++	4.712e-05	2.583	0.4273	-4.6961
HCO3-	4.063e-06	0.2473	0.7961	-5.4902

Al(OH)2+	3.248e-06	0.1976	0.7897	-5.5910
CuOH+	2.151e-06	0.1728	0.7897	-5.7700
Al2(OH)2++++	1.132e-06	0.09933	0.0719	-7.0892
Fe++	8.915e-07	0.04966	0.4273	-6.4192
FeCO3+	2.039e-07	0.02357	0.7897	-6.7931
Al3(OH)4(5+)	1.057e-07	0.01571	0.0163	-8.7638
Al(OH)3	3.680e-08	0.002863	1.0000	-7.4342
MnHCO3+	1.524e-09	0.0001762	0.7897	-8.9197
Al(OH)4-	7.913e-10	7.500e-05	0.7897	-9.2042
Fe(OH)4-	2.748e-10	3.396e-05	0.7897	-9.6635
CoOH+	2.462e-10	1.865e-05	0.7897	-9.7112
OH-	2.185e-10	3.707e-06	0.7829	-9.7668
FeHCO3+	3.110e-11	3.625e-06	0.7897	-10.6098
MnOH+	1.091e-11	7.829e-07	0.7897	-11.0648
CO3--	6.196e-12	3.709e-07	0.3925	-11.6141
Al13O4(OH)24(7+)	6.068e-12	4.982e-06	0.0003	-14.7242
FeOH+	5.301e-13	3.852e-08	0.7897	-12.3782
MnCO3	1.615e-13	1.852e-08	1.0000	-12.7918
HCoO2-	1.460e-13	1.339e-08	0.7897	-12.9381
FeCO3	4.436e-15	5.127e-10	1.0000	-14.3530
Co(OH)2	1.941e-15	1.799e-10	1.0000	-14.7121
Mn2OH+++	1.042e-15	1.320e-10	0.1798	-15.7271
Mn(OH)2	3.530e-19	3.132e-14	1.0000	-18.4523
Fe(OH)2	3.968e-20	3.557e-15	1.0000	-19.4014
Mn2(OH)3+	2.986e-21	4.793e-16	0.7897	-20.6274
Co(OH)3-	8.184e-24	8.977e-19	0.7897	-23.1896
Mn(OH)3-	7.117e-27	7.522e-22	0.7897	-26.2503
Fe(OH)3-	1.315e-28	1.402e-23	0.7897	-27.9837
Co4(OH)4++++	1.187e-30	3.598e-25	0.0719	-31.0684
Co(OH)4--	4.506e-34	5.707e-29	0.3800	-33.7664
Mn(OH)4--	2.052e-36	2.517e-31	0.3800	-36.1081
Co2(OH)3+	5.656e-91	9.528e-86	0.7897	-90.3500

Mineral saturation states

	log Q/K		log Q/K
Co(FeO2)2	18.8008s/sat	Malachite	-5.4631
Hematite	15.4814s/sat	Rhodochrosite	-5.7259
Ferrite-Cu	10.3692s/sat	Siderite	-7.4680
Goethite	7.2624s/sat	Co(OH)2(s,pink)	-8.2135
Magnetite	7.2515s/sat	FeO(c)	-9.3390
CuFeO2(c)	3.5744s/sat	CoO	-9.4713
Fe(OH)3(ppd)	2.8733s/sat	Wustite	-9.8558
Gibbsite	0.7722s/sat	Hercynite	-9.9522
Diaspore	-0.0192	Fe(OH)2(ppd)	-10.8277
Boehmite	-0.8636	Mn(OH)2(am)	-11.5550
Tenorite	-2.5626	Azurite	-13.3017
Corundum	-3.9187	Manganosite	-14.1820

CoCO3	-5.2262

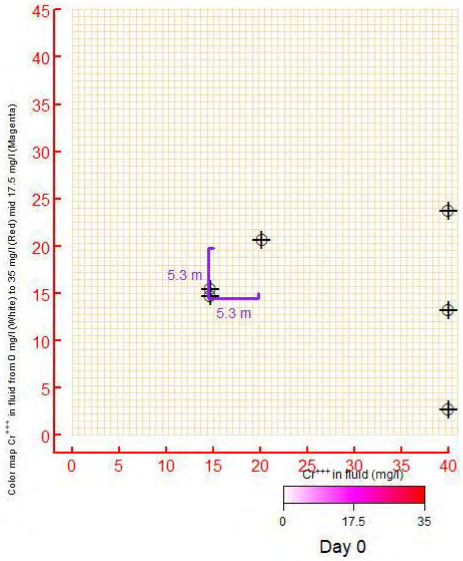
Gases	fugacity	log fug.
Steam	0.03131	-1.504
CO2(g)	0.01283	-1.892

		In fluid		Sorbed		Kd
Original basis	total moles	moles	mg/kg	moles	mg/kg	L/kg
Al+++	0.000664	0.000664	17.9			
Co++	0.000103	0.000103	6.06			
Cu++	0.00110	0.00110	69.5			
Fe++	8.92e-07	8.92e-07	0.0497			
Fe+++	0.0285	0.0285	1.59e+03			
H+	-0.0423	-0.0423	-42.5			
H2O	55.6	55.6	9.98e+05			
HCO3-	0.000457	0.000457	27.8			
Mn++	4.71e-05	4.71e-05	2.58			

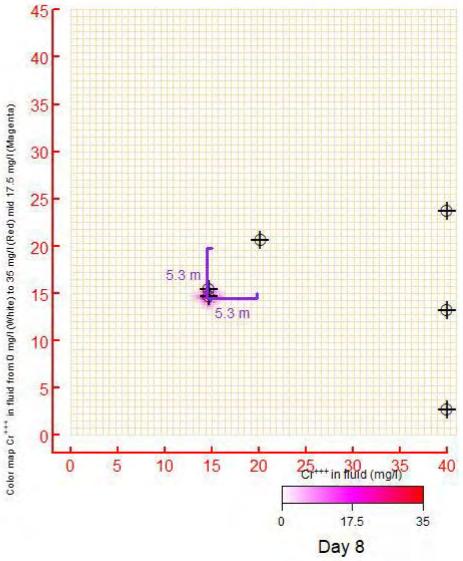
		In fluid		Sorbed	
Elemental composition	total moles	moles	mg/kg	moles	mg/kg
Aluminum	0.0006643	0.0006643	17.88		
Carbon	0.0004569	0.0004569	5.475		
Cobalt	0.0001031	0.0001031	6.059		
Copper	0.001097	0.001097	69.53		
Hydrogen	111.1	111.1	1.117e+05		
Iron	0.02853	0.02853	1589.		
Manganese	4.713e-05	4.713e-05	2.583		
Oxygen	55.55	55.55	8.866e+05		

APPENDIX B
SOURCE TERM A-1 MODEL OUTPUTS

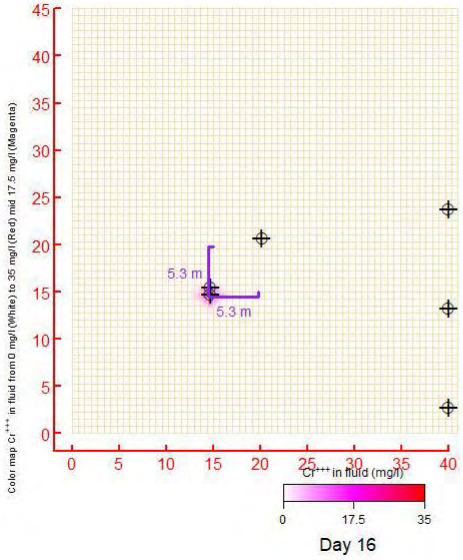
Appendix B1 – Predictive modelling of chromium in the push pull test



Day 0



Day 8



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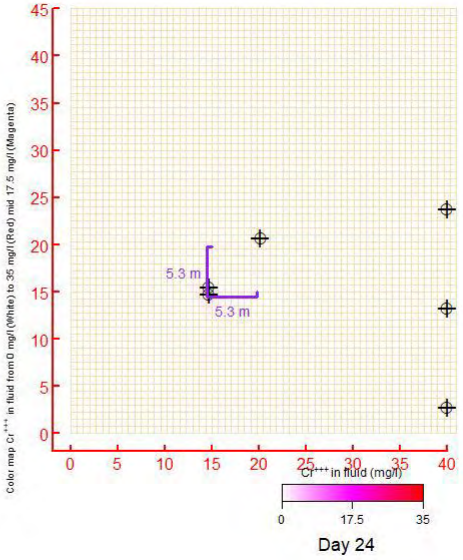
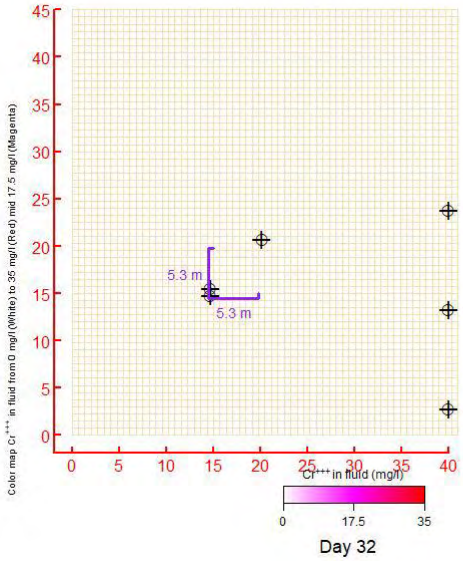
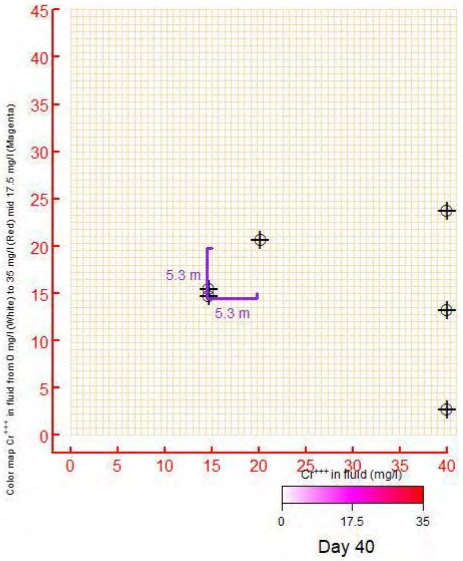


Day 24

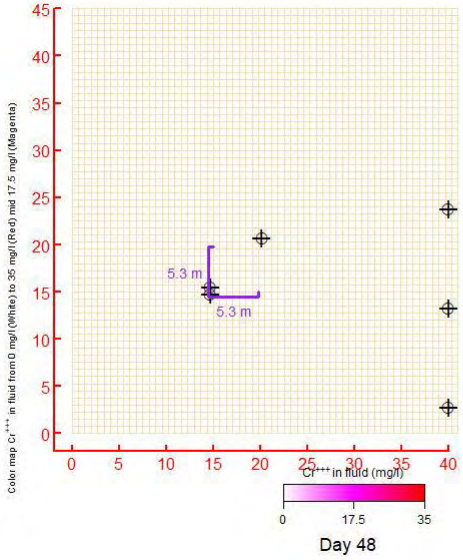
Appendix B1 – Predictive modelling of chromium in the push pull test



Day 32



Day 40



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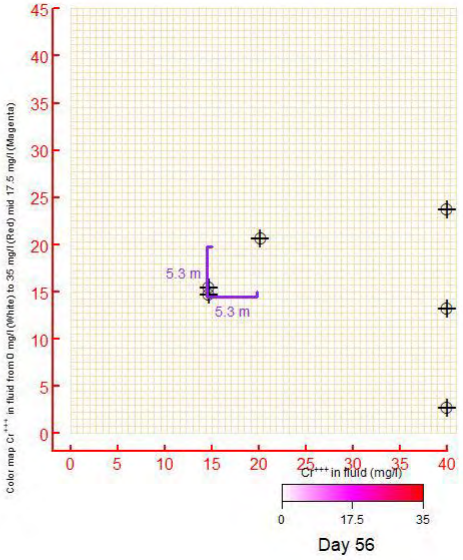
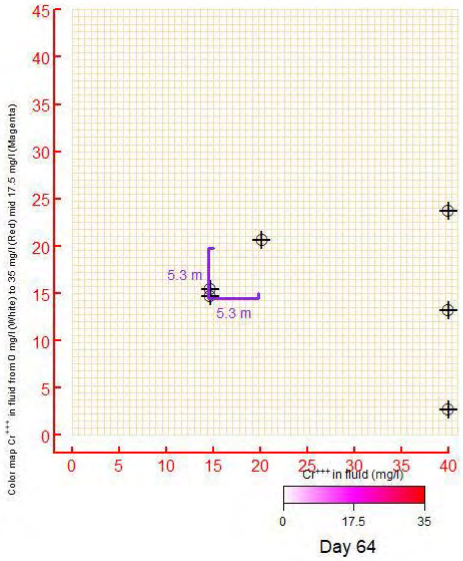
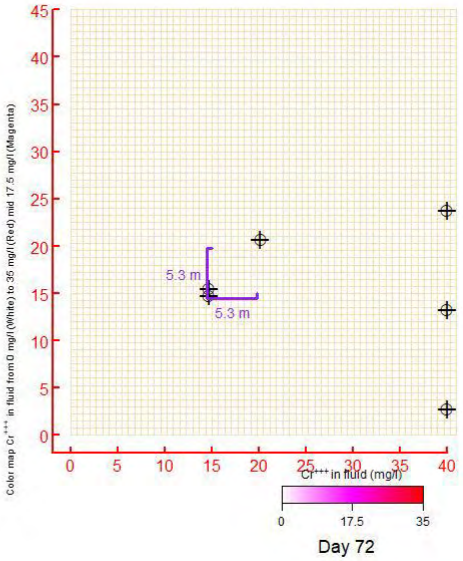


Day 56

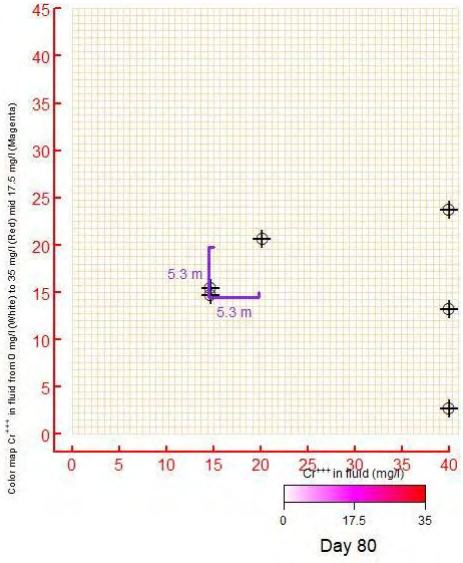
Appendix B1 – Predictive modelling of chromium in the push pull test



Day 64

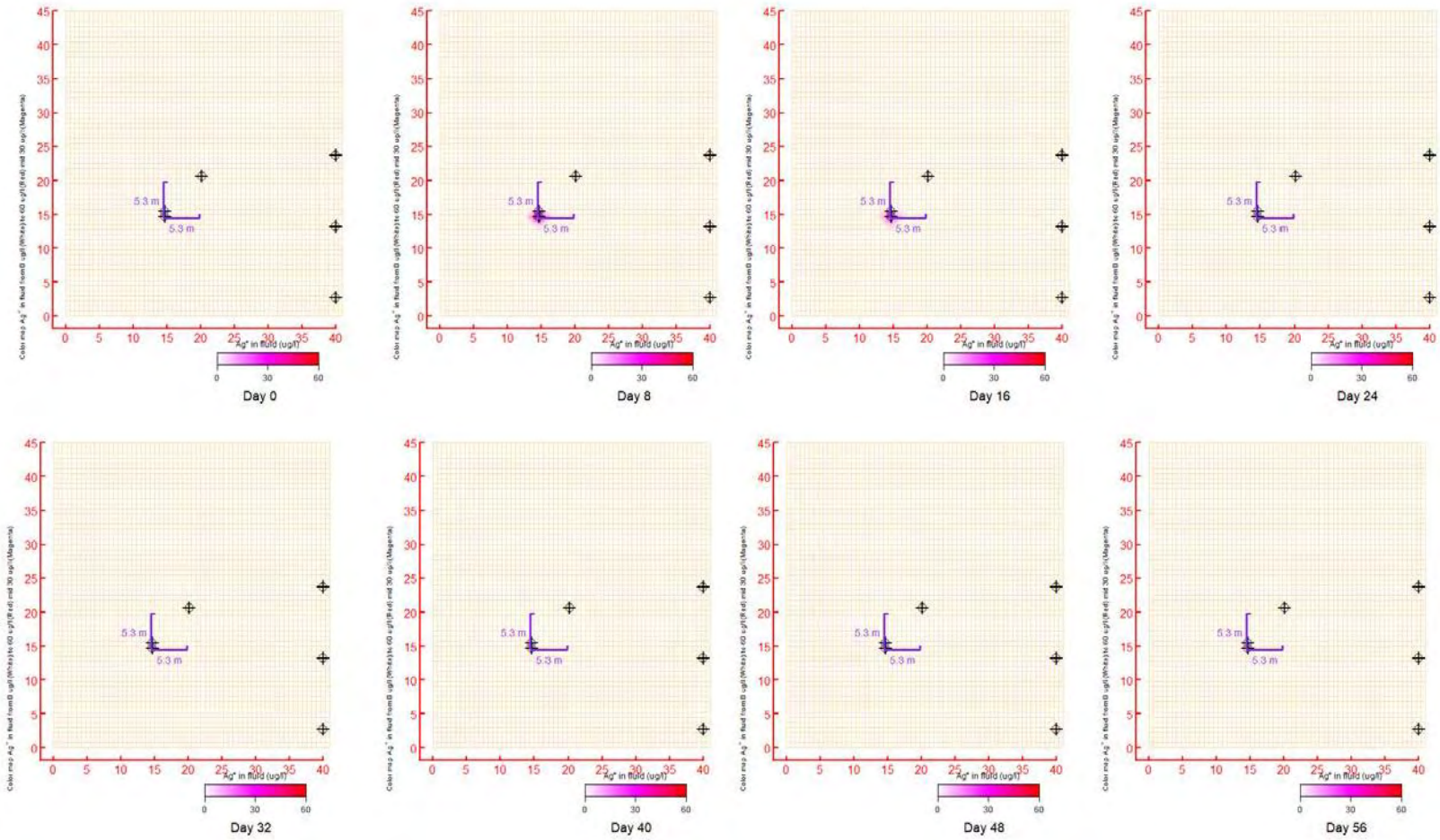


Day 72

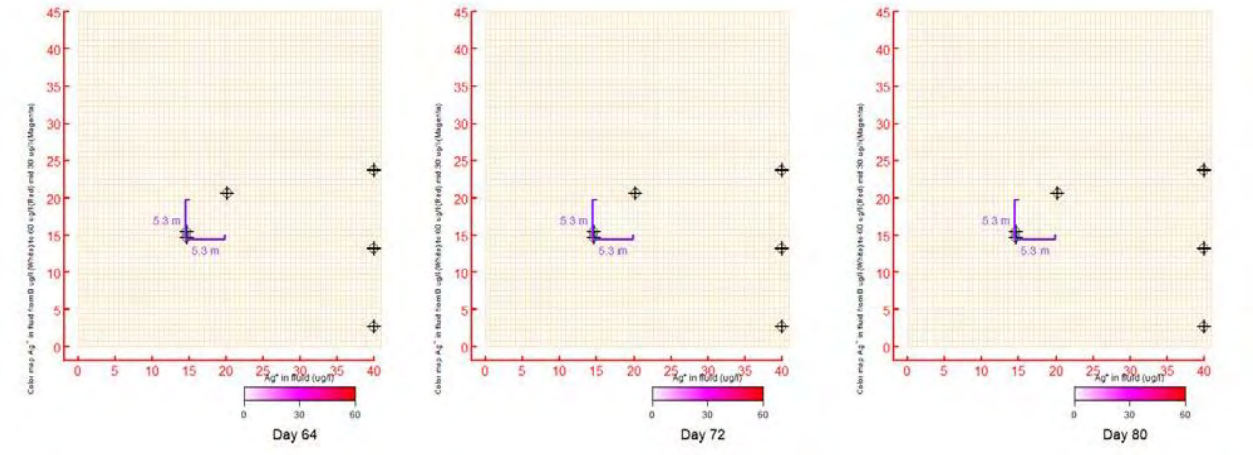


Day 80

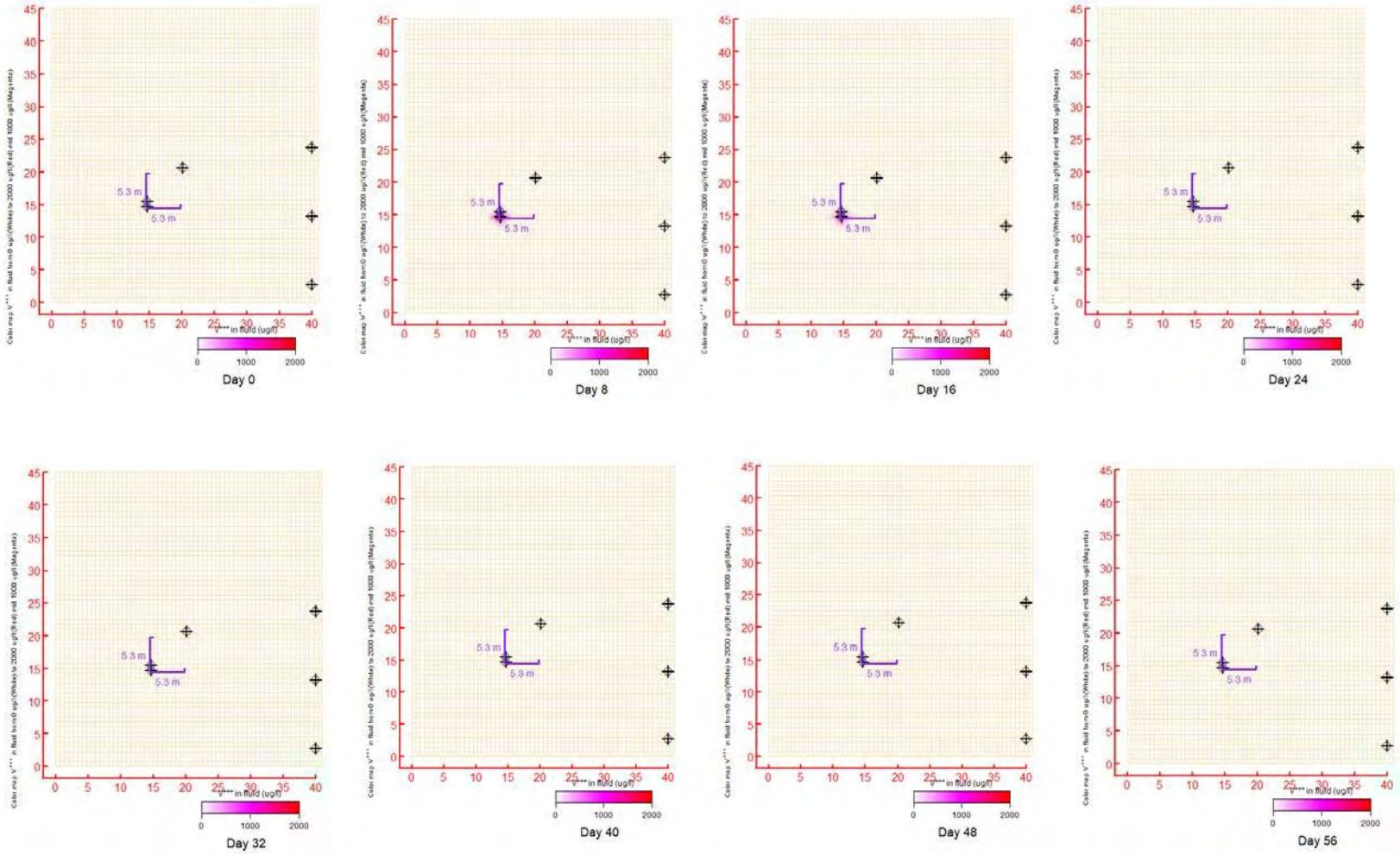
Appendix B2 - Silver



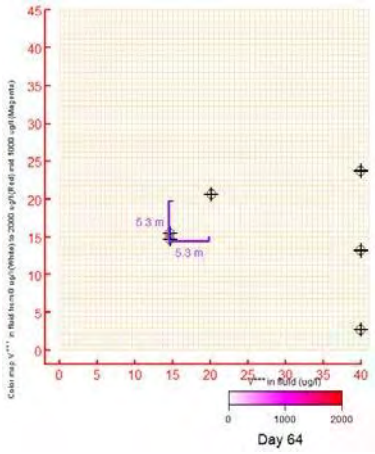
Appendix B2 - Silver

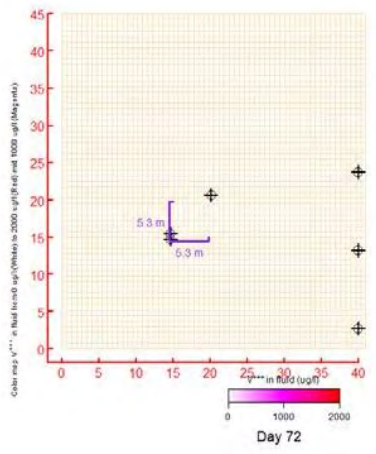


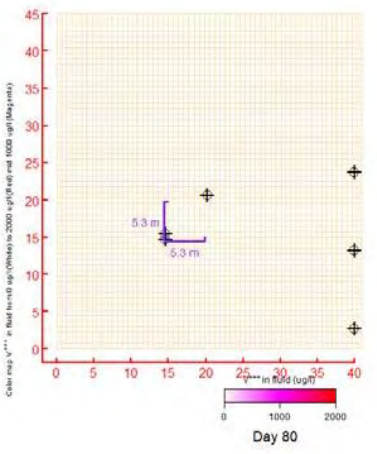
Appendix B3 - Vanadium



Appendix B3 - Vanadium







APPENDIX C
REPORT LIMITATIONS

STATEMENT OF LIMITATIONS & IMPORTANT INFORMATION REGARDING YOUR REPORT

This report has been prepared in accordance with an agreement between LWC Management Pty Ltd trading as Land & Water Consulting (LWC) and Enviro Copper Recovery (the Client). The services provided by LWC have been conducted in a manner consistent with the level of quality and skill generally exercised by members of its profession and consulting practice. No warranty or guarantee of the site conditions or outcomes at any point in time is intended.

This report was prepared for the sole use of Enviro Copper Recovery and may not contain sufficient information for purposes of other parties or for other uses. Any reliance on this report by third parties shall be at such parties' sole risk. This report shall only be presented in full and may not be used to support any other objectives than those set out in the report, except where written approval with comments are provided by LWC.

The scope of works undertaken, and the report prepared to complete the assessment was in accordance with the information provided by the Client and the specifications for works required by the Client under the contract. As such, works undertaken and statements made are based on those specifications and data provided and should be considered and interpreted within this context.

The information in this report is accurate with respect to conditions encountered at the site at the time of assessment based on information provided and considering the inherent limitations associated with extrapolating information from a sample set and where using estimates to represent specific environmental systems.

Subsurface conditions can vary across a site across time and no practical degree of assessment and modelling can ever eliminate the possibility that conditions may be present at a site that have not been represented though such assessment.

All conclusions made in this report are the professional opinions of the LWC personnel involved with the project and while normal checking of the accuracy of data has been conducted, LWC assumes no responsibility or liability for errors in data obtained from external sources, nor from occurrences outside the scope of this project.

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Constraining regional-scale groundwater transport predictions with multiple geophysical techniques

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ARTICLE INFO

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Geophysics
Nuclear magnetic resonance
Electromagnetics
Magnetotellurics
Fractured Rock

ABSTRACT

Study region: The study area is located at Kapunda, South Australia with a semi-arid climate and comprises a fractured rock aquifer. Established in 1842, Kapunda was the first mining town in Australia and its open-pit mine was a key economic driver for the whole continent. The mine was closed in 1879 and the remnant low-grade copper was considered sub-economic, hence the mine has been developed into a tourist attraction. With the recent advances in In-Situ Recovery (ISR), the feasibility of recovering the remnant copper is under consideration again.

Study focus: A field trial involving lixiviant injection and extraction is under development. This study uses a combination of stochastic groundwater modeling and multiple geophysical techniques to investigate (1) the flow paths of injectant and whether it will reach the Light River, and (2) the injectant residence time in the aquifer.

New hydrological insights for the region: Depending on the effective porosity of the aquifer, the modeling suggests a probability of 1 %–5 % for the injectant to escape the site. There is a large uncertainty in the simulated injectant residence time, ranging from 200 to beyond 1000 days. These analyses are conservative and do not consider the biodegradability of the injectant, which can achieve a 90 % degradation over 28 days. Our modeling shows no evidence that the injectant can reach the Light River within this timeframe.

1. Introduction

Numerical modeling is useful for informing management decisions about groundwater resources (Hunt and Zheng, 2012). However, its effectiveness is hampered by various sources of uncertainty, including data, conceptualization and parameterization (Doherty and Simmons, 2013). This is partly because spatial continuity of model parameters is generally assumed to support a more straightforward uncertainty analysis, while most classical hydrogeological techniques provide point-scale information (Brunner et al., 2006). This mismatch can be mitigated by complementing groundwater models with geophysics due to its denser spatial coverage, non-invasiveness and relatively low cost on an area basis (Slater, 2007).

Audio-frequency Magnetotellurics (AMT) and Time-domain Electromagnetics (TEM) are electromagnetic methods that estimate subsurface electrical resistivity, which is related to groundwater salinity, sediment texture, mineralogy and degree of saturation (Everett, 2013). Nuclear Magnetic Resonance (NMR) a geophysical technique that detects subsurface water directly and provides

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information on pore size distribution and water content, the latter of which is a proxy for porosity in the saturated zone (Legchenko et al., 2002). These geophysical techniques have proven useful in previous studies for constraining important components of groundwater models, including conceptualizations, geological framework and hydraulic properties. For example, Wagner (2007) used AMT to determine the freshwater-saltwater transition zone under Amchitka Island to model the transport of subsurface radioactive materials to the sea floor. Marker et al. (2015) used TEM to improve the hydrostratigraphic characterization for a hydrological model to estimate groundwater levels in Norsminde, Denmark. Boucher et al. (2012) used NMR to estimate transmissivity and specific yield for a groundwater model to assess recharge to a sandstone aquifer in Niger. However, these studies only coupled geophysics with groundwater modeling in a deterministic manner, where a single, best-calibrated groundwater model was developed and used to make predictions. In addition, the uncertainty inherent in geophysical data was rarely quantified and accounted for in groundwater model inversion.

For groundwater model inversion, the Gauss-Levenberg-Marquardt (GLM) algorithm (Hanke, 1997) is commonly used for parameter estimation and uncertainty analysis via programs such as PEST (Doherty et al., 1994), PESTPP (Welter et al., 2015) and UCODE (Poeter et al., 2014). The GLM algorithm requires a sensitivity matrix known as the Jacobian matrix, which is commonly constructed using a finitedifference approach. An alternative approach was proposed by White (2018), who implemented the ensemble-smoother form of the GLM algorithm from Chen and Oliver (2013) into the PESTPP suite, referred to as PESTPP-IES. The ensemblesmoother method derives the Jacobian matrix empirically from an ensemble of random parameter values (White, 2018), which has several advantages. Firstly, it produces an ensemble of calibrated models that can be considered to represent the posterior distribution of parameters and predictions, which can be readily used for non-linear uncertainty analysis and probabilistic predictions. In addition, observation uncertainty can be expressed as a prior variance and used to form a random observation ensemble, allowing the inversion to fit to the observation distribution instead of the observation itself. Furthermore, the ensemble-smoother method decouples the number of parameters being estimated from the number of model runs required, greatly reducing the computational time needed for highly parameterized models (White, 2018).

The objective of this paper is to couple multiple geophysical techniques of AMT, TEM and NMR with stochastic groundwater modelling using the ensemble-smoother framework. We demonstrate how this framework can be used as a data assimilation tool to facilitate the flow of information from geophysical and hydrogeological data to the groundwater model prediction of interest. We also show how the uncertainty of geophysical data can be expressed in a manner that is relevant for groundwater model inversion. This modelling framework was applied in the context of an In-Situ Recovery (ISR) copper mining operation, which involves injecting lixiviant into the ground to dissolve and extract minerals through a system of injection and extraction wells (Sinclair and Thompson,

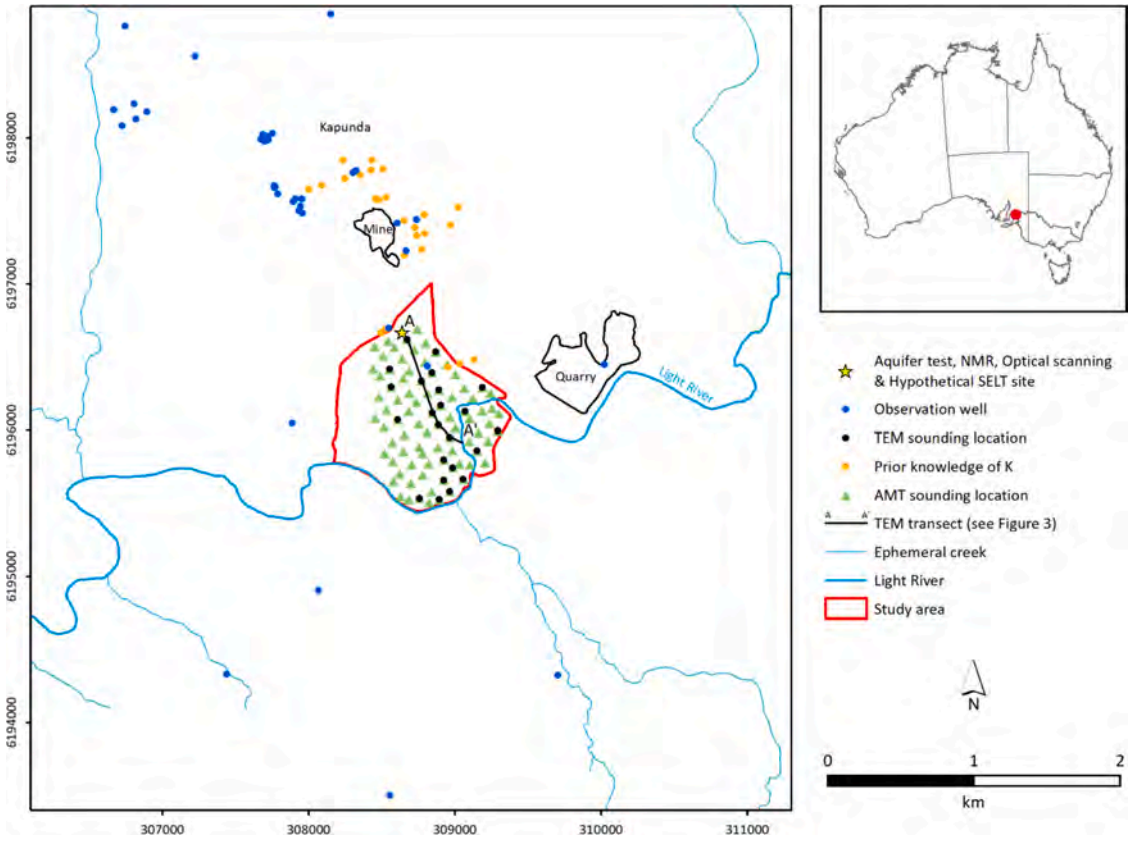

Fig. 1. Kapunda site map, with spatial extent of the groundwater model domain.

2015). The model ensemble was used to predict the regional-scale hydrological impact of a hypothetical ISR trial operation, the results of which are presented in a probabilistic manner.

2. Methods

2.1. Site descriptions

The historical Kapunda copper mine is located approximately 80 km north east of Adelaide, South Australia (Fig. 1). It has a semi-arid climate with a mean annual rainfall of 490 mm/y and evaporation of 1800 mm/y (Bureau of Meteorology, 2020). Established in 1842, Kapunda was the first mining town in Australia and its open-pit mine was a key economic driver for the whole continent until its closure in 1879 (Nirola et al., 2016). The remnant low-grade copper surrounding the mine was considered to be sub-economic, and the mine has since been developed into a heritage site and tourist attraction (Bogenes et al., 2003). With the recent advances in ISR (Sinclair and Thompson, 2015), the feasibility of recovering the remnant copper is under consideration again.

At the time of writing, the proponent is developing a Site Environmental Lixiviant Test (SELT), which is a small-scale operation using a limited number of injection and extraction wells to test various recovery options. The SELT operation is planned to be followed by a remediation phase, where the remaining injectant is retrieved using the extraction well. From a management perspective, the key hydrological issues of concern are: (1) the flow paths of the injectant and whether it will reach the Light River, an important environmental asset; and (2) the residence time of the injectant in the aquifer. This study demonstrates how these questions can be addressed by using a combination of multiple geophysical techniques and stochastic groundwater modeling.

2.2. Hydrogeological data

Kapunda is located within the Adelaide Geosyncline, a major geological province in central South Australia. The local geology is dominated by Neoproterozoic aged formations (Lambert et al., 1980). The main geological formations in the study area include the Tapley Hill Formation to the north, which covers the hypothetical SELT site, and the Brighton Limestone to the south. The Tapley Hill Formation primarily consists of blue-grey laminated siltstone and slate, while the Brighton Limestone is typically characterized by coarse-grained and recrystallized marble units (Akker and Watson, 2017). From a hydrogeological perspective, these formations behave as an interconnected fractured rock aquifer, the hydraulic behavior of which is largely governed by the secondary porosity developed from fracturing (Jeuken and Magarey, 2017).

A total of 42 observations wells were used in this study (Fig. 1), most of which only have a single groundwater level reading, often collected in the 1970s. There are no metered groundwater usage data in Kapunda. As groundwater EC is relatively high in Kapunda, ranging between 1900 and 22,000 μS/cm with a mean of 5800 μS/cm (~3300 mg/L total dissolved solids), groundwater usage is assumed to be negligible.

Hydraulic conductivity was estimated from well yield and draw-down data using Logan Approximation (Logan, 1964) by Jeuken and Magarey (2017). This approach provided 28 estimates of hydraulic conductivity (Fig. 1) ranging between 0.0007 and 0.4 m/d, with a geometric mean of 0.04 m/d. The error of this method is likely to be in the order of ±50 % (Logan, 1964). In addition, a 9-hour aquifer test was performed in February 2020 in the northern part of the study area (Fig. 1) and reported a hydraulic conductivity of 0.07 m/d. Effective porosity was estimated to be 1% near the aquifer test site based on fracture logging using a downhole optical scanner to ~65 m depth and assuming 50 % cementation (Jeuken and Magarey, 2017).

An initial assessment of groundwater recharge was undertaken using the chloride mass balance method (Wood, 1999). This technique assumes 1D vertical advective flow only and no chloride derived from flow upgradient of the bores. The chloride mass balance equation is as follows:

$$\text{Recharge} = \frac{\text{Rainfall} \times \text{Cl}_{\text{Rainfall}}}{\text{Cl}_{\text{Groundwater}}} \quad (1)$$

where Cl is chloride concentration (mg/L). In Kapunda, the average chloride concentration is ~9 mg/L in rainfall (Davies and Crosbie, 2018) and ~1100 mg/L in groundwater according to the observation well data. Based on this analysis, the long-term average recharge rate is ~4 mm/y, which is ~0.8 % of rainfall. Note that this method estimates net recharge, which already accounts for groundwater evapotranspiration.

The regional groundwater sink is the Light River. Lamontagne et al. (2020) applied various environmental tracers, including δD and $\delta^{18}O$ of water, EC, chloride and radon-222, to evaluate the surface water – groundwater connectivity of the Light River. They estimated baseflow to the Light River within our study area in 2019 to be in the order of 400–3000 m^3/d. They also identified a zone of higher groundwater discharge in the eastern part of our study area (i.e. upstream of A' in Fig. 1).

2.3. Geophysical data

2.3.1. Audio-frequency magnetotellurics

AMT is an electromagnetic method that uses naturally-occurring, passive electromagnetic field sources, such as global lightning strikes, to map geological structures (Garcia and Jones, 2002). Timevarying magnetic fields induce electrical currents into the earth that can be measured using grounded dipoles and magnetic field antennas over a wide range of frequencies (Vozoff, 1991). The

received signal is used to estimate ground electrical resistivity and the depth of investigation is generally in kilometers (Spies, 1989).

As part of this study, a broadband, audio-frequency magnetotellurics (AMT) survey was undertaken in April 2019 on a grid of 87 sites with a nominal spacing of 100 m (Fig. 1). Data were recorded at each site for about 20 h using the Phoenix MTU-5A systems, yielding good quality AMT responses in the bandwidth of 1–10,000 Hz.

The collected AMT data were inverted in 3D using ModEM (Kelbert et al., 2014). The model consists of 100 cells in the east-west direction and 120 cells in the north-south direction with a minimum cell dimension of 12 m. The vertical dimension was discretized into 120 layers with a minimum thickness of 5 m, increasing at a rate of 2% with depth. Impedance error floors were set to 7% for all components. The inversion included 26 frequencies, spread evenly from 0.001 to 100 Hz with five estimates per decade. The model roughness was set with a tau of 0.1 and no weighting was applied for either horizontal or vertical smoothing. The model misfit with the data has a root mean square error (RMSE) of 1.9.

The electrical conductivity (EC) estimates from the 3D inversion at 50 and 100 m depth are shown in Fig. 2. The 50 m depth slice shows two distinctly different zones in the study area. The more conductive zone to the north is interpreted to be related to the Tapley Hill Formation, while the more resistive zone to the south is interpreted to be related to the Brighton Limestone. The 100 m depth slice indicates that EC generally decreases with depth. In addition, phase tensor analysis of the high frequency AMT data suggests that the top 100 m of the fractured rock aquifer is electrically isotropic over the survey area, possibly due to deep-weathering of the existing bedrock fabric.

The EC estimates from the inverted AMT data can also be used to provide information on hydraulic conductivity via the following petrophysical relationship (Purvance and Andricevic, 2000):

$$EC = aK^b \tag{2}$$

where K is hydraulic conductivity (m/d), and a and b are empirical constants, which were calibrated using data from the aquifer test and the closest AMT station. With a hydraulic conductivity of 0.07 m/d (Section 2.2) and a geometric EC mean of ~520 μS/cm, it was estimated that a = 950 and b = 0.23.

While there are other non-linear petrophysical relationships to relate EC and K (Slater, 2007), a linear log-log relationship (Eq. (2)) was adopted in this study for reasons of parsimony, which has the potential to cause bias in the model predictions. The investigation of different petrophysical relationships on the predictive uncertainty, however, is beyond the scope of this study.

2.3.2. *Time-domain electromagnetics*

TEM involves applying a direct current to a transmitter loop and then shutting the current off abruptly (Everett, 2013). This produces a timevarying magnetic field into the earth, subsequently generating eddy currents in subsurface conductors. Such eddy currents create a secondary magnetic field that is measured by a receiver loop. The decay rate of the secondary magnetic field is directly related to ground electrical resistivity (Everett, 2013). Compared to AMT, TEM generally has a shallower depth of investigation but a finer resolution at the near-surface (Spies, 1989).

A TEM survey was conducted in May 2019 at 85 sites with a nominal spacing of 100 m. The TEM sites were chosen to be as close to

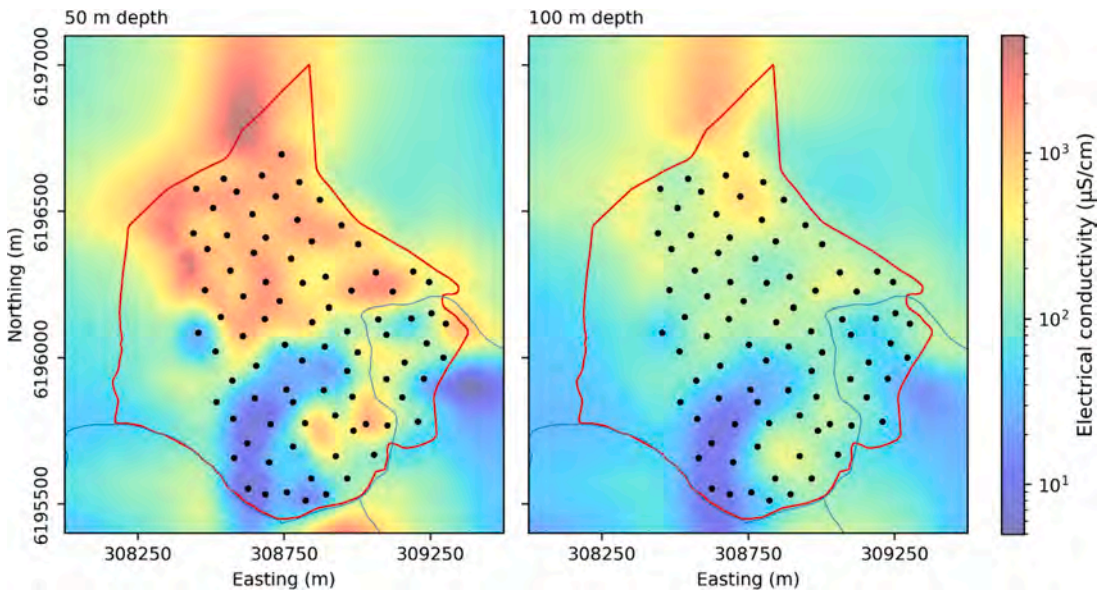

Fig. 2. EC depth slice of the inverted AMT data at 50 and 100 m depth. The black dots denote AMT stations, the red line denotes the study area and the blue lines denote rivers and creeks (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.).

the AMT sites as possible. The soundings were collected using the Zonge Engineering NanoTEM system. This system has fast transmitter turn-off and sampling rate to collect near-surface data down to ~80 m depth in our study area. A central loop configuration was used where a single-turn 5 m × 5 m receiver loop was placed at the center of a single-turn 20 m × 20 m transmitter loop. The transmitter was set to 2 amps and powered by a 12 V battery. Three data stacks were collected at each station using a repetition rate of 64 Hz and sampling period of 1.6 μS. The collected TEM data were processed to remove noisy late time data and then inverted in 1D using AarhusInv (Auken et al., 2015) as a smooth 20-layer model.

A transect of the inverted TEM data is shown in Fig. 3. The south-eastern side of the transect (i.e. near A') shows a thin layer with moderate EC near the surface, probably representing the unsaturated zone. It is then followed by a highly conductive layer, possibly indicating the weathered part of the saturated zone with relatively high porosity and groundwater salinity. It then gradually transitions into a more resistive layer, potentially representing the unweathered part of the saturated zone with low porosity. This layering conceptualization is believed to be applicable throughout Kapunda, although the unweathered layer may extend to greater depths in other parts of the area (Figs. 2 and 3).

Given the relative shallowness and high salinity of groundwater in the survey area, the water table is expected to be detectable in the TEM data as an EC high. Therefore, the EC peak of the TEM soundings was used as an indicator of water table depth. Due to a paucity of groundwater level observations for ground-truthing, a quality assurance process was performed on the water table estimates using a pseudo-Bayesian approach, where our prior knowledge is based on a potentiometric surface developed using groundwater level observations and water levels of the Light River. Given the absence of groundwater-affecting activities (e.g. pumping) in the survey area, the potentiometric surface is assumed to be a reasonable approximation of the system. Therefore, only the groundwater levels derived from TEM that are within ±2 m of our prior knowledge, totaling 23 estimates (Fig. 1), were used in the groundwater model inversion.

2.3.3. *Nuclear magnetic resonance*

NMR, also known as Magnetic Resonance Sounding (MRS), is a geophysical technique that exploits the quantum physical properties of hydrogen protons in subsurface water to gain hydrogeological information (Legchenko et al., 2002). The initial amplitude of the received signal is directly related to water content, which is a proxy for porosity in the saturated zone. In addition, a decay time constant T_2 is estimated from the decay pattern of the received signal, which provides information about pore size distribution (Behroozmand et al., 2015).

Borehole NMR data were collected in the northern part of the study area (Fig. 1) using Vista Clara's Javelin system equipped with a JPY 350 probe (88.9 mm in diameter) to ~28 m depth. The Carr-Purcell-Meiboom-Gill (CPMG) pulse sequence was used (Carr and Purcell, 1954; Meiboom and Gill, 1958). The collected NMR data were processed and inverted using Vista Clara's Javelin Pro Plus program.

The decay time constant T_2 and total water content from the NMR inversion below the water table are shown in Fig. 4. Note that the total water content includes both connected and isolated pores, and it is the former that contributes to groundwater flow. Therefore, the total water content was separated into water content in small, moderate and large pores using T_2 cut-off times of 3 and 33 ms (Behroozmand et al., 2015). We assume groundwater flows primarily in larger pores, hence the water content in large pores was used as a proxy for effective porosity. However, the water content in large pores below ~17 m depth appears to be affected by some localized fractures, the porosity of which may not be regionally representative (Fig. 4) and hence was excluded from the analysis. The remaining data indicate a mean effective porosity of 5.6 %. This is considerably higher than the value of 1% as suggested by optical scanning, but is consistent with Akker and Watson (2017) who reported an effective porosity of 5% for the same Tapley Hill Formation, but approximately 80 km south of the study area. The uncertainty in effective porosity is explored further in the groundwater model inversion.

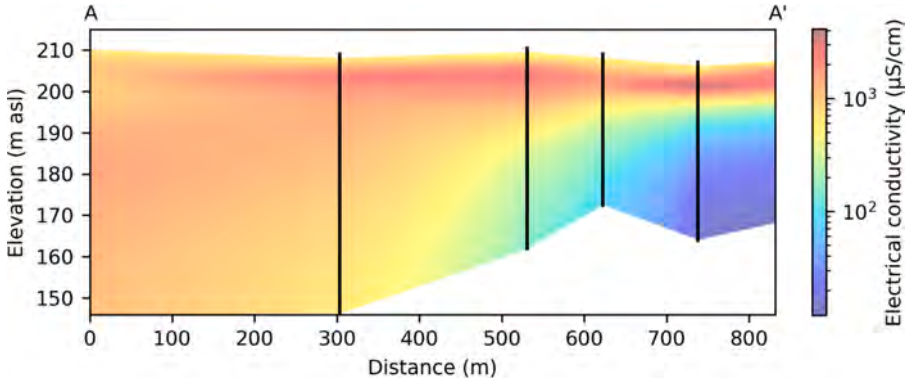

Fig. 3. A transect of the inverted TEM data. The transect location is shown in Fig. 1. The black lines denote TEM stations; asl stands for above sea level.

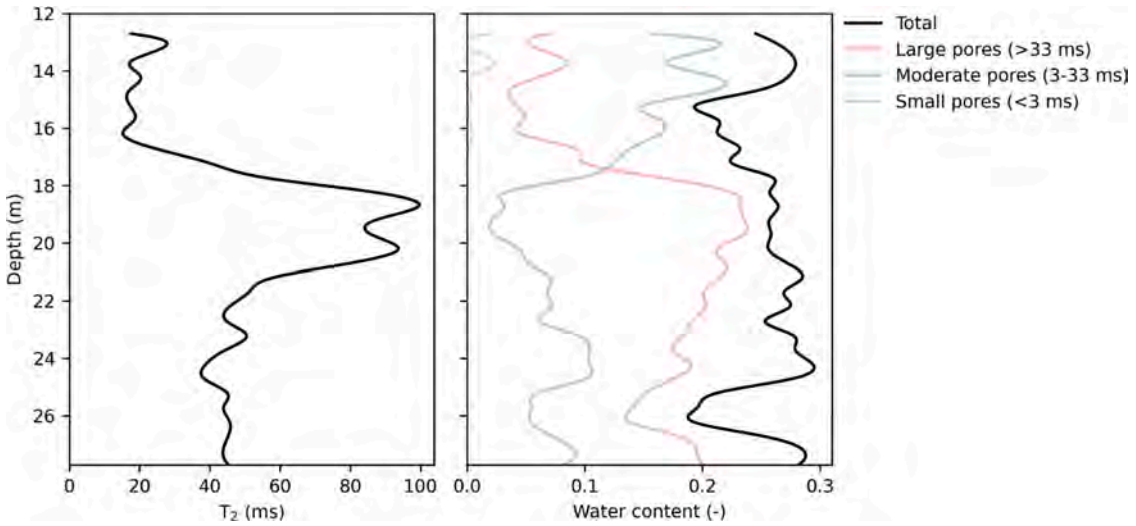

Fig. 4. Profiles of the decay time constant T_2 (left) and water content (right) from the NMR inversion. The water content in large pores is assumed to be a proxy for effective porosity.

2.4. Groundwater modeling

2.4.1. Model development

Due to the lack of detailed fracture data at a regional scale in Kapunda, the fractured rock aquifer was simulated using the equivalent porous medium approach (Long et al., 1982). Also, despite the importance of rapid flow paths in contaminant transport problems, a dual porosity scheme was considered beyond the scope of this study and should be acknowledged as a model limitation.

A 3D regional-scale numerical groundwater model was developed using MODFLOWUnstructured Grid (USG) (Panday et al., 2017). The model domain is 5.5 km × 5.2 km in area and the model edges were set ~2 km away from the study area to avoid boundary effects (Fig. 1). The Voronoi grid was generated using AlgoMesh (Merrick, 2016) with a nominal cell size of 10 m^2 in the study area and up to ~25,000 m^2 in the regional area. The same grid was applied to two layers, resulting in a total of 294,356 cells.

The top layer of the model represents the more permeable, weathered part of the fractured rock aquifer, while the bottom layer represents the less permeable, unweathered part of the aquifer. The top model surface was sourced from the DEM that has a resolution of 5 m × 5 m. The thickness of the weathered layer was estimated using the AMT data, where the EC sounding at each station was divided into two layers using the K-means clustering technique (Jain, 2010), assuming electrical and hydraulic properties are related. These thickness estimates were interpolated within the AMT survey area and extrapolated to their geometric mean of ~100 m outside the survey area. A constant thickness of 100 m was applied to the bottom layer, allowing all observation wells to be included in the model.

The Light River and other ephemeral creeks were simulated using MODFLOW's RIV package (Panday et al., 2017). Time-varying river depths were used for the Light River based on data from the nearest gauging station. The local ephemeral creeks are usually dry except for the wetter winter months, hence their river depth was set to 0 m (i.e. river stage equals riverbed elevation). River bathymetry was sourced from the DEM. Riverbed conductance was mostly set to 0.1 m^2/d based on the regional hydraulic conductivity (Section 2.2), except for the eastern part of the Light River in the study area where a higher conductance of 10 m^2/d was applied, as this reach was identified to be a zone of higher groundwater discharge (Lamontagne et al., 2020). The historical mine and quarry were represented as groundwater discharge features using MODFLOW's DRN package (Panday et al., 2017). The drain elevation was sourced from the DEM and the drain conductance was set to 0.1 m^2/d. The regional lateral groundwater inflows from the northern and southern sides were modeled in both layers using MODFLOW's GHB package (Panday et al., 2017). The head values were derived from groundwater level observations and the conductance was set to 0.1 m^2/d.

Net groundwater recharge was simulated using MODFLOW's RCH package (Panday et al., 2017). Annually-varying rainfall data were incorporated into the model as recharge multipliers, which were multiplied with the spatially-varying rainfall-to-recharge ratios (a calibration parameter) to derive net recharge. Groundwater evapotranspiration is not explicitly included in the model as it is already accounted for in net recharge. Given the relatively high groundwater salinity in Kapunda (Section 2.2), groundwater extraction is assumed to be negligible and hence not simulated in the model.

The model consists of 53 stress periods. The first period is steady-state and represents the pre-1970 period, which was selected based on the observation data availability. This stress period provides the initial conditions for the subsequent 50 transient annual stress periods, which represent the time period between 1970 and 2019 and were used for history-matching. The last two stress periods represent the hypothetical SELT operation and remediation phase, with a duration of two months and three years respectively. All transient stress periods have 10 time steps and a time step multiplier of 1.2.

The hypothetical SELT operation consists of four injection wells, separated by 20 m, and one extraction well at the center. The

operation rate is 0.02 L/s for each injection well and 0.1 L/s for the extraction well. During the remediation phase, the extraction well continues to operate at the same rate of 0.1 L/s while all the injection wells are switched off.

Transport of the injectant was simulated using the particle-tracking code mod-PATH3DU (Craig et al., 2020). The only transport mechanism modeled is advection, while processes such as dispersion, chemical reaction and sorption are considered beyond the scope of this study. A circle of 12 particles, representing the injectant, were placed around each injection well and released at the commencement of the SELT operation. The model was set to extend the tracking time beyond the end of simulation time by using the flow field from the last time step.

2.4.2. Model inversion

Groundwater model inversion was performed using the ensemble-smoother method via PESTPPIES (White, 2018). A brief description of the ensemble-smoother method is provided here and readers are referred to White (2018) and Chen and Oliver (2013) for further details. The ensemblesmoother method reformulates the GLM algorithm by empirically deriving the Jacobian matrix from an ensemble of random parameter values (Chen and Oliver, 2013):

$$\Delta_\theta = -\left(\left(J_{emp}^T \Sigma_\varepsilon^{-1} J_{emp}\right) + (1+\lambda)\Sigma_\theta^{-1}\right)^{-1}\left(\Sigma_\theta^{-1}(\Theta - \Theta_0) + J_{emp}^T(D_{sim} - D_{obs})\right) \tag{3}$$

where

$$J_{emp} \approx \Sigma_\varepsilon^{\frac{1}{2}} \Delta_{sim} \Delta_{par}^{-1} \Sigma_\theta^{-\frac{1}{2}} \tag{4}$$

$$\Delta_{sim} = \frac{\Sigma_\varepsilon^{-\frac{1}{2}}\left(D_{sim} \ominus \overline{D}_{sim}\right)}{\sqrt{N_e - 1}} \tag{5}$$

$$\Delta_{par} = \frac{\Sigma_\theta^{-\frac{1}{2}}(\Theta \ominus \overline{\Theta})}{\sqrt{N_e - 1}} \tag{6}$$

where Δ_θ is the parameter upgrade matrix, J_{emp} is the empirically-derived Jacobian matrix, Σ_ε is the observation noise covariance

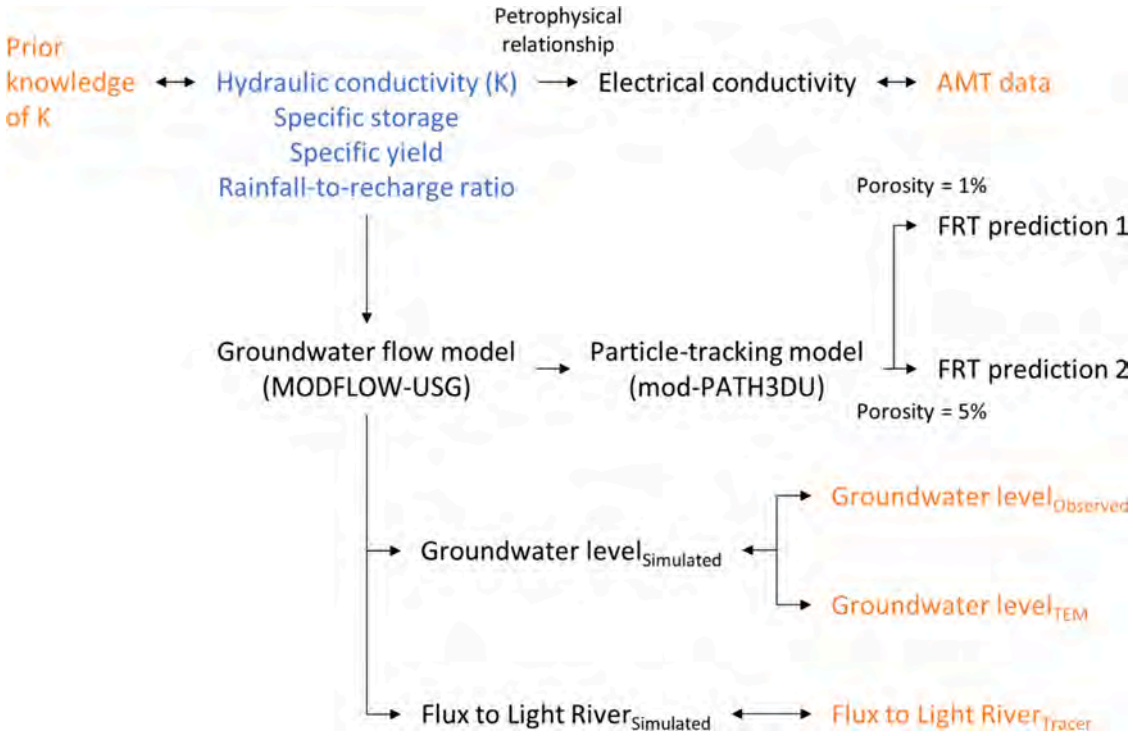

Fig. 5. Inversion workflow in this study: parameter groups that were varied during the inversion are in blue color, observation groups that were used as inversion targets to compute the objective function are in orange color. Due to the uncertainty in effective porosity and the lack of inversion targets, two separate particle-tracking runs were undertaken with different uniform effective porosity values of 1% and 5%. Each double arrow denotes a residual calculation (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.).

matrix, Σ_θ is the prior parameter covariance matrix, λ is the Marquardt dampening parameter, Θ and Θ_0 are the current and initial parameter vector respectively, D_{obs} and D_{sim} are the observation and simulated-equivalent ensembles respectively, $\overline{D}_{sim}$ and $\overline{\Theta}$ are the mean of the simulated-equivalents to observations and parameters across their respective ensembles respectively, N_e is the number of realizations, and $\ominus$ denotes broadcast subtraction.

In this study, the ensemble size was initially set to 105 realizations to account for situations where some realizations may fail to converge. The dampening of the parameter upgrade factor is controlled by λ (Eq. (3)), where a high value of λ leads to rapid improvement in the objective function, while a low value of λ is better at navigating the objective function space. The optimal value for λ is automatically estimated for each inversion iteration through a trial-and-error procedure based on a subset of the parameter ensemble (the whole ensemble is not used to reduce computational time). In this study, the inversion was converged after 9 iterations based on the following termination criteria: (1) if the relative decrease in the mean objective function was less than 1% over 3 iterations, or (2) if there was no reduction in the mean objective function for 3 iterations. The top 100 realizations with the smallest objective function were used to form the final ensemble.

The inversion workflow in this study is illustrated in Fig. 5. The modeled hydraulic conductivity was compared with our prior knowledge, including the aquifer test and Logan Approximation estimates. In addition, to provide more constraints in the study area, the modeled hydraulic conductivity was compared with the AMT data. This was achieved by converting the hydraulic conductivity field to an EC field using Eq. (2) and the empirical constants estimated in Section 2.3.1. The empirical constants are assumed to be spatially uniform due to the limited aquifer test data. Given the uncertainty in the petrophysical relationship, the AMT data were aggregated into five zones using the K-means clustering technique (Jain, 2010). The EC comparison was only undertaken for the weathered layer as the unweathered layer possesses a different electrical property (Figs. 2 and 3) where the estimated empirical constants may not apply.

Groundwater levels computed by the flow model were compared with groundwater levels from the observation wells and TEM. In addition, the simulated groundwater flux to the Light River within the study area in 2019 was compared with the mean of tracer estimates from Lamontagne et al. (2020).

It is worth noting that effective porosity was not included as a calibration parameter. While the ensemble smoother method allows the inclusion of all parameters in the history matching procedure as long as there is a covariance matrix to constrain parameter values, the prior and posterior probability distribution of effective porosity are expected to be similar due to the lack of inversion targets for particle tracking. Therefore, the inclusion of effective porosity in the history matching procedure is believed to have minimal contribution to the prediction uncertainty quantification. As such, given the model objective, the uncertainty associated with effective porosity was assessed by undertaking two separate particle-tracking runs with different uniform effective porosity values of 1% and 5%, which are considered to represent the lower and upper bounds respectively.

Pilot points, a method for spatial parameterization, were used for all parameter groups (Doherty, 2003). Given the fractured rock environment, pilot points were placed at each observation to capture the local heterogeneity. In addition, gaps in the pilot point coverage were filled using a maximum separation distance of 25 m in the study area and 250 m elsewhere in the weathered layer, and 500 m in the unweathered layer. This resulted in 1397 pilot points in the weathered layer and 103 pilot points in the unweathered layer for each corresponding parameter group. Spatial correlation between the pilot points were defined using an exponential variogram, with nugget = 0, sill = 1 and a = 1100, where "a" describes the decay rate of spatial correlation with distance and was set to ~20 % of the model extent.

The calibration parameters are detailed in Table 1. All parameters were log-transformed during the inversion. The prior parameter variance was calculated based on the assumption that the difference between the upper and lower bound of a parameter group is equal to four standard deviations of its prior probability distribution (White, 2018). Based on the AMT data, horizontal hydraulic conductivity is assumed to be isotropic (i.e. $K_x = K_y$). A similar assumption was adopted for vertical hydraulic conductivity (i.e. $K_{horizontal} = K_{vertical}$). The effect of this assumption is expected to be small given the relatively low permeability of the unweathered layer and therefore the already dominant lateral flow. Hydraulic conductivity of the unweathered layer was forced to be at least an order of magnitude lower than the hydraulic conductivity of the weathered layer. It is worth noting that while the potentially connected high hydraulic conductivity pathways are not explicitly represented in the prior, these pathways are expected to be reflected in the AMT data that were included in the history matching procedure (Fig. 5). The storage parameter settings are based on the aquifer tests in the adjacent Barossa region (~30 km away) that has a similar hydrogeological setting (Li and Cranswick, 2016). Specific storage was

Table 1
Inversion settings for the parameter groups. The initial and bound parameter values are before log-transformation. Prior parameter variance was calculated based on the assumption that the difference between the upper and lower bound of a parameter group is equal to four standard deviations of its prior probability distribution.

Parameter group	Layer	Initial value	Lower bound	Upper bound	Variance †	Source
Hydraulic conductivity (m/d)	1	0.1	$1e^{-5}$	1	1.562	Aquifer test Logan Approximation
Hydraulic conductivity (m/d)	2	$1e^{-4}$	$1e^{-5}$	$1e^{-3}$	0.25	Aquifer test Logan Approximation
Specific storage (m^{-1})	2	$1e^{-6}$	$1e^{-7}$	$1e^{-5}$	0.25	Li and Cranswick (2016)
Specific yield (-)	1	0.01	0.001	0.05	0.18	Li and Cranswick (2016)
Rainfall-to-recharge ratio (-)	1	0.008	$1e^{-4}$	0.05	0.455	Chloride mass balance

† Based on log-transformed parameter values.

predominately used for the bottom layer, which is confined, and for simplicity the same values were applied to the top layer (vice versa for specific yield). The rainfall-to-recharge ratios vary spatially but were fixed with time for parsimony reasons.

The observation groups are detailed in Table 2. Prior observation variance was calculated in a similar fashion to the prior parameter variance. The error bounds are assumed to be ±0.2 m for groundwater levels from the observation wells (Rau et al., 2019), ±2 m for groundwater levels derived from TEM and ±50 % for prior knowledge of hydraulic conductivity (Logan, 1964). The bounds for the EC and baseflow observation groups are based on the actual range of the AMT data and tracer estimates (Lamontagne et al., 2020). The EC, hydraulic conductivity and baseflow observations were log-transformed. The prior observation variance values were used to derive the random observation ensemble and observation weights, the latter were then adjusted using the program PWTADJ1 (Doherty et al., 1994), which automatically scales the observation weights so that all observation groups are equally visible in the objective function.

3. Results

3.1. History-matching performance

The history-matching performance of the model ensemble for all observation groups is shown in Fig. 6. For groundwater levels from the observation wells, the residual map shows some potential conflicts between data, where positive residuals are adjacent negative residuals. This may be caused by local heterogeneity given the fractured rock environment, or simply a measurement error, which cannot be resolved with the currently available data. The scatter plot shows a reasonable match between the observed and simulated values, with the cloud of points being centered around the 1:1 line and a scaled root mean square error (SRMSE, calculated as RMSE divided by the observation range) of 7.3 %.

For groundwater levels derived from TEM, both the residual map and scatter plot show an overall overestimation by the model. This potentially suggests that the peak of EC profile may be a sub-optimal indicator of true water table depth. It is possible that the top of the saturated zone may have been diluted by mixing with the relatively fresh rainwater, or there is a significant capillary zone. Nevertheless, an RMSE of 1.3 m is considered to be within the uncertainty bounds of these groundwater level estimates.

Prior knowledge of hydraulic conductivity includes the aquifer test data and Logan Approximation estimates. The prior knowledge functions like regularization in that the objective function is penalized as the modeled values deviate from the prior values. It is worth noting that hydraulic conductivity is a model input, not an output that requires calculation like groundwater levels, and hence is relatively easy to fit. The misfit of hydraulic conductivity between the prior and modeled values is a trade-off for the inversion to fit other observation groups, especially groundwater levels from the observation wells as most of the prior hydraulic conductivity values are located outside the study area. The misfit suggests a potential conflict between these two observation groups, which may be caused by the heterogeneous nature of the fractured rock aquifer and/or errors in the Logan Approximation estimates and groundwater level observations.

For the EC observation group, the residual map shows two distinct zones: an underestimated zone to the north and an overestimated zone to the south, which coincide with the location of Tapley Hill Formation and Brighton Limestone respectively. This suggests that using the same petrophysical relationship empirical constants for these two formations is sub-optimal. The fit may be improved by undertaking an additional aquifer test so that a separate set of empirical constants can be derived for each of these formations. The additional aquifer test may also contribute to the improvement of model predictive accuracy.

The simulated baseflow to the Light River within the study area in 2019 ranges between 290 and 780 m^3/d with a mean of 560 m^3/d, which is mostly within the tracer estimate range of 400–3000 m^3/d (Lamontagne et al., 2020), albeit on the lower end of the range. This discrepancy may be due to the difference in time scale between the tracer and modeled estimates and/or the riverbed conductance term used.

3.2. Posterior parameter distribution and uncertainty

The maximum likelihood and logarithmic standard deviation of the posterior distribution for the calibration parameters are shown in Fig. 7. Hydraulic conductivity in the weathered layer is higher in the north-eastern part and lower in the south-western part of the study area. Regionally, there is a substantial permeable zone to the east and a less permeable zone to the west of the study area, potentially indicating the differences in the amount of weathering. The unweathered layer typically has a lower hydraulic

Table 2
Inversion settings for the observation groups. Prior observation variance was estimated by assuming the difference between the upper and lower bound of an observation is equal to four standard deviations of its prior probability distribution.

Observation group	Unit	Number of observations	Variance
Groundwater levels from observation wells	m asl	42	0.01
Groundwater levels from TEM	m asl	23	1
Zoned EC from AMT †	μS/cm	5	0.008 – 0.03
Prior knowledge of hydraulic conductivity †	m/d	29	0.014
Baseflow to Light River †	m^3/d	1	4.57

† Log-transformed.

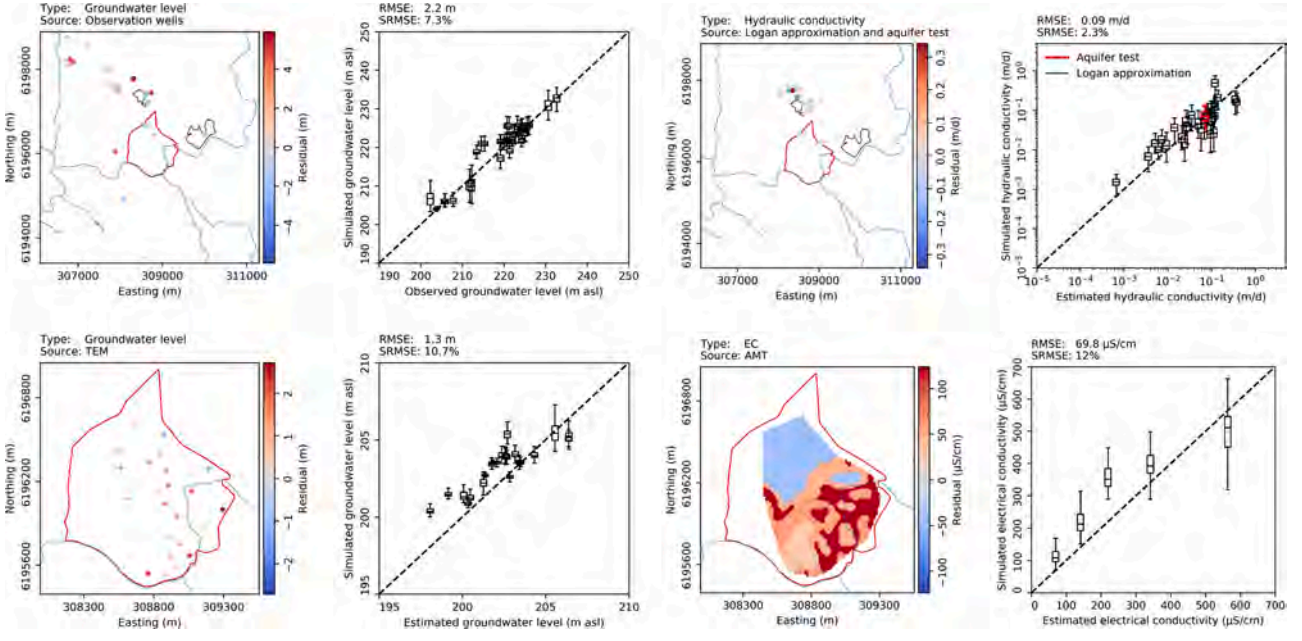

Fig. 6. History-matching performance of the model ensemble for all observation groups. The left column shows the residual maps, where positive value indicates overestimation and negative value indicates underestimation by the model. The right column shows the scatter plots of simulated against target values. The RMSE and SRMSE were calculated based on the maximum likelihood of the simulated values.

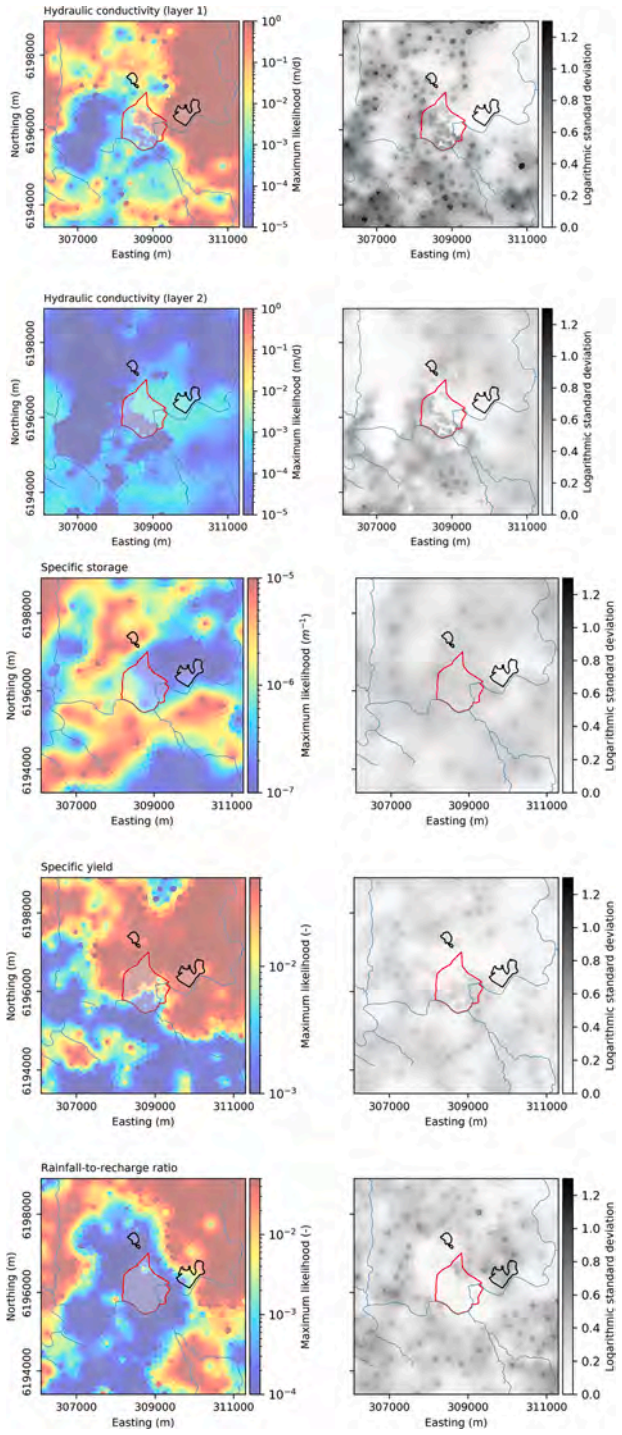

Fig. 7. The maximum likelihood and logarithmic standard deviation of the posterior distribution for the calibration parameters. The logarithmic standard deviation can be used as an indicator of posterior parameter uncertainty.

conductivity, although there is a relatively permeable zone in the north-eastern part of the study area. Specific storage is generally high except to the east and south-east of the study area, while specific yield is higher to the north and lower to the south. The rainfall-to-recharge ratio generally follows topography and is higher in the outer, elevated areas and lower in the center, low-lying areas.

The logarithmic standard deviation in Fig. 7 was calculated using parameter values from the 100 model realizations on a cell-by-cell basis and can be used as an indicator of posterior parameter uncertainty, which is highest for hydraulic conductivity in the weathered layer. Its uncertainty is relatively high in the study area, probably due to the limited physical measurements of groundwater

level in this area. In contrast, the uncertainty is relatively low near the historical mine, which is probably due to the abundance of Logan Approximation estimates in this area (Fig. 1). Both hydraulic conductivity in the unweathered layer and specific yield show a relatively high uncertainty in the southern part of the study area, while the uncertainty of specific storage is relatively uniform. Although the uncertainty of rainfall-to-recharge ratio is considerably high in the regional areas, it is relatively low in most part of the study area.

3.3. Prediction distribution and uncertainty

The predicted injectant flow paths for the hypothetical SELT operation are shown in Fig. 8. For an effective porosity of 1%, 95 out of the 100 model realizations indicate that all of the injectant may be retrieved, while 5 realizations show that the injectant has the potential to reach the Light River. For an effective porosity of 5%, 99 out of the 100 model realizations suggest complete removal of the injectant and only 1 realization shows the potential for injectant to reach the river. As the travel speed of injectant is inversely proportional to effective porosity, the injectant travels at a slower speed in the 5% porosity scenario and hence has a higher probability to be completely retrieved. The modeling suggests that it would take 9–175 years after the SELT commencement for the injectant to reach the river, with a median of ~35 years. It is important to note that these model runs represent the worst-case scenario as processes such as degradation and attenuation are not considered in the modeling.

It is worth noting that the injectant under consideration is highly biodegradable. It is expected that ~90 % of the injectant will degrade completely within 28 days of exposure to groundwater (ECHA, 1999; Hidalgo et al., 2019, 2020). Our modeling shows no

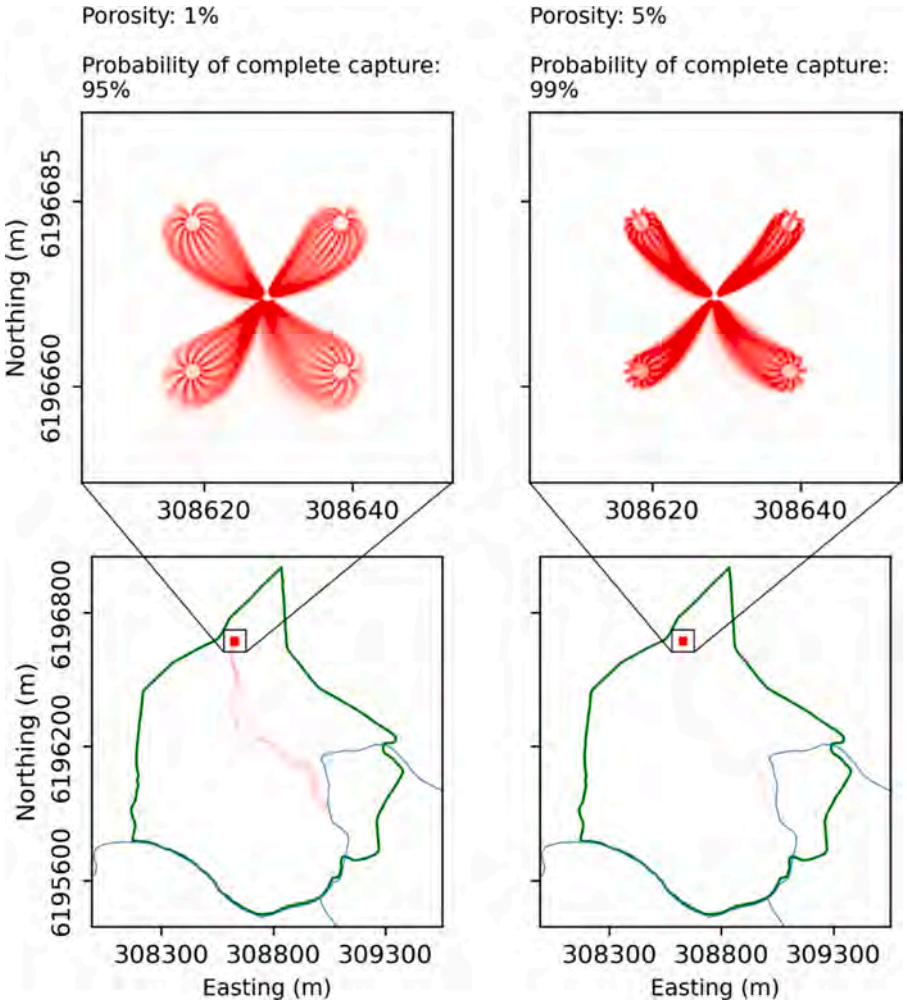

Fig. 8. Predicted injectant flow paths for the hypothetical SELT operation and the probability of completely capturing the injectant for different effective porosity values of 1% and 5%. Note that the injectant under consideration is highly biodegradable (~90 % degradation over 28 days). Our modeling shows no evidence that the injectant can leave the SELT site or reach the Light River within this timeframe. The red lines denote injectant flow paths, the opacity of the red lines denotes likelihood, the green line denotes the study area and the blue line denotes rivers and creeks (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.).

evidence that the injectant can leave the SELT site, much less reach the Light River within this timeframe.

Further analysis was performed on the injectant residence time in the aquifer after the SELT commencement (Fig. 9). This analysis assumes that the injectant does not degrade with time. For an effective porosity of 1%, the results suggest that most of the injectant may be retrieved between 200 and 400 days after the SELT commencement. This relatively long residence time was unexpected given the small scale of the SELT operation and is likely due to the need of some injectant to travel against the regional groundwater flow gradient to reach the extraction well. The relatively low extraction rate and permeability (compared to sedimentary aquifers) may also contribute to this relatively long residence time. For an effective porosity of 5%, the results indicate that there may still be up to 20 % of injectant remaining in the aquifer even after 1000 days, potentially suggesting a longer remediation phase and/or a higher extraction rate may be needed. Again, it is important to note that these residence time results represent the worst-case scenario and do not consider the biodegradability of the injectant.

4. Discussion

There are various levels of coupling geophysics and groundwater modeling, ranging from basic manual conceptual interpretation (e.g. Harrington et al., 2014) to sequential inversion (e.g. Christensen et al., 2017) to joint inversion (e.g. Herckenrath et al., 2013). For sequential inversion, outputs from geophysical inversion are used for groundwater model inversion, while for joint inversion both the geophysical and groundwater models are inverted simultaneously. This study performed a relatively complex sequential inversion that uses AMT, TEM and NMR data to constrain stochastic groundwater modeling. This method facilitates the flow of information from geophysical and hydrogeological data to the groundwater model prediction of interest.

The challenge of coupling geophysics with groundwater modeling is that geophysical techniques rarely provide direct information about hydrogeological properties. Additional methods and assumptions, such as petrophysical relationships, are often required to bridge this gap, potentially increasing the uncertainty of geophysically-derived observations, as these relationships may vary depending on local site conditions. When using these observations as targets in groundwater model inversion, it is critical to quantify and account for their uncertainty to avoid incorrectly biasing model outcomes. The ensemble-smoother method potentially provides a means to achieve this via the prior observation variance (Table 2), which expresses observation uncertainty as a prior probability distribution. For a given observation, a random sample is drawn from its prior probability distribution for each realisation, forming an ensemble of random observations. This allows the inversion to fit to the observation distribution, which incorporates the observation uncertainty, instead of the observation itself, which may be uncertain especially for the geophysically-derived observations.

There are some limitations in the modeling presented in this paper. Firstly, it is worth noting that the ensemble-smoother method may not necessarily converge to the global minimum of the objective function space, unlike other stochasic methods such as Markov-Chain Monte Carlo. By using the ensemble-smoother method, a compromise is implicitly made where some accuracy in the posterior parameters and predictions is sacrificed for computational efficiency. Secondly, as with most other Bayesian-based techniques, the ensemble-smoother method is dependent on the priors, the derivation of which may sometimes be subjective for geophysically-derived observations. In this study, the TEM data were used to estimate groundwater levels in the study area, which are acknowledged to be uncertain. We assumed the error to be ±2 m and expressed this uncertainty as a prior observation variance (Table 2), which was then

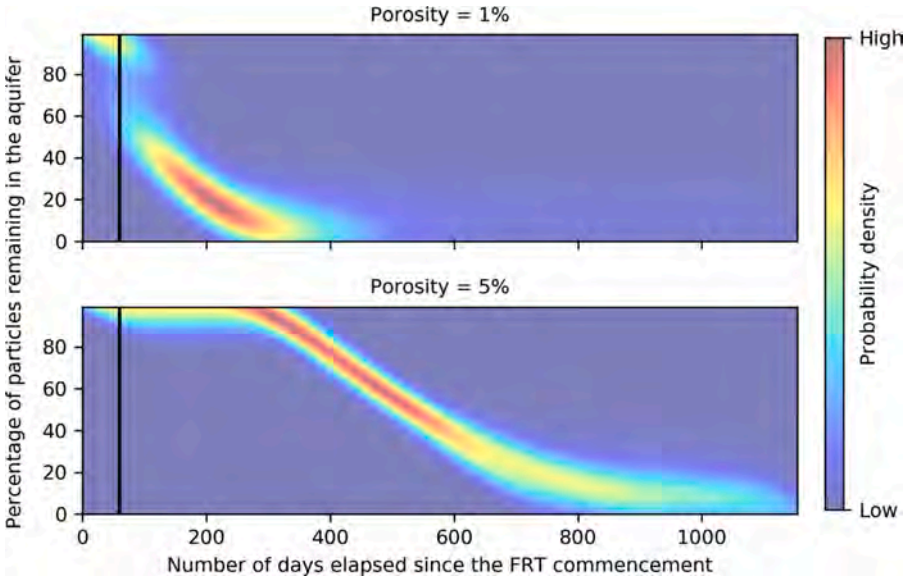

Fig. 9. Predicted injectant residence time in the aquifer since the SELT commencement for different effective porosity values of 1% and 5%. Note that these residence time results represent the worst-case scenario and do not consider the biodegradability of the injectant (~90 % degradation over 28 days). The vertical black line denotes when the SELT ceases.

incoporated into the groundwater model inversion. This error bound is a subjective estimation based on our hydrogeological knowledge of the area. Nevertheless, we demonstrated how multiple geophysical techniques can be used to provide a large set of soft data to aid groundwater model development, espeically in areas with limited drillhole informatioion, and more importantly, how the uncertainty in these soft data can be expressed in a transparent and repeatable framework that can be reviewed and adjusted as needed.

As for site-specific limitations, there are some areas in the model where the parameters are at their upper bound, especially hydraulic conductivity in the weathered layer and recharge (Fig. 7). It is hypothesised that the baseflow estimate may be too high, forcing these parameters to reach their upper bound. This hypothesis can be tested by collecting more field data, including baseflow analysis and aquifer tests. Meanwhile, the EC estimates from the AMT inversion were used to provide information on hydraulic conductivity via a petrophysical relationship. This requires calibrating the empirical constants against field data, ideally aquifer test data. Due to the limited aquifer test data in the study area, we assumed the empirical constants to be spatially uniform. The model results suggest that this approach may be sub-optimal when applied across multiple geological formations with variable electrical properties. The model results are likely to be improved if an additional aquifer test was performed so that a separate set of empirical constants could be derived for each of these formations.

It is worth noting the difference between the predictive scale and data scales. Spatially the former is mostly between the SELT site and the Light River (i.e. within the study area). In comparison, most of the hydrogeological data, including groundwater level observations and hydraulic conductivity estimates, lie outside the study area (Fig. 1). Therefore, the model predictions are likely to be influenced more by the geophysically-derived groundwater levels and hydraulic conductivity estimates (i.e. NanoTEM and AMT data) within the study area. There is considerable uncertainty associated with these geophysically-derived datasets and it is therefore important to incorporate their uncertainty explicitly in the modelling workflow as demonstrated in this study.

Transport predictions are preferentially sensitive to rapid transport pathways such as along fractures rather than the average media properties provided from an aquifer test. The direct use of aquifer test data for improving model predictive accuracy may therefore be limited. Instead, as demonstrated in this study, aquifer test data can be used to provide constraints for the petrophysical relationship that relates K and EC, which is critical as the EC distribution contains information about the rapid transport pathways.

5. Conclusions

In this study, we coupled multiple geophysical techniques with stochastic groundwater modeling to predict the regional-scale hydrological impact of a hypothetical ISR trial operation for copper recovery in Kapunda, South Australia. The geophysical techniques, including AMT, TEM and NMR, were used to provide constraints on hydraulic conductivity, water table depth, hydrostratigraphy and porosity in a data sparse region. The groundwater model was used as a data assimilation tool to facilitate the flow of information from the geophysical and hydrogeological data to the model prediction of interest. This was achieved using the ensemble-smoother method via PESTPP-IES, which produced an ensemble of 100 calibrated models with a reasonable history-matching performance (an average SRMSE of 7.3 % for groundwater level observations). These calibrated models can be considered to represent the posterior distribution of parameters and predictions that can be readily used for non-linear uncertainty analysis and probabilistic predictions. The model ensemble shows no evidence that the injectant can leave the SELT site or reach the Light River within its biodegradation timeframe.

The challenge of coupling geophysics with groundwater modeling is that geophysical techniques rarely provide direct quantification of hydrogeological propoerties. Additional methods, such petrophysical relationships, are required to bridge this gap, potentially increasing the uncertainty of geophysically-derived observations. When using these observations as targets in groundwater model inversion, it is critical to quantify and account for their uncertainty to avoid incorrectly biasing outcomes. The ensemble-smoother method potentially provides a means to achieve this via the prior observation variance and random observation ensemble, allowing the inversion to fit to the observation distribution, which incorporates the observation uncertainty, instead of the observation itself. However, as with most other Bayesian-based techniques, the ensemble-smoother method is dependent on the priors, the derivation of which may sometimes be subjective for geophysically-derived observations. Nevertheless, we demonstrated how multiple geophysical techniques can be used to provide a large set of soft data to aid groundwater model development, espeically in areas with limited drillholes, and more importantly, how the uncertainty in these soft data can be expressed in a transparent and repeatable framework that can be reviewed and adjusted as needed.

Author statement

Chris Li

- Conceptualization
- Methodology
- Validation
- Formal analysis
- Data Curation
- Writing – Original Draft
- Writing – Review & Editing
- Visualization

Rebecca Doble

- Conceptualization
- Methodology
- Validation
- Resources
- Writing – Review & Editing
- Supervision
- Project administration

Michael Hatch

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- Methodology
- Validation
- Formal analysis
- Investigation
- Resources
- Writing – Review & Editing
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- Fund acquisition

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- Formal analysis
- Investigation

Declaration of Competing Interest

The authors report no declarations of interest.

Acknowledgements

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ejrh.2021.100841.

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Light Regional Council

Community Land Management Plan

Kapunda Mine Historic Site

Adopted 03 December 2020

Community Land Management Plan

Part One	Introduction
This part provides an introduction and information on the applicable legislation, policies and By-Laws that apply to the document. Refer separate document.	
Part Two	**General**
This part of the Plan applies to all areas of land regardless of the category. This is to ensure common information is not repeated in each of the categories. Refer separate document.	
Part Three	**Categories**
This part of the plan will identify individual sites or a number of sites collectively as they fit within the categories identified. Plans will be updated periodically as required.	

	Category	Description of Category
1	**Recreation**	Sporting or recreational activities including active and passive recreation and organised sport. Often large complexes involving indoor and outdoor facilities, ovals, courts and clubrooms with a lease to incorporated associations to manage on Councils behalf.
2	**Community**	Recreational or cultural activities including community group activities or provision of community services. Usually a town hall or institute type building where community activities may take place or hired on an adhoc or regular basis. Includes facilities provided for the community such as public toilets. May be leased to incorporated associations.
3	**Parks & Gardens**	Generally landscaped and irrigated open spaces with garden beds, lawn and park furniture. May include playgrounds.
4	**Natural Reserves**	Includes land that may be provided as levy banks, former stone quarries, adjacent water courses, road reserves, screening reserves or historical surplus land.
5	**Cemetery**	Areas set aside for the burial and remembrance of deceased persons with memorials, plaques and headstones.
6	**Operational**	Land that is required for Council's operations including its offices, for emergency services or for stormwater drainage, recycled water, Community Wastewater Management Scheme (CWMS) or other water management purposes.

Part 3 Category 1 - Recreation

Kapunda Mine Historic Site

The Kapunda Mine Historic Site is a State Heritage Place. Its listing on the SA Heritage Register (ID: 11535) records:

The Kapunda Mine, established in 1844 following the discovery of copper in 1842, is important as the first metal mine in South Australia to be worked on a commercial scale. The success of the mine contributed to the Colony's economic recovery from a period of depression in the early 1840s. It also led to the creation of the town of Kapunda, one of the first mining towns in Australia. Worked by Cornish miners, the mine was also the first in the colony to utilise large-scale open-cut methods of mining (from 1867) to more efficiently remove the low-grade ore and the first to utilise an acid leaching and concentrating treatment process to produce copper. The mine closed in 1878.

The Kapunda Mine Historic Site is comprised of several properties. It features heritage infrastructure (including but not limited to a chimney and Buhl winding house complex), interpretive signage, shelters, walking trails and car parking areas.

The Site, and wider region, continues to be subject to mineral tenements held for exploratory purposes There continues to be interest shown in the Kapunda Mine Historic Site for exploration and possibly mining purposes by third parties. A mineral Exploration Licence (presently EL No.6198) currently includes this Site.

Site Components

Asset #	Site Name	Property Details	Property Address	Lease (if applicable)
119	Kapunda Mine Historic Site	D861 A23 CT 5751/298	Mine Street	
119	Kapunda Mine Historic Site	F7985 A30 CT 5502/698	Perry Road	
118	Copper Mine Chimney	F7985 A28 CT 5786/672	Mine Street	
119	Kapunda Mine Historic Site	F7985 A29 CT 5786/670	Perry Road	
119	Kapunda Mine Historic Site	D56267 A40 CT 5843/524	Perry Road	

PURPOSE OF THE LAND

The land is retained by Council for the purpose of preserving a significant historical asset for the community of Kapunda, the Light Region, visitors to the area and future generations. The Site provides for interpretation of the first metal mine in South Australia, together with unstructured recreational pursuits such as walking, sightseeing and photography.

The land has a secondary purpose, recognising that it remains a part of a mineral Exploration Licence and may be used for mineral exploration and possibly mining purposes, subject to relevant legal processes.

POLICIES

Relevant policies include:

- Asset Management Policy

PLANS

Relevant plans include:

- Kapunda Mine Heritage Site Conservation Management Plan,
- Kapunda Historic Mine Site Tourism Development Plan
- Light Regional Council Tourism Development Plan.

OBJECTIVES FOR MANAGEMENT OF THE LAND

1. To facilitate safe ongoing use of the defined areas of the Site as a passive recreation area, making use of the surface areas of the land and/ or areas where public access has been made possible, such as the staircase access to the 'Stockyard Cut'.
2. To provide a historical interpretive experience for both the community of the Light Region and as a destination for tourists alike, in-line with adopted plans for the Site.
3. To acknowledge and preserve the mining heritage of the Site.
4. Revegetation of the site with native plantings for erosion control and biodiversity improvements;
5. To enable consideration to be given to approaches for mineral exploration and/ or non-invasive mining, within identified areas of the Site and where such activities can be considered to be undertaken in a sympathetic manner and in a way that ensures that the proposals for the management of the land can be maintained and achieved.
6. To enable consideration of commencing a process to add the Kapunda Historic Mine Site to the National Heritage Places listing for 'Australian Cornish Mine Sites' as a precursor to a potential Bid to include the Kapunda Historic Mine Site as a part of a UNESCO 'World Heritage' Site.

PROPOSALS FOR MANAGEMENT OF THE LAND

- Given its previous commercial use, geotechnical assessments have been commissioned for the Site over time however ongoing monitoring is required, such as to detect any ground subsidence that may be the result of heavy rainfall or erosion events;
- To this end, it is necessary to restrict public access to certain areas, such as the area between the Perry Road and Mine Street car parks (along a walkway installed between these features), as well as the pathway around the 'Open Cut' and the access path into the 'Stockyard Cut' (collectively identified as **'Zone 1 – Public Access Zone'**);
- All other areas are collectively **'Zone 2 - Public Exclusion Zone'** and may progressively be fenced-off as needed to enhance public safety.
- Appendix A to this Plan includes a Plan which delineates each Zone.

Zone 1 - Public Access Zone

- In line with the Kapunda Historic Mine Site Conservation Management Plan and Kapunda Historic Mine Site Tourism Development Plan, activities occurring within Zone 1 shall only take the form of those related to development and conservation of the Site as a historic Site and tourism destination; attracting local, national and international tourists. The destination status of the land will contribute to economic growth and community benefit. Proposals may take the form of on-Site re-discovery and conservation works.
- Relate to the overall Site, the positive impact of Cornish mining skills/ 'know-how' and technology and cultural contribution to the development of South Australia, particularly from the mid-19th Century onwards, has been recognised through National Heritage listing of historic mine Sites at Moonta and Burra as 'Australian Cornish Mine Sites' in May 2017. This occurred as a 'first step' prior to seeking United Nations Educational, Scientific and Cultural Organisation (UNESCO) 'World Heritage Site' listing for these Sites;
- Council may choose to consider seeking similar recognition for the Kapunda Historic Mine Site through its inclusion in the National Heritage listing, subject to having an understanding of the cost/ benefits of such a Bid and how this may align with any ongoing efforts with respect to the Moonta and Burra Sites. Activities occurring across either Zone shall not compromise the potential for the Site to be identified on either of these lists.
- If requested by third parties, Council may consider a Licence (or similar) to facilitate access across Zone 1 between a public road and Zone 2.

Zone 2 - Public Exclusion Zone

- Zone 2 is designated as those areas which are deemed to present an unacceptable risk to the general public, requiring that access by the general public is restricted. Examples include the 'Open Cut' and the 'Buhl Pump Shaft';
- Council may provide consideration of third-party access to the land in Zone 2 of the Site for the purpose of mineral exploration activities and related subsequent non-invasive mining activities which can co-exist with heritage elements and the purpose of the land.

  Such consideration would be subject to robust and considered community engagement, satisfying legislated Work, Health and Safety requirements and consideration and understanding of the impact of such proposal/s on both the land and on the primary proposal for the land. Actions which jeopardise the purpose of the land should not be advanced. Progression of any proposal will require consideration and adoption of related lease and/or licence documents.

PERFORMANCE TARGETS

- Regular inspections of the land to assess that pathways, fencing and signage (warning and interpretive) on the land have been maintained to a level considered appropriate by Council.
- Biennial satisfaction surveys and audits of visitor numbers (carried out in a manner determined to be appropriate by the Council).
- Regular inspections of the land to assess that the land has been maintained and restored to a level appropriate for a heritage asset.
- Regular monitoring of rehabilitation and revegetation initiatives to assess that erosion has been limited and/ or managed at a level considered appropriate by Council.
- Consideration of any requests for site access for mineral exploration and/ or non-invasive mining in a timely manner that is consistent with Council's legislated responsibilities and enables Council to be satisfied that such activities can be undertaken in a way that ensures that the proposals for the management of the land can also be maintained and achieved.
- Reporting to Council with respect to exploring adding the Kapunda Historic Mine Site to the National Heritage Places listing for 'Australian Cornish Mine Sites'.

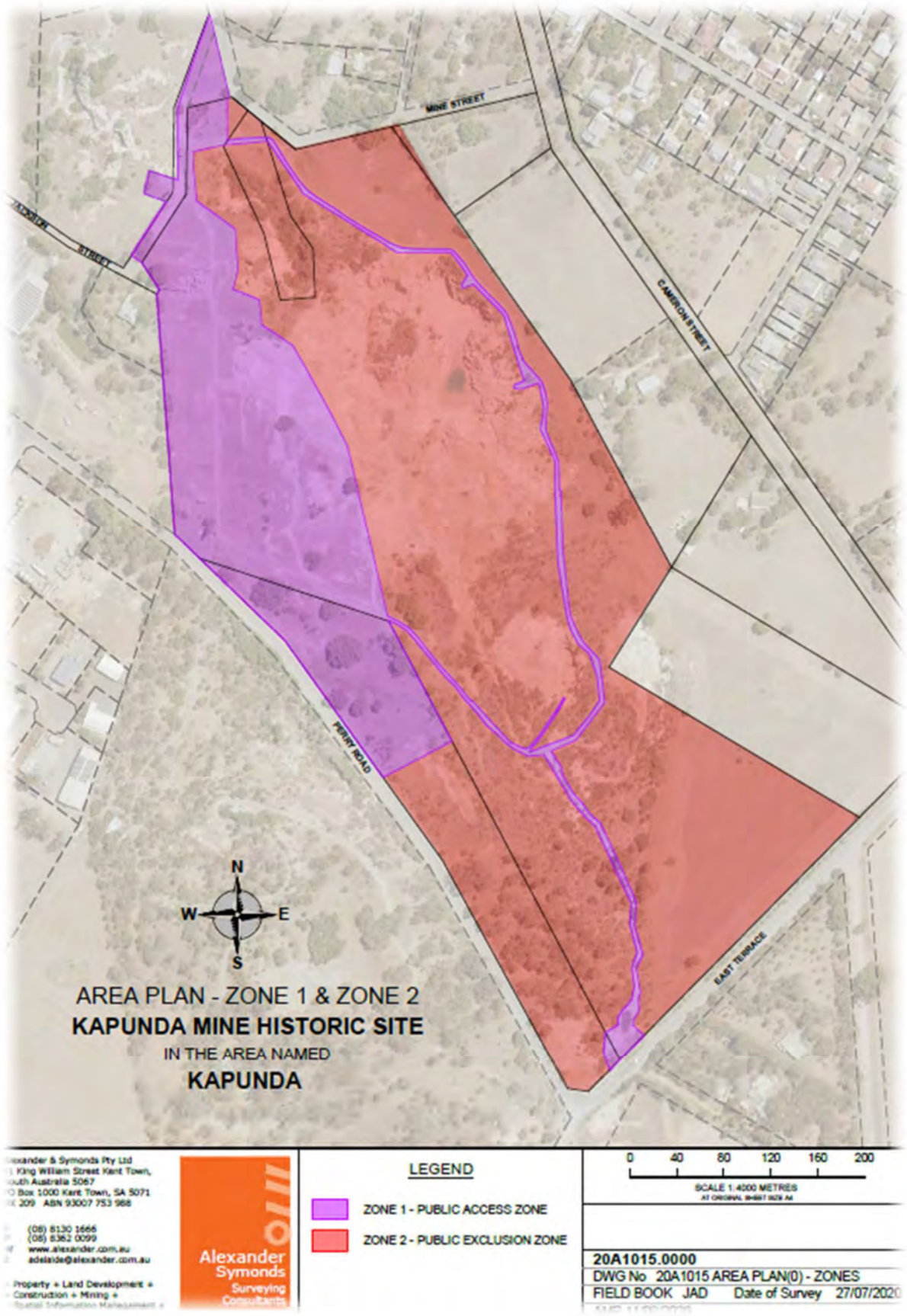
PERFORMANCE MEASURES

- Inspections of the land at intervals that the Council considers appropriate to assess that pathways, fencing and signage (warning and interpretive) on the land have been maintained to a level considered appropriate by Council.
- Sustained or increased community satisfaction with public access to the land and increased tourism numbers as determined by satisfaction surveys and audits of visitor numbers (carried out in a manner determined to be appropriate by the Council) conducted not less than every 2 years.
- Inspections of the land at intervals that the Council considers appropriate to assess that the land has been maintained and restored to a level appropriate for a heritage asset.
- Monitoring of rehabilitation and revegetation initiatives at intervals that the Council considers appropriate to assess that erosion has been limited and/ or managed at a level considered appropriate by Council.

- Consideration of any requests for site access for mineral exploration and/ or non-invasive mining in a manner consistent with legislated requirements and where Council is satisfied that such activities can be undertaken in a way that ensures that the proposals for the management of the land can also be maintained and achieved.
- Exploration and reporting to Council on the process involved in adding the Kapunda Historic Mine Site to the National Heritage Places listing for 'Australian Cornish Mine Sites' as a precursor to a potential Bid to include the Kapunda Historic Mine Site as a part of a UNESCO 'World Heritage' Site.

LEASES & LICENCES

- Council retains a right to grant exclusive and non-exclusive leases or licences over the land (or parts of thereof) for particular purposes.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AREA PLAN - ZONE 1 & ZONE 2
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ZONE 2 - PUBLIC EXCLUSION ZONE
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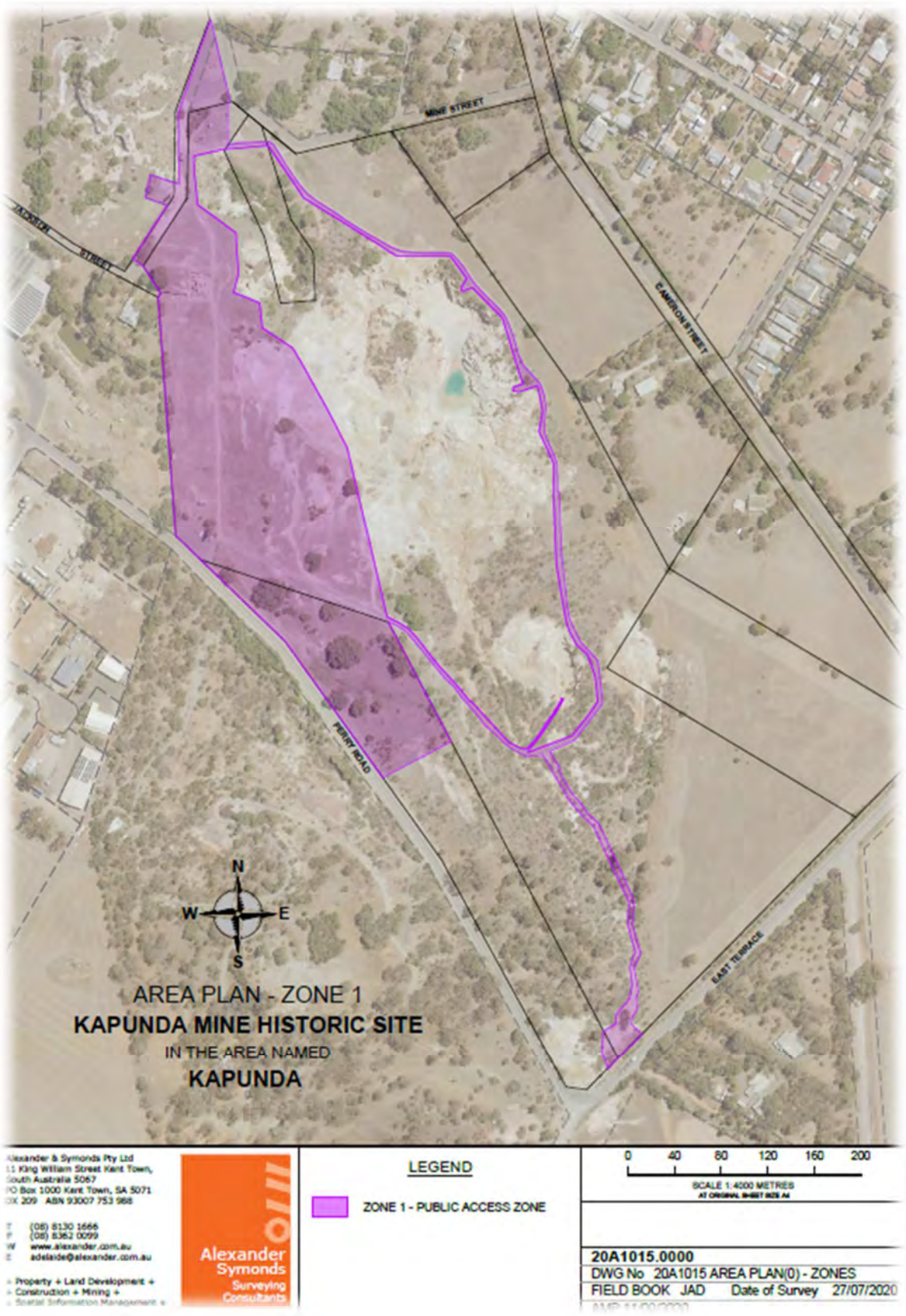
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AREA PLAN - ZONE 1
KAPUNDA MINE HISTORIC SITE
IN THE AREA NAMED
KAPUNDA
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+ Construction + Mining +
+ Spatial Information Management +
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LEGEND
ZONE 1 - PUBLIC ACCESS ZONE
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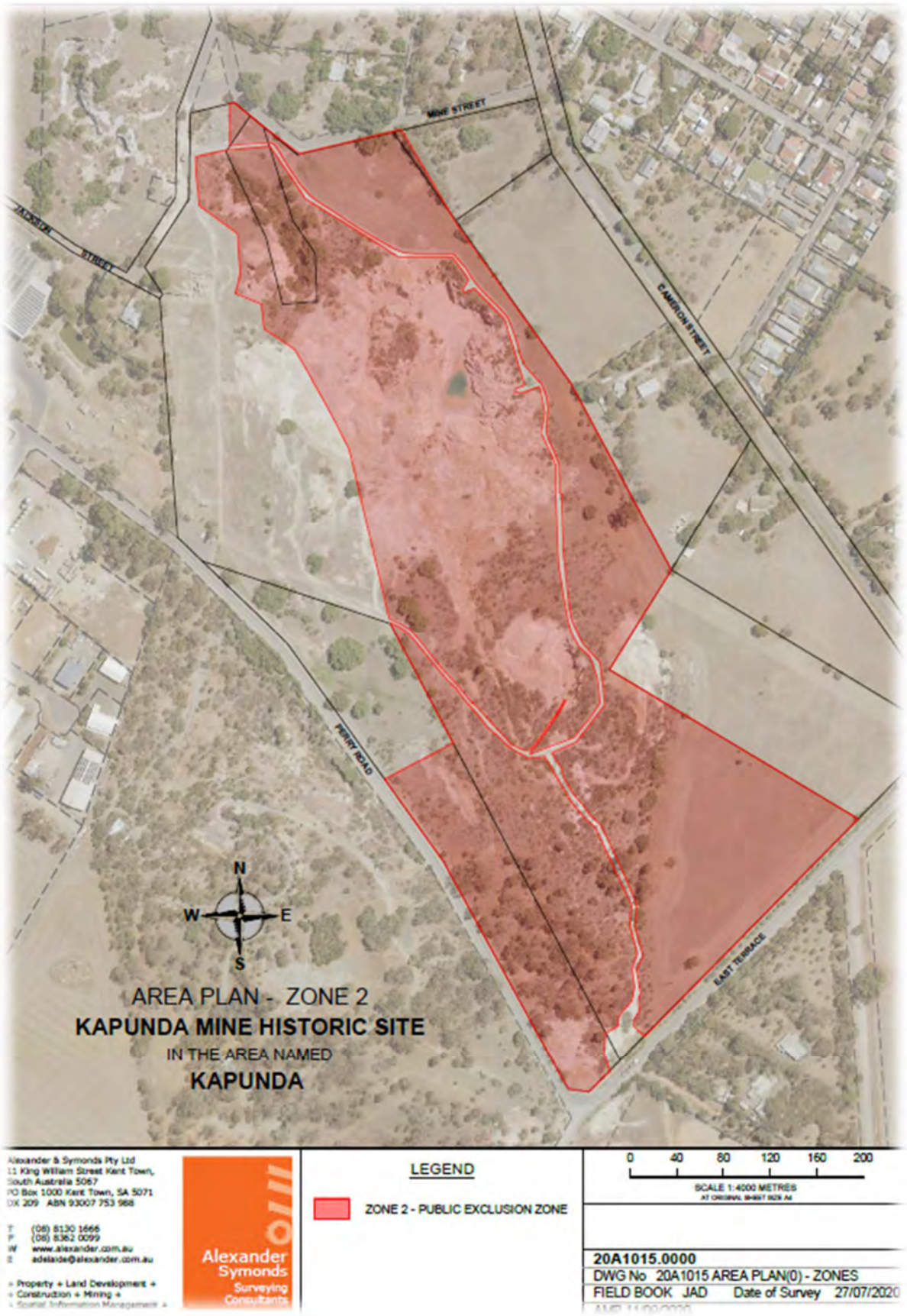
MINE STREET
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AREA PLAN - ZONE 2
KAPUNDA MINE HISTORIC SITE
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+ Construction + Mining +
Alexander Symonds
Surveying Consultants
LEGEND
ZONE 2 - PUBLIC EXCLUSION ZONE
0 40 80 120 160 200
SCALE 1:4000 METRES
20A1015.0000
DWG No 20A1015 AREA PLAN(0) - ZONES
FIELD BOOK JAD Date of Survey 27/07/2020

AGREEMENT FOR WAIVER OF EXEMPTION

SECTION 9AA – MINING ACT 1971 (SA)

BETWEEN:

LIGHT REGIONAL COUNCIL

and

TERRAMIN EXPLORATION PTY LTD (ACN 122 765 708)

and

ENVIRONMENTAL COPPER RECOVERY SA PTY LTD (ACN 620 419 810)

TABLE OF CONTENTS Page No

BACKGROUND 3

1. DEFINED TERMS AND INTERPRETATION 4
   - 1.1 Defined terms 4
   - 1.2 Interpretation 5
   - 1.3 Background 6

2. GRANT OF WAIVER 6

3. TERM OF AGREEMENT 6

4. CONDITIONS TO BE MET BEFORE COMMENCEMENT OF PERMITTED OPERATIONS 7
   - 4.1 Fee 7
   - 4.2 Notification to Safework SA 7
   - 4.3 Risk assessment 7
   - 4.4 Insurance 7
   - 4.5 Program for environment protection and rehabilitation 8
   - 4.6 Registration of agreement 8

5. OTHER COVENANTS OF THE COMPANY AND MANAGER DURING TERM 8
   - 5.1 Notice of completion of Permitted Operations 8
   - 5.2 Compliance with Statutory Requirements 8
   - 5.3 Authority to undertake Permitted Operations 9
   - 5.4 Safety 9
   - 5.5 Damage and repair 9
   - 5.6 Evidence of insurance 10

6. COUNCIL'S RIGHTS 10
   - 6.1 Right to enter 10
   - 6.2 Emergencies 10
   - 6.3 Right to rectify 10

7. ASSIGNING AND CHARGING 10
   - 7.1 Assignment 10
   - 7.2 Request for Assignment 11
   - 7.3 No Release 11
   - 7.4 Charging 11
   - 7.5 Costs 11

8. BREACH 11
   - 8.1 Payment obligations 11
   - 8.2 Council's rights on breach 11
   - 8.3 Rights of Council not limited 11

9. INDEMNITY AND RELEASE 12
   - 9.1 Risk 12
   - 9.2 Indemnity 12
   - 9.3 Release 12
   - 9.4 Indemnities are independent 12

10. GOODS AND SERVICES TAX 12
    - 10.1 Agreed consideration 12
    - 10.2 Tax invoice 13

11. TERMINATION 13

12. GENERAL 13
    - 12.1 No interest in land 13
    - 12.2 No warranty 13

TABLE OF CONTENTS Page No

12.3 Costs for breach or threatened breach....13
12.4 Waiver....13
12.5 Notice....14
12.6 Severance....14
12.7 Entire agreement....14

AGREEMENT dated in accordance with the signatory clauses

BETWEEN

LIGHT REGIONAL COUNCIL of 93 Main Street Kapunda SA 5373 (**the Council**);

and

TERRAMIN EXPLORATION PTY LTD (ACN 122 765 708) of Unit 7, 202-208 Glen Osmond Road Fullarton SA 5063 (**the Company**);

and

ENVIRONMENTAL COPPER RECOVERY SA PTY LTD (ACN 620 419 810) of 58 Galway Avenue North Plympton SA 5037 (**the Manager**).

BACKGROUND

A. The Company is the holder of Exploration Licence 6198, issued by the State of South Australia pursuant to the *Mining Act 1971* (SA) (**the Act**).

B. Exploration Licence 6198 covers (among other areas) the Kapunda Historic Mine Site. Therefore, subject to the matter described in Recital D, the Company is authorised under the Act to carry out exploratory operations of a kind described in that exploration licence in respect of the Kapunda Historic Mine Site.

C. The Company has entered into a Mining Farm-in and Joint Venture Agreement with the Manager wherein the Company authorises the Manager to conduct exploratory operations upon part of the Kapunda Historic Mine Site on behalf of the Company and the Manager.

D. The Kapunda Historic Mine Site constitutes parklands or recreation grounds under the control of the Council. The Kapunda Historic Mine Site is therefore exempt land for the purposes of section 9 of the Act.

E. The Company and the Manager have, by written notice under the Act (set out in a 'Form 23' which is Annexure B to this Agreement), requested that the Council enter into an agreement with the Company and the Manager to waive the benefit of the exemption over the relevant part of the Kapunda Historic Mine Site, for certain preliminary testing activities.

F. The Council has agreed to waive the exemption over the relevant part of the Kapunda Historic Mine Site for these preliminary testing activities, but only to the extent, and only upon the conditions, described in this Agreement.

G. This Agreement is an agreement for the purposes of section 9AA of the Act and is a contractual agreement enforceable under the general law.

H. The rights conferred by this Agreement do not create or confer upon the Company or Manager any tenancy, estate or interest in, over or under the Agreement Area or any other land owned by or in the care, control and management of the Council.

1. DEFINED TERMS AND INTERPRETATION

1.1 Defined terms

In this Agreement:

Act means the *Mining Act 1971* (SA).

Agreement Area means the following parts of parcel F7985AL30 (contained in CT5502/698):

- drill hole "K024" depicted as a red dot in Map 1 in Annexure A;
- any land immediately adjacent to drill hole "K024" which is reasonably necessary to be used in carrying out the Permitted Operations; and
- the access route to drill hole "K024" depicted as a red line in Map 2 in Annexure A.

Claim includes any action, proceeding, right, claim or demand whether present or future, certain or contingent, due or may become due, known or unknown and including all costs and expenses (including legal expenses).

Company means Terramin Exploration Pty Ltd.

Council means Light Regional Council.

Fee means the sum specified in clause 4.1.

Form 23 means the Form 23 *Waiver of Exemption – Request* issued by the Company and the Manager to the Council on 3 November 2020 and which is included as Annexure B to this Agreement.

GST has the same meaning as given to that term in the GST Legislation.

GST Legislation means the *A New Tax System (Goods and Services Tax) Act 1999* (Cth) and any ancillary or similar legislation.

GST Rate means 10% or such other percentage equal to the rate of GST imposed from time to time under the GST Legislation.

Insolvency Event means the occurrence of any of the following:

- a meeting of the directors or members of the Company or Manager is convened to pass a resolution that an administrator of the Company or Manager be appointed or that the Company or Manager be wound up voluntarily;
- any person appoints an administrator of the Company or Manager;
- an application is made to any court to wind up the Company or Manager;
- an application is made pursuant to Section 411 of the *Corporations Act 2001* (Cth) with respect to the Company or Manager;
- a Controller, Managing Controller, Receiver or Receiver and Manager is appointed to the Company or Manager or in respect of any property of the Company or Manager; or

- the Company or Manager is deregistered or dissolved.

Legislation includes any relevant Statute or Act of Parliament (whether State or Federal) and any regulation or by-law, including any by-laws issued by any Statutory Authority.

Loss includes any loss, damage, death or injury.

Manager means Environmental Copper Recovery SA Pty Ltd.

Permitted Operations means only the operations described in Section C of the Form 23 and all associated rehabilitation works.

Statutory Authority means any government or semi-government authorities (including the Council in its separate capacity as local government authority) or authorities created by or under Legislation.

Statutory Requirements means all relevant and applicable Legislation and all lawful conditions, requirements, notices and directives issued or applicable under any such Legislation or by any Statutory Authorities (including any requirement of Council in its separate capacity as a Statutory Authority).

Term has the meaning given by clause 3.

1.2 **Interpretation**

Unless the contrary intention appears:

1.2.1 a reference to a clause or Annexure is a reference to a clause or Annexure in this Agreement;

1.2.2 headings are for convenience only and do not affect interpretation;

1.2.3 the singular includes the plural and vice-versa;

1.2.4 a reference to an individual or person includes a corporation, partnership, joint venture, authority, trust or government;

1.2.5 a reference to a party includes that party's executors, administrators, substitutes, successors and assigns;

1.2.6 a reference to any Legislation includes any amendment, statutory modification, re-enactment or any Legislation substituted for it, and all by-laws, regulations and rules issued under it;

1.2.7 any right of the Council or obligation of the Company or Manager under this Agreement which is capable of surviving after the expiry or termination of this Agreement remains enforceable after the expiry or termination of this Agreement;

1.2.8 a reference in this Agreement to the consent or approval of Council is a reference to Council's prior written approval or consent which may be granted (conditionally or unconditionally) or withheld in Council's discretion; and

1.2.9 "including" and similar expressions are not and must not be treated as words of limitation.

1.3 **Background**

1.3.1 The Background is correct and forms part of this Agreement.

2. GRANT OF WAIVER

2.1 Subject to clauses 2.2 and 2.3, in consideration of payment of the Fee and the observance by the Company and the Manager of the covenants set out in this Agreement, the Council waives the exemption which applies to the Agreement Area under the Act, in relation to the Permitted Operations only, for the duration of the Term.

2.2 The waiver in clause 2.1 will not take effect until and unless:

2.2.1 the cooling-off period under section 9AA of the Act has expired; and

2.2.2 all of the conditions expressed in clause 4 of this Agreement are met.

2.3 Once having taken effect, the waiver in clause 2.1 will cease to have effect:

2.3.1 if any of the conditions expressed in clause 4 this Agreement are no longer met; or

2.3.2 upon the conclusion of the Term;

(whichever is earlier).

2.4 To avoid doubt, if the conditions in clause 4 of this Agreement are not met before the conclusion of the Term, then no waiver under section 9AA of the Act shall take effect pursuant to this Agreement.

2.5 This document constitutes:

2.5.1 an agreement under section 9AA of the Act; and

2.5.2 a contractual agreement.

3. TERM OF AGREEMENT

3.1 The Term of this Agreement commences upon the last party executing this Agreement.

3.2 The Term of this Agreement concludes upon:

3.2.1 the expiry of 6 months from the date of commencement of the Term this Agreement (or greater period agreed pursuant to clause 3.3); or

3.2.2 the receipt by the Council of a notice under clause 5.1 of this Agreement; or

3.2.3 termination of this Agreement in accordance with clause 11;

(whichever is earlier).

3.3 The Parties may at any time during the Term agree to increase the period in clause 3.2.1 up to a maximum of 12 months from the date of commencement of the Term this Agreement.

4. CONDITIONS TO BE MET BEFORE COMMENCEMENT OF PERMITTED OPERATIONS

The following conditions must be met prior to the Company or Manager undertaking any Preliminary Operations (see above clause 2.2.2):

4.1 Fee

4.1.1 The Manager must pay to the Council the sum of $10,000 within 28 days of the commencement of the Term of this Agreement or by such other date as may be specified in a tax invoice issued by the Council to the Manager.

4.1.2 The Manager acknowledges that this Fee is intended, in part, to cover the administrative and legal costs which have been borne the Council in connection with this Agreement and the facilitation of the Permitted Operations more generally.

4.2 Notification to Safework SA

4.2.1 The Company, or the Manager on behalf of the Company, must provide notice to Safework SA under regulation 616 of the *Work Health and Safety Regulations 2012* (SA) that the Company is the mine holder for the Agreement Area.

4.2.2 The Manager must supply to the Council evidence (to the satisfaction of the Council) that the Manager and/or Company is recorded by Safework SA as the mine holder and mine operator for the Agreement Area.

4.2.3 The Manager and/or the Company must remain recorded by Safework SA as the mine holder and mine operator for the Agreement Area.

4.3 Risk assessment

4.3.1 The Manager must ensure that a risk assessment is conducted by a competent person under regulation 617 of the *Work Health and Safety Regulations 2012* (SA) with respect to the Agreement Area and must supply that risk assessment to the Council.

4.4 Insurance

4.4.1 The Manager must obtain and keep current during the Term:

(a) public liability insurance for at least $20,000,000.00 for each claim; and

(b) registration under the *Return to Work Act 2014* (SA) (if required to be registered under that Act).

4.4.2 The Manager's public liability insurance policy must:

(a) be with an insurer and on terms reasonably approved by the Council;

(b) be in the name of the Manager and note the Council's interest; and

(c) cover events occurring during the policy's currency regardless of when claims are made.

4.4.3 The Manager must give the Council copies of certificates evidencing the currency of the public liability insurance policy the Manager has taken out

for the purposes of this clause 4.4 and its registration under the *Return to Work Act 2014* (SA) (if required to be registered under that Act).

4.4.4 The Manager must ensure that all contractors of the Manager who perform any part of the Permitted Operations are registered under the *Return to Work Act 2014* (SA) (if required to be registered under that Act) and must either:

(a) ensure that the public liability insurance policy taken out by the Manager for the purposes of this clause 4.4 also covers any liability which any contractor of the Manager may incur as a result of or in connection with the Permitted Operations; or

(b) ensure that all contractors of the Manager who perform any part of the Permitted Operations have equivalent public liability insurance policies to that required of the Manager under this clause 4.4.

4.4.5 The Company must be registered under the *Return to Work Act 2014* (SA) (if required to be registered under that Act) and must either:

(a) ensure that the public liability insurance policy taken out by the Manager under this clause 4.4 also covers any liability which the Company or any contractor of the Company may incur under this Agreement (including as a result of the indemnities in clause 9) or otherwise as a result of or in connection with the Permitted Operations; or

(b) take out equivalent policies of insurance to those required of the Manager under this clause 4.4 (and the obligations in clauses 4.4.3, 4.4.4(b) and 5.6 will also apply to the Company as if a reference to the Manager were a reference to the Company).

4.5 **Program for environment protection and rehabilitation**

4.5.1 The Manager must provide to the Council a copy of the approved program for environment protection and rehabilitation which entitles the Company and Manager to carry out the Permitted Operations under the Act.

4.6 **Registration of agreement**

4.6.1 The Company, or the Manager on behalf of the Company, must give notice of this Agreement to the Mining Registrar in accordance with section 9AA(14b) of the Act.

5. OTHER COVENANTS OF THE COMPANY AND MANAGER DURING TERM

5.1 **Notice of completion of Permitted Operations**

5.1.1 Within seven (7) days of completion of the Permitted Operations, the Manager must give notice to the Council of the fact of such completion.

5.2 **Compliance with Statutory Requirements**

5.2.1 The Company and Manager must at their own cost and expense comply with all Statutory Requirements relating to the Permitted Operations and the use of the Agreement Area.

5.3 **Authority to undertake Permitted Operations**

5.3.1 The Company and the Manager agree and warrant that:

(a) the Manager is authorised to conduct the Permitted Operations on behalf of the Manager and the Company;

(b) any other contractor which the Manager or Company engages to conduct the Permitted Operations on behalf of the Manger and/or Company is authorised to conduct the Permitted Operations on behalf of the Manager and/or the Company (as the case may be); and

(c) neither the Company nor the Manager will undertake or permit any alteration to the Agreement Area or use the Agreement Area for a purpose other than for the Permitted Operations in accordance with this Agreement.

5.3.2 Should any employee or contractor of the Company (other than the Manager) enter the Agreement Area and conduct any part of the Permitted Operations, any obligation under this Agreement which is expressed to apply only to the Manager will also apply as if a reference to the Manager were a reference to the Company.

5.4 **Safety**

5.4.1 If the Manager becomes aware that it is unsafe to proceed with the Permitted Operations at any time and for any reason, the Manager must:

(a) notify the Council; and

(b) not proceed with the Permitted Operations.

5.4.2 Unless otherwise agreed in writing with the chief executive officer of the Council, the Manager is to leave the Agreement Area clean and clear and all structures, objects or substances erected, installed, placed or deposited on the Agreement Area in connection with the conduct of the Permitted Operations (or otherwise in connection with the Manager's use of the Agreement Area) are to be removed by the Manager upon the conclusion of the Term.

5.5 **Damage and repair**

5.5.1 The Manager must when using the Agreement Area take all reasonable precautions to avoid damage (other than the Permitted Operations) to the Agreement Area.

5.5.2 If the Manager does cause any damage to the Agreement Area or any of Council's property as a result of the Manager's use or misuse of the Agreement Area, the Manager:

(a) must notify the Council of this as soon as practicable;

(b) must (after receiving written approval from the chief executive officer of the Council) carry out and complete repairs and maintenance to Council's reasonable satisfaction;

(c) is liable for all costs and expenses to rectify the damage and reinstate the Agreement Area and any property to the reasonable satisfaction of the Council.

5.5.3 The Company and the Manager acknowledge that nothing in this Agreement limits the obligations of the Company or Manager with respect to the rehabilitation of the Agreement Area required under any Legislation and/or by any Statutory Authority.

5.6 **Evidence of insurance**

5.6.1 The Manager must, during the Term:

(a) not allow any insurance policy to lapse or vary or cancel any policy without the consent of Council; and

(b) notify the Council immediately if a policy is cancelled or if an event occurs which could prejudice or give rise to a claim under a policy.

6. COUNCIL'S RIGHTS

6.1 **Right to enter**

6.1.1 Nothing in this Agreement restricts or derogates from the Council's ability to enter and occupy any part of the Agreement Area.

6.1.2 However, to avoid doubt, nothing in this Agreement permits the Council, without lawful excuse, to obstruct or hinder any person exercising functions or rights conferred under the Act, if such hindrance or obstruction would be contrary to the Act.

6.2 **Emergencies**

6.2.1 Subject to any Statutory Requirements, in an emergency the Council may:

(a) close the Agreement Area; and

(b) prevent or restrict access to the Agreement Area (including by the Company or Manager).

6.3 **Right to rectify**

6.3.1 Council may at the Company and Manager's cost do anything which the Company or Manager should have done under this Agreement but which the Company or Manager has not done or which the Council reasonably considers the Company or Manager has not done properly.

7. ASSIGNING AND CHARGING

7.1 **Assignment**

7.1.1 The Company or Manager must not assign, transfer or otherwise deal with the Company or Manager's interest in this Agreement without the consent of Council.

7.2 **Request for Assignment**

7.2.1 If the Company or Manager requests that the Council consent to any assignment, transfer or other dealing the Company and Manager must comply with Council's procedural requirements for dealing with the request.

7.3 **No Release**

7.3.1 Where the Council grants consent to an assignment, transfer or other dealing the Company and Manager will not be released or discharged from the current or future obligations under this Agreement.

7.4 **Charging**

7.4.1 The Company must not charge the Company's interest in this Agreement and the Manager must not charge the Manager's interest in this Agreement, without the consent of Council.

7.5 **Costs**

7.5.1 The Company and the Manager must pay all costs reasonably incurred by the Council including any legal fees in relation to any dealing under this clause, including in considering whether or not to grant any consent to a request by the Company or the Manager under this clause 7.

8. **BREACH**

8.1 **Payment obligations**

8.1.1 Unless otherwise provided in this Agreement, payments due to the Council under this Agreement must be made by the relevant party:

(a) without demand;

(b) without set-off, counter-claim, withholding or deduction; and

(c) to the Council or as the Council directs.

8.2 **Council's rights on breach**

8.2.1 If the Company or Manager is at any time in breach of any of its obligations under this Agreement, and the Company or Manager fails to remedy that breach to the reasonable satisfaction of the Council after being requested by the Council to do so, the Council may at the Company and Manager's cost and expense (which may be recovered as a debt due and payable on demand) at any time come onto the Agreement Area without notice and do all things necessary to remedy that breach.

8.3 **Rights of Council not limited**

8.3.1 The rights of the Council resulting from a breach of this Agreement by the Company or Manager will not be excluded or limited in any way by reason of the Council having or exercising any powers under this Agreement including any powers under this clause 8 or clause 11.

9. INDEMNITY AND RELEASE

9.1 Risk

9.1.1 The Company and the Manager use the Agreement Area at their own risk.

9.2 Indemnity

9.2.1 The Company and the Manager are liable for and indemnify the Council against all Claims for any Loss which any person may incur or suffer directly or indirectly as a result of the Company or Manager's use of the Agreement Area or conduct of the Permitted Operations, including in connection with:

(a) any act or omission of the Company or Manager or any contractor of the Company or Manager (whether or not permitted under this Agreement);

(b) loss or damage to property or injury or death to any person caused or contributed to by the Company or Manager or any contractor of the Company or Manager;

(c) a breach of this Agreement by the Company or Manager.

9.3 Release

9.3.1 The Company and the Manager release the Council from all Claims for any Loss arising in any manner:

(a) in connection with the Permitted Operations; or

(b) as a result of the use of or any act or omission on the Agreement Area; or

(c) as a result of the exercise by the Council of any power or right conferred upon the Council under this Agreement or under Legislation or the common law.

9.4 Indemnities are independent

9.4.1 Each indemnity is independent from the Company and Manager's other obligations and continues during the Term and after the Term.

10. GOODS AND SERVICES TAX

10.1 Agreed consideration

10.1.1 If the Council is liable to pay GST in connection with this Agreement then:

(a) any consideration for that supply is exclusive of GST;

(b) the Council may increase the consideration or the relevant part of the consideration by a percentage amount which is equal to the GST Rate; and

(c) the increased consideration must be paid by the relevant party on the due date for payment of the consideration.

10.2 **Tax invoice**

10.2.1 Where the consideration is to be increased to account for GST under this clause 10, the Council will on or before the date on which the consideration is payable, issue a tax invoice to the relevant party .

11. TERMINATION

11.1 This Agreement may be terminated by the Council or the Company or the Manager in accordance with this clause 11.

11.2 The Council may terminate this Agreement immediately (and regardless of whether any request has been made by the Council for remedy of any breach or default) if:

11.2.1 the Company or Manager commits, permits or suffers to occur any material breach, or default in the observance and performance of any of the covenants, obligations and provisions of this Agreement; or

11.2.2 there is an Insolvency Event.

11.3 In any circumstances not described in clause 11.2, the Council may terminate this Agreement on five (5) days' written notice to both the Company and the Manager.

11.4 The Company may terminate this Agreement on provision of five (5) days' written notice to the Council and the Manager.

11.5 The Manager may terminate this Agreement on provision of five (5) days' written notice to the Council and the Company.

12. GENERAL

12.1 **No interest in land**

12.1.1 The rights conferred by this Agreement do not create or confer upon the Company or Manager any tenancy, estate or interest in, over or under the Agreement Area or any other land owned by or in the care, control and management of the Council.

12.2 **No warranty**

12.2.1 The Company and Manager acknowledge and agree that the Council makes no warranty regarding the suitability of the Agreement Area for the Permitted Operations.

12.3 **Costs for breach or threatened breach**

12.3.1 The Company and Manager are liable for and must pay or reimburse to the Council all legal and other costs and expenses incurred by the Council in consequence of any breach by the Company or Manager hereunder or in exercising or enforcing (or attempting to do so) any rights or remedies of the Council hereunder or at law or otherwise arising in consequence of any breach by the Company or Manager.

12.4 **Waiver**

12.4.1 If the Council accepts or waives any breach by the Company or Manager, that acceptance or waiver cannot be taken as an acceptance or waiver of any future breach of the same obligation or of any other obligation under this Agreement.

12.5 **Notice**

12.5.1 A notice, demand, consent, approval or communication under this Agreement (**Notice**) must be:

(a) in writing, in English and signed by a person authorised by the sender; and

(b) hand delivered or sent by pre-paid post, electronic mail or facsimile to the recipient's address, email address or facsimile number last notified by the recipient to the sender.

12.5.2 A Notice is deemed to be received:

(a) if hand delivered, on delivery;

(b) if sent by prepaid mail, four Business Days after posting (or ten Business Days after posting if posting to or from a place outside Australia);

(c) if sent by electronic mail, at the time and on the day shown in the sender's electronic mail delivery report, if it shows that the Notice was sent to the recipient's electronic mail address last notified by the recipient to the sender;

(d) if sent by facsimile, at the time and on the day shown in the sender's transmission report, if it shows that the entire Notice was sent to the recipient's facsimile number last notified by the recipient to the sender;

12.5.3 Any notice may be signed on a party's behalf by its attorney, director, secretary, officer, solicitor, or authorised delegate.

12.6 **Severance**

12.6.1 If any part of this Agreement is found to be invalid, void or unenforceable, then that part will be read down to the extent necessary to make it valid or otherwise will be severed and the remainder of this Agreement will continue to apply.

12.7 **Entire agreement**

12.7.1 The Council, the Company and the Manager acknowledge and agree that this Agreement contains and represents the entire agreement reached between them with regard to the Agreement Area and that no promises,

representations or undertakings, other than those contained in this Agreement, were made or given or relied upon.

EXECUTED as an Agreement

Signed for **Light Regional Council** by its authorised delegate in the presence of:

Signature of witness

TERRY SAVAGE
Name of witness (print)

Signature of authorised delegate

BRIAN CARR
Name of authorised delegate (print)

CHIEF EXECUTIVE OFFICER
Position of authorised delegate

Executed by **Terramin Exploration Pty Ltd** (ACN 122 765 708) pursuant to section 127 of the *Corporations Act 2001*

Signature of Director

Kevin McGuinness
Name of Director (print)

Signature of [redacted]/Company Secretary (*Please delete as applicable*)

André van Driel
Name of [redacted]/Company Secretary (print)

or

Signature of Sole Director and Sole Company Secretary

Name of Sole Director and Sole Company Secretary (print)

Executed by **Environmental Copper Recovery SA Pty Ltd** (ACN 620 419 810) pursuant to section 127 of the *Corporations Act 2001*

Signature of Director

Leon Faulkner
Name of Director (print)

Signature of Director/Company Secretary (*Please delete as applicable*)

Philippa Faulkner
Name of Director/Company Secretary (print)

or

Signature of Sole Director and Sole Company Secretary

Name of Sole Director and Sole Company Secretary (print)

Annexure A — Agreement Area

Map 1:

Map 2:

Annexure B — Form 23

FORM 23 Mining Act 1971 ("the Act") - Part 1

WAIVER OF EXEMPTION - REQUEST

Government of South Australia

USE THIS FORM TO: Request that a person who has the benefit of an exemption under section 9 of the Act, that is 'exempt land', enter into an agreement with a mining operator to allow exploration and/or mining operations on the land (see Appendix A for details).

Section A: Applicant(s)

	NAME OF COMPANY or INDIVIDUAL	% SHARE	
Applicant 1	Environmental Copper Recovery Pty Ltd	50	%
Applicant 2	Terramin Exploration Pty Ltd	50	%

ⓘ List all applicants and percentage share in the application.

Note: Each party must complete a separate copy of the 'applicant details' page attached to this form.

Section B: For the attention of the person who has the benefit of an exemption[1] under section 9 of the Act.

Owner of land	Light Regional Council		
	Po Box 72		
Address line 1			
Address line 2			
Suburb/Locality	KAPUNDA	SA (State)	5373 (Postcode)
Type of owner	Freehold		

ⓘ Please refer to note below for information on who may be considered to be the holder of the benefit of exempt land.

[1] Under the *Mining Act 1971*, the following persons shall be regarded as having the benefit of an exemption under section 9:
a) The owner of the exempt land; and
b) In the case of land that is exempt from mining operations under section 9(1)(d) by reason of its proximity to other land on which a building, structure, spring, well, reservoir or dam is situated – the owner of that other land.

Section C: Location, timing and duration of proposed activities on the land

Section, Hundred	160400
Pastoral block	
Land Title reference	CT5843/524
Describe why the land is classified as 'exempt land' under section 9 of the Act.	land that constitutes any parklands or recreation grounds under the control of a council
Describe the place(s) where activities are to be carried out on the land; the nature of the operations; and the proposed timing and duration of the activities.	ECR will conduct further limited work on the southern portion of the council mine site. Drill 3 x 20-30m bores and conduct tracer (bromine) test (1.5 weeks); Push/pull - test this involves feeding a volume of lixiviant into the ground, leaving it sit for ~ week, then extracting it to see what the concentration is – this will then be compared with lab leach work.

ⓘ Identify the land with as much detail as possible.

ⓘ Address at least one requirement. Additional information (including a plan) may be attached.

Circulation test – feed lixiviant into one well while extracting from the other in a closed loop to test flow rate and copper dissolution. ECR may conduct limited photography/mapping/sampling in Main and Stockyard pits.	

Section D: I, the mining operator, request that you, the person who has the benefit of an exemption identified in Section C, enter into an agreement to waive the benefit of the exemption for the operations listed in Section C.

Type	☐ Individual	☑ Company			ⓘ Provide a postal address that can be used to contact you regarding this notice. ⓘ If 'Company', provide ABN/ACN.
Name	Light Regional Council				
Address line 1	Po Box 72				
Address line 2					
Suburb/Locality	KAPUNDA		SA	5373	
ABN	35 455 841 625	ACN			

Contact Name	Brian Carr		ⓘ A contact person **must** be nominated.
Email	bcarr@light.sa.gov.au		
Telephone	08 8525 3200	Mobile	

Section E: Declaration that application is complete and accurate

I declare the information provided in this request is complete and accurate and meets the requirements of section 9AA of the Act and regulation 6 of the Mining Regulations 2011, and that *Appendix A: Further information for the owner of land* is attached.

APPLICANT 1	Individual or Company Representative 1		Individual's Witness or Company Representative 2		ⓘ Ensure that applicants sign in the correct order, as listed on page 1.
Print Name	1.	Martin Janes	2.	LILY BOSMAN	
Signature	1.		2.		

APPLICANT 2	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.	Leon Faulkner	2.	Philippa Faulkner
Signature	1.		2.	

COMPANY: Sign in accordance with the *Corporations Act 2001*. If agent, written authority must be provided.

INDIVIDUAL: Signature must be witnessed by a person who is not a beneficiary of the application (e.g. not a joint applicant).

APPENDIX A: FURTHER INFORMATION FOR THE PERSON WHO HAS THE BENEFIT OF AN EXEMPTION

ⓘ The following information is provided as a guide only. You may wish to seek your own advice on this notice.

Glossary of terms used in this document

The Act – the current version of the *Mining Act 1971*

Mining operator – the party who served the notice to you. They may already hold, or be applying for, a mining tenement under the Act (including exploration licence or mineral claim)

Mining operations – any operations carried out in the course of prospecting, exploring or mining for minerals

Owner of land – a person who:

a) Holds a registered estate or interest in the land conferring a right to immediate possession of the land; or
b) Holds native title in the land; or
c) Has, by statute, the care, control or management of the land; or
Is lawfully in occupation of the land.

Holder of benefit of exemption –

a) the owner of the exempt land
b) in the case of land that is exempt from mining operations under subsection (1)(d) by reason of its proximity to other land on which a building, structure, spring, well, reservoir or dam is situated – the owner of that other land.

Purpose of this form

You have received Form 23A (Waiver of Exemption – Request) because the mining operator is requesting that you enter into an agreement to allow mining operations on your land, and your land is considered to be 'exempt land'.

Exempt land

Under section 9 of the Act the following land is exempt from mining operations-

(a) land that is lawfully and genuinely used –
  (i) as a yard, garden, cultivated field, plantation, orchard or vineyard;
  (ii) as an airfield, railway or tramway;
  (iii) as the grounds of a church, chapel, school, hospital or institution; or
(b) land that constitutes any parklands or recreation grounds under the control of a council; or
(ba) land –
  (i) that is dedicated or reserved, pursuant to statute, for the purpose of waterworks; or
  (ii) that is vested in the Minister of Public Works for the purpose of waterworks; or
  (iii) that is comprised within an easement in favour of the Minister of Public Works;
  or
(bb) land that constitutes a forest reserve under the Forestry Act 1950; or
(c) any separate parcel of land of less than 2 000 square metres within any city, town or township; or
(d) land that is situated –
  (i) within 400 metres of a building or structure used as a place of residence (except a building or structure of a class excluded by regulation from the ambit of this paragraph); or
  (ii) within 150 metres of –
    (A) a building or structure, with a value of $200 or more, used for an industrial or commercial purpose; or
    (B) a spring, well, reservoir or dam

The land is not exempt land if a mining tenement (claim, lease or licence) is pegged or granted before the land falls into one of the above categories. For example, land will not be classed as exempt land if a dwelling or structure is built after a mining tenement is pegged or granted.

Waiver of exemption agreement

The benefit of an exemption under the Act may be waived by a written agreement between the mining operator and the person who has the benefit of the exemption or by an ERD Court order if an agreement cannot be reached.

Mining operations cannot commence until after the exemption has been waived (through an agreement or court order), however the mining operator may enter the exempt land and/or peg a claim before the exemption has been waived.

Section 9AA of the Act outlines a two-step process whereby the operator first serves a *Form 23: Waiver of Exemption – Request* (Form 23) on the person who has the benefit of the exemption, and also enters into an agreement with that person to waive the exemption.

If the person who has the benefit of the exemption consents to enter into an agreement, the Waiver of Exemption agreement document must comply with section 9AA of the Act and regulation 6(1) of the *Mining Regulations 2011*.

Form 23 and an agreement to waive the benefit of an exemption, once negotiated, will meet these requirements and may be lodged together for registration with the Mining Registrar.

In accordance with section 9AA of the Act, a person who has the benefit of the exemption may rescind the Waiver of Exemption agreement, by giving the mining operator written notice before the expiration of the cooling off period (five clear business days after the day on which the agreement is made).

If an agreement cannot be reached between the mining operator and the person who has the benefit of the exemption, the mining operator may apply to the Environment, Resource and Development (ERD) Court for an order waiving the benefit of the exemption.

If the mining operator satisfies the ERD Court that adverse effects from mining operations can be addressed by imposing conditions, the Court may make an order waiving the benefit of the exemption (including conditions and compensation). If the Court is not satisfied it may refuse the application.

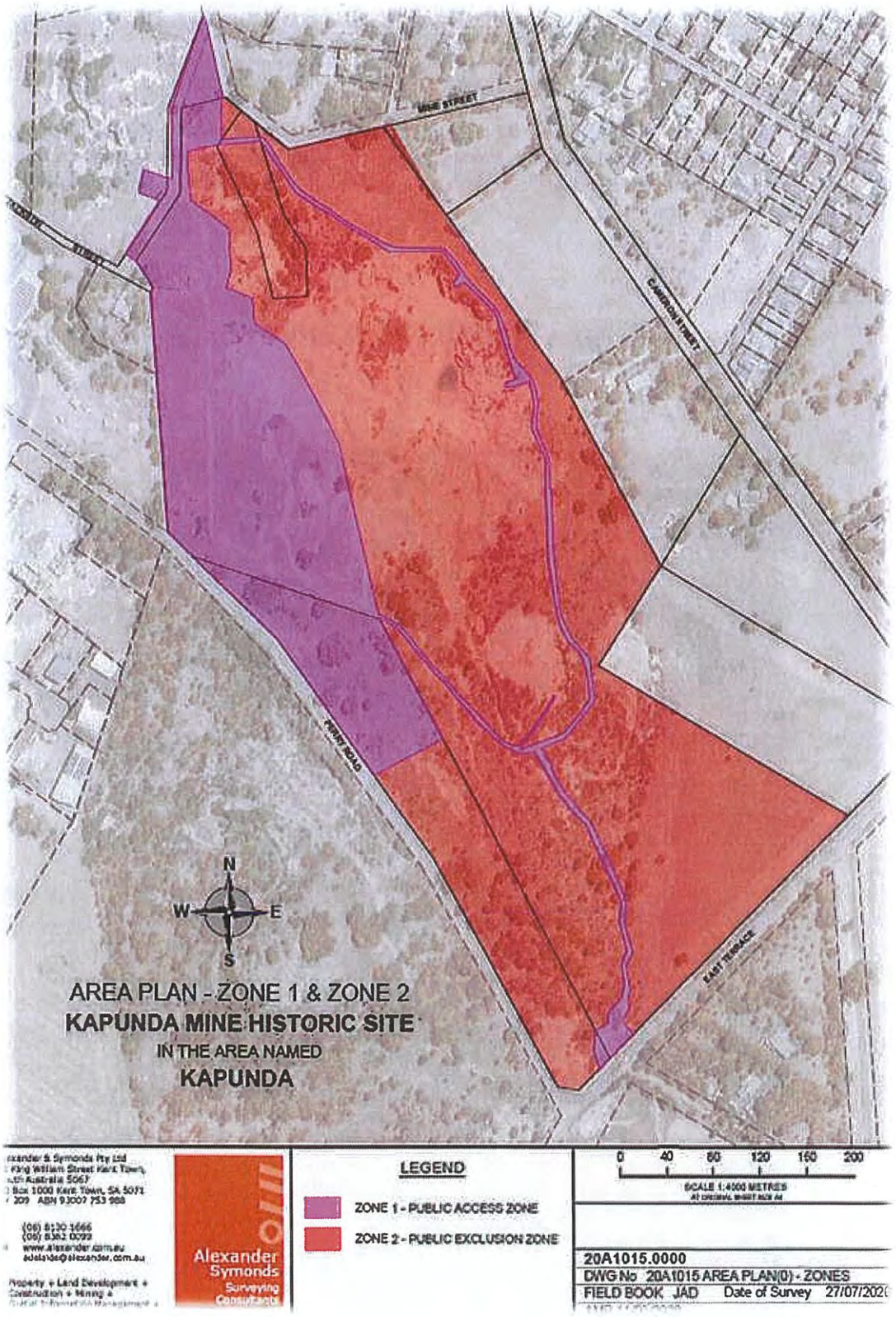
The Court may not make an order for costs against the person who has the benefit of the exemption unless the person has obstructed or delayed the proceedings or the person has failed to attend any proceedings or failed to comply with a rule, order or direction of the Court.

If the benefit of an exemption is waived by agreement or Court order, the land ceases to be exempt land until mining operations have been completed, or such time as stipulated in the agreement or Court order, whichever comes first.

An agreement or order to waive the benefit of exemption under the Act is binding on and carries forward to –

(a) successors in title to those owners of the land who had the benefit of the former exemption; and
(b) the holders from time to time of any mining tenement under which mining operations are carried out.

The mining operator who gives notice under this section is liable to pay to the person who has the benefit of the exemption reasonable costs of obtaining legal assistance up to $500, or some other amount as prescribed. The person who has the benefit of the exemption must provide a copy of an account or other reasonable evidence relating to the cost of obtaining that assistance.


MINE STREET
CAMBRIDGE STREET
FIRST ROAD
EAST TERRACE
N
W
E
S
AREA PLAN - ZONE 1 & ZONE 2
KAPUNDA MINE HISTORIC SITE
IN THE AREA NAMED
KAPUNDA
Alexander Symonds
Surveying Consultants
LEGEND
ZONE 1 - PUBLIC ACCESS ZONE
ZONE 2 - PUBLIC EXCLUSION ZONE
0 40 80 120 160 200
SCALE 1:4000 METRES
20A1015.0000
DWG No 20A1015 AREA PLAN(0) - ZONES
FIELD BOOK JAD Date of Survey 27/07/202

Form 23

THIRD ADDENDUM

to the

AGREEMENT FOR WAIVER OF EXEMPTION SECTION 9AA – MINING ACT 1971 (SA)

between:

LIGHT REGIONAL COUNCIL of 93 Main Street Kapunda SA 5373 (**the Council**);

and

TERRAMIN EXPLORATION PTY LTD (ACN 122 765 708) of 2115 Callington Road Strathalbyn SA 5255 (**the Company**);

and

ENVIRONMENTAL COPPER RECOVERY SA PTY LTD (ACN 620 419 810) of Suite 4 Level 1 155 King William Road Unley SA 5061 (**the Manager**).

BACKGROUND TO THIRD ADDENDUM

A. In February 2021, the Council, the Company and the Manager executed an 'Agreement for Waiver of Exemption' (**Agreement**) for the purposes of section 9AA of the *Mining Act 1971* (SA) (**the Act**).

B. The original Term of the Agreement expired on 11 February 2022.

C. In March 2022, the Council, the Company and the Manager executed an Addendum to the Agreement (**First Addendum**).

D. The First Addendum extended the Term of the Agreement by 12 months. The Term of the Agreement as extended by the First Addendum expired on 11 February 2023.

E. In March 2024, the Council, Company and the Manager executed a further Addendum to the Agreement (**Second Addendum**).

F. The Second Addendum extended the Term of the Agreement by 24 months. The Term of the Agreement as extended by the Second Addendum expires on 11 February 2025.

G. The Company and the Manager:

(a) were unable to conduct the Permitted Operations under the Agreement during the Term of the Agreement (as extended by the First Addendum and the Second Addendum); and

(b) now propose revisions to the operations which they wish to carry out in the Agreement Area and the area of those operations.

H. The Council is satisfied that the proposed minor revisions to the operations which the Company and the Manager wish to carry out and the area of those operations do not constitute a significant departure from the original Permitted Operations.

I. The Council has determined, at its sole discretion, that it is appropriate:

(a) to permit the Company and the Manager to carry out their operations in the revised manner and area now proposed; and

(b) to extend the Term of the Agreement so as to provide more time for the Company and the Manager to conduct their proposed operations.

J. This Third Addendum records the agreement of the parties:

(a) to extend the Term of the Agreement by an additional 24 months; and

(b) to make necessary amendments to the Agreement to reflect the proposed minor revisions to the operations which the Company and the Manager wish to carry out and the area of those operations.

K. This Third Addendum uses words and expressions which are defined in the Agreement.

OPERATIVE PROVISIONS

1. The Background is correct and forms part of this Third Addendum.

2. The Agreement is varied such that:

2.1 the definition of 'Agreement Area' is deleted and replaced with:

Agreement Area means the following parts of Allotment 40 in Deposited Plan 56267 (contained in CT5843/524) and Allotment 30 in Filed Plan 7985 (contained in CT5502/698):

- The location of the one (1) extractor well depicted in orange on the Map in Annexure A;
- The location of the four (4) injector wells depicted in blue on the Map in Annexure A;
- The location of the four (4) monitoring wells depicted in green on the Map in Annexure A;
- The location of any additional extractor wells, injector wells or monitoring wells which may be required by any Government regulatory authority in order for the Permitted Operations to proceed and which the Council, in its absolute discretion, determines to allow by written notice;
- Any land immediately adjacent to any of the wells described above which is reasonably necessary to be used in carrying out the Permitted Operations; and
- Such access routes to and between the wells described above which are most direct and practicable having regard to minimising impact upon the land, other persons and operations on and within the vicinity of the land, and adjacent traffic.

2.2 Annexure A is deleted and replaced with the Map which is Annexure A to this Third Addendum.

2.3 The definition of 'Form 23A' in clause 1.1 of the Agreement (as inserted by the Second Addendum) is deleted and replaced with the following new definition:

> **Form 23A** means the Form 23A *Waiver of Exemption – Tenement Holder Request* issued by the Company to the Council on 20th February 2025 and which is included as Annexure B to this Agreement.

2.4 The text of clause 3.2.1 of the Agreement (as substituted by the Second Addendum) is deleted and replaced with "*11 February 2027; or*"; and

2.5 Annexure B of the Agreement (as substituted by the Second Addendum) is deleted and replaced with the content which is Annexure B to this Third Addendum.

3. All other provisions of the Agreement remain unaltered (noting, for completeness, that clause 3.3 of the Agreement was deleted by the First Addendum and remains deleted, and that the definition of 'Permitted Operations' remains that which was inserted by the Second Addendum).

4. The parties acknowledge that this Third Addendum constitutes a fresh agreement by the Council to waive the benefit of an exemption under the Act and accordingly:

4.1 a new cooling-off period under section 9AA of the Act commences upon execution of this Third Addendum; and

4.2 the Company, or the Manager on behalf of the Company, must give notice of this Third Addendum to the Mining Registrar in accordance with section 9AA(14b) of the Act.

5. The parties acknowledge and agree that nothing in the Agreement, or the First Addendum, or the Second Addendum, or this Third Addendum, or in the conduct of the parties, gives rise to any expectation that the Council:

   5.1 will agree to any further variations to the Agreement; or

   5.2 will grant any further waiver of any exemption under the Act, whether in relation to the operations and area which are the subject of the Agreement or any other operations or areas.

6. The Manager must pay to the Council the sum of $2,800 plus GST within 28 days of the execution of this Third Addendum (or by such other date as may be specified in a tax invoice issued by the Council to the Manager) in order to cover the Council's legal and administrative costs of considering the request for variation of the Permitted Operations and extension to the Term of the Agreement, and preparing and executing this Third Addendum.

EXECUTED as an agreement

Signed for **Light Regional Council** by its authorised delegate in the presence of:

Signature of witness

CRAIG DOYLE
Name of witness (print)

Signature of authorised delegate

RICHARD DODSON
Name of authorised delegate (print)

CEO
Position of authorised delegate

12-03-2025
Date

Executed by **Terramin Exploration Pty Ltd** (ACN 122 765 708) pursuant to section 127 of the ~~*Corporations Act 2001*~~

Signature of Director

Feng (Bruce) Sheng
Name of Director (print)

24 February 2025
Date

Signature of [redacted]/Company Secretary (*Please delete as applicable)*

André van Driel
Name of [redacted] Company Secretary (print)

24 February 2025
Date

Executed by **Environmental Copper Recovery SA Pty Ltd** (ACN 620 419 810) pursuant to section 127 of the *Corporations Act 2001*

Signature of Director

Leon Faulkner
Name of Director (print)

21/02/2025
Date

Philippa Faulkner

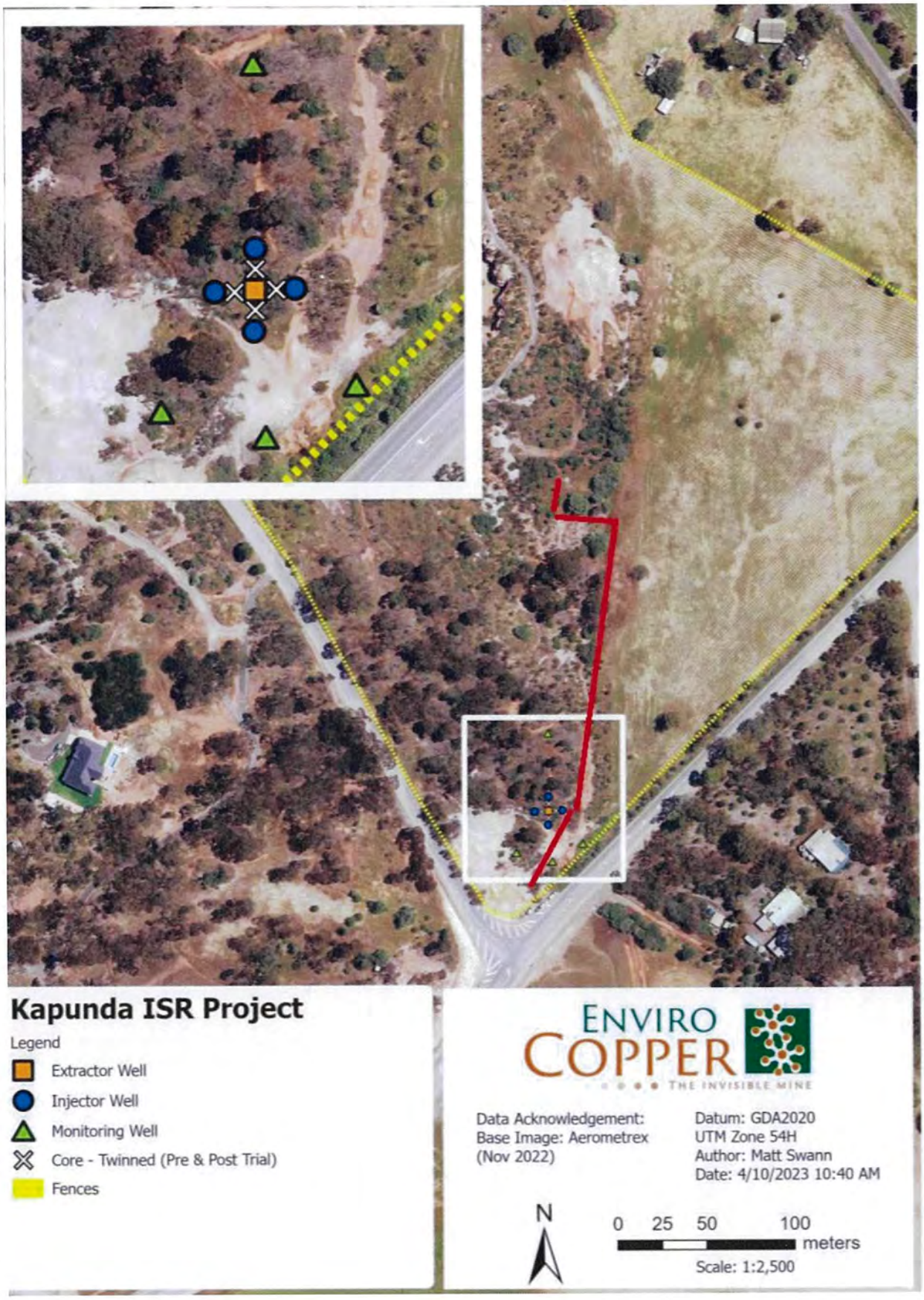
Signature of Director/Company Secretary (*Please delete as applicable)*

Philippa Faulkner
Name of Director/Company Secretary (print)

21/02/2025
Date

Annexure A to Third Addendum: new Annexure A to be substituted into Agreement

Annexure A — Map of Agreement Area



Annexure to Third Addendum: new Annexure B to be substituted into Agreement

Annexure B — Form 23A

FORM 23A Mining Act 1971 (the 'Act') - Part 1

WAIVER OF EXEMPTION – TENEMENT HOLDER REQUEST

Government of South Australia

USE THIS FORM TO: Request that an owner of land who has the benefit of an exemption under section 9 of the Act, that is 'exempt land', enter into an agreement with a tenement holder to allow exploration and/or mining operations on the land (see Appendix A for details).

Section A: Tenement holder(s)

	NAME OF COMPANY or INDIVIDUAL	% SHARE		
Tenement holder 1	Terramin Exploration Pty Ltd	100	%	ⓘ List all tenement holder(s) and percentage share in the application.
Tenement holder 2	Environmental Copper Recovery Pty Ltd in JV with Terramin	0	%	

Section B: Tenement numbers

TENEMENT TYPE	TENEMENT NUMBER	
Exploration License	6198	ⓘ Provide the tenement numbers of the tenements related to the notice

Section C: For the attention of the owner of land who has the benefit of an exemption[1] under section 9 of the Act.

Owner of land	Light Regional Council		ⓘ Please refer to note below for information on who may be considered to be a landowner with a benefit of exempt land.
Email	rdodson@light.sa.gov.au		
Address	PO Box 72		
Suburb/Locality	Kapunda	SA State	5373 Postcode
Type of owner	Freehold		

[1] Under the *Mining Act 1971*, the following persons shall be regarded as having the benefit of an exemption under section 9:
a) The owner of the exempt land; and
b) In the case of land that is exempt from mining operations under section 9(1)(d) by reason of its proximity to other land on which a building, structure, spring, well, reservoir or dam is situated – the owner of that other land.

Section D: Location of proposed operations on the land

Section, Hundred	160400				ⓘ Address all requirements. ⓘ Identify the land with as much detail as possible (a map may be attached). ⓘ Attach a list if required to reference the land.
Pastoral block					
Land Title reference	Allotment 40 in Deposited Plan 56267 CT5843/524 and Allotment 30 in Filed Plan 7985 CT5502/698				
	Plan type	Plan number	Parcel type	Parcel number	

Describe the place(s) where activities are to be carried out on the land; the nature of the operations; and the proposed timing and duration of the activities. **OR** Provide a copy or link to the program for environment protection and rehabilitation (PEPR).	Environmental Copper Recovery SA Pty Ltd conducts exploration activities in accordance with a Mining Farm-in and Joint Venture Agreement dated 2nd April 2019 with Tenement Holder Terramin Exploration Pty Ltd (Agreement) ECR is manager of exploration activities under this Agreement. ECR are planning to conduct test work on the southern portion of council mine site, corner of Perry Rd and Thiele Hwy. This work will involve a Tracer Test, Push Pull Test and a Circulation Test via a series of 5 bores. Tracer test for baseline will be conducted over approximately 2 weeks. Push/Pull test will inject a diluted volume of solution for approximately 1 week to check copper concentrations Circulation test will feed solution into 4 injection wells while extracting from another well in a closed loop system to test for flow rate and copper dissolution over a period of approximately 90 days. In accordance with EPA requirements, ECR is installing 4 monitor bores for environmental monitoring and management during this test work phase.

Section E: I, the tenement holder, request that you, the landowner who has the benefit of an exemption identified in Section C, enter into an agreement to waive the benefit of the exemption for the operations listed in Section C.

Type	☐ Individual	☑ Company		ⓘ Provide a postal address that can be used to contact you regarding this notice. ⓘ If 'Company', provide ABN/ACN.
Name	Light Regional Council			
Address line 1	PO Box 72			
Address line 2				
Suburb/Locality	Kapunda	SA	5373	
ABN	35 459 841 625	ACN		

Contact Name	Richard Dodson		ⓘ A contact person must be nominated.
Email	rdodson@light.sa.gov.au		
Telephone	08 8525 3200	Mobile	

Section F: Declaration that application is complete and accurate

I declare the information provided in this request is complete and accurate and meets the requirements of section 9AA of the Act and regulation 6 of the Mining Regulations 2020, and the relevant determination.

APPLICANT 1	Individual or Company Representative 1		Individual's Witness or Company Representative 2		ⓘ Ensure that applicants sign in the correct order, as listed on page 1.
Print Name	1.	Martin Janes	2.	Tom Mehrtens.	
Signature	1.		2.		

APPLICANT 2	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.	Leon Faulkner	2.	Philippa Faulkner
Signature	1.		2.	Philippa Faulkner

COMPANY: Sign in accordance with the *Corporations Act 2001*. If agent, written authority must be provided.

INDIVIDUAL: Signature must be witnessed by a person who is not a beneficiary of the application (e.g. not a joint applicant).

FORM 23A Mining Act 1971 (the 'Act') - Part 1

Government of South Australia

WAIVER OF EXEMPTION - REQUEST

APPENDIX A: FURTHER INFORMATION FOR THE PERSON WHO HAS THE BENEFIT OF AN EXEMPTION

ⓘ The following information is provided as a guide only. You may wish to seek your own advice on this notice.

MINING ACT 1971

Notice under Section 9AA(2) of the *Mining Act 1971*

NOTICE is hereby given pursuant to the provision of section 9AA(2) of the *Mining Act 1971*, to specify the manner and form of a notice to seek a waiver of exempt land by agreement under section 9AA(1) of the *Mining Act 1971*.

In accordance with section 9AA(2) of the *Mining Act 1971* this notice will have effect from 1 January 2021.

TAKE notice that I, Daniel van Holst Pellekaan, Minister for Energy and Mining, pursuant to section 9AA(2) of the *Mining Act 1971* do hereby:

DETERMINE that a notice to seek a waiver of exempt land by agreement under section 9AA(1) of the *Mining Act 1971* must be in the following manner and form:

1. state the full name(s) and address(es), as well as the phone numbers and email addresses (if known) of the relevant owner of land;
2. state the full name(s) and business address(es) of the tenement holder(s);
3. provide a description of the land, including the title reference (CT or CL) and parcel references, relating to the notice;
4. provide a copy of or a link to access the program for environment protection and rehabilitation (PEPR) (if approved) or provide a reasonable description of the type of operations proposed to be carried out on the land;
5. provide the tenement numbers of the tenements related to the notice being served (tenement information can be found at map.sarig.sa.gov.au);
6. be accompanied by an Information Sheet relating to:
   a. exempt land and the owner of land's rights approved by the Minister and published on the website of the Department for Energy and Mining; and
   b. the owner of land's rights to apply to the Small Business Commissioner approved by the Minister and published on the website of the Department for Energy and Mining.

Links to required information sheets

- Information Sheet M69 Your rights to agreement making and compensation
- Information Sheet M70 Exempt land: your rights
- Information Sheet M71 Exempt land: court imposed conditions and compensation
- Information Sheet M72 Exempt land: supporting landowners with legal fees
- Information Sheet M73 Your rights to the apply to the Small Business Commissioner

FORM 21B Mining Act 1971 ("the Act") - Part 9

NOTICE OF ENTRY ON LAND

Government of South Australia

USE THIS FORM TO: To notify the owner of land of an intention to enter land to carry out advanced exploration operations.

Section A: For the attention of the Owner of Land[1]

Owner of land full names(s)	LIGHT REGIONAL COUNCIL		ⓘ 'Owner of land' has several definitions – see notes below.
Address	PO BOX 73		
Suburb/Locality	KAPUNDA	SA (State)	5373 (Postcode)
Email	bcarr@light.sa.gov.au		
Telephone	8253200		
Type of owner	FREEHOLD		

[1] Under the *Mining Act 1971,* **owner of land** includes (but is not limited to):
- a freehold landowner; or
- a native title holder; or
- a person who controls or manages the land; or
- a person who is lawfully in occupation of the land.

Refer to Part 1, section 6 of the Act for the full definition of **owner of land.**

A Notice of Entry must also be served on –
- native title claimants registered under law; and
- SA Native Title Services (in the case of native title land as per section 58A(2) of the Act); and
- the holder of a current licence under the *Petroleum and Geothermal Energy Act 2000.*

Section B: I give notice of an intention to enter the land described in Section F below, 42 days from the date of service of this notice.

	☐ Individual	☑ Company		ⓘ If 'Company', provide ABN/ACN. Full name and business address of tenement holder(s) intending to undertake advanced exploration operations.
Full name	ENVIRONMENTAL COPPER RECOVERY PTY LTD			
Business address	PO BOX 5			
Suburb/Locality	MARLESTON DC	SA (State)	5033 (Postcode)	
ABN	37620419810	ACN	620419810	

Section C: Contact person about this notice

Contact name	LEON FAULKNER	Position title	MANAGING DIRECTOR	ⓘ Contact person **must** be nominated for any queries.
Email	lfaulkner@envirocopper.com.au			
Telephone	71271110	Mobile	0409612007	

Section D: Reason for seeking entry on land

Please indicate why you wish to enter the land.	☑ As the holder of a tenement(s) granted under the Mining Act 1971	ⓘ Attach further information if required. See Appendix A for definition of tenement.
Tenement number(s)	EL 6198 - Terramin Exploration Pty Ltd. In JV with ECR Pty Ltd, see attached Agency Agreement	
	☑ I am seeking to enter the land to carry out advanced exploration operations	

Section E: Proposed operations

Provide a copy of the program for environment protection and rehabilitation (PEPR) if approved.

OR

Provide a reasonable description of the type of operations proposed to be carried out on the land.

- ECR will conduct further limited work on the southern portion of the council mine site.
- Drill 20-30m in depth bores and conduct tracer test;
- Push/pull - test this involves feeding a volume of lixiviant into the ground, leaving it sit for ~ week, then extracting it to see what the concentration is – this will then be compared with lab leach work.
- Circulation test – feed lixiviant into one well while extracting from the other in a closed loop to test flow rate and copper dissolution.
- Anticipated activity time 6 - 8 weeks
- Council to be notified om commencement and completion of works program with updates during works as required.

ⓘ Attach further information if required.

Section F: Location, timing and duration of proposed operations on the land

Section, Hundred: 160400

Pastoral block:

Land Title reference: CT 5843/524

Plan type	Plan number	Parcel type	Parcel number
D – Deposited Plan	56267	A – Allotment	40

Identify the place(s) where proposed operations are to be conducted within the tenement (if applicable).

AND

Describe the process by which the owner of land will be updated on the operations carried out on the land.

Southern portion of mine site, cornering Perry Rd and Thiele Hwy, for a duration of APPROX 6 weeks.
Light Council will be notified and commencement and completion of project and during works program as necessary

ⓘ Address all requirements.

ⓘ Identify the land with as much detail as possible (a map **must** be attached). See Appendix A, part 5 for map requirements.

ⓘ Attach a list if required to reference the land.

Section G: Management of proposed operations on the land

Identify the proposed events and their consequences on the land, and the proposed actions to manage and address them.

AND

Describe the process by which the owner of land will be updated on the operations carried out on the land.
See Appendix A, part 9 for further information.

Photography, mapping and sampling will have no impact
Drilling with small footprint drill rig may cause minor disturbance and leave track marks, these will be raked to avoid compaction.
Drill chips will be collected in large green bags and removed from site
All fluid containing vessels will be bunded to avoid leakage
Flushing of bores post tracer testing, once rehabilitated, all above ground infrastructure will be removed – PEPR to follow for complete detail on rehabilitation strategy.

Light Council will be notified at commencement and completion of project and during works program as required

ⓘ Address **both** requirements.

Attach further information if required.

ⓘ **Inform the owner of the land that the operations to which the notice relates are conducted under the Act and that any concerns or issues associated with the conduct of those operations may be raised with the tenement holder in the first instance.**

Section H: Declaration that application is complete and accurate

I, the applicant, declare:

☑	The information provided in this notice is complete and accurate and meets the requirements of section 58A of the Act
☑	I have provided a copy of 'Information Sheet M68 Notice of entry: your rights' with this notice
☑	I have provided a copy of 'Information Sheet M69 Your rights to agreement making and compensation' with this notice
☑	I have provided a copy of 'Information Sheet M71 Exempt land: court imposed conditions and compensation' with this notice
☑	I have provided a copy of 'Information Sheet M72 Exempt land: supporting landowners with legal fees' with this notice
☑	I have provided a copy of 'Information Sheet M73 Your rights to the apply to the Small Business Commissioner' with this notice
☑	I have kept a duplicate copy of this completed notice and completed the 'Proof of Servce' information on my copy only (Appendix B) in accordance with Regulation 70(1)
☑	I understand I must serve a copy of this notice on the Mining Registrar in accordance with Regulation 70(2)

ⓘ Check that these items are complete. See Appendix A for links to the required documents.

APPLICANT 1	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.	MARTIN JANES	2.	ANDRE VAN DRIEL
Signature	1.		2.	

APPLICANT 2	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.	LEON FAULKNER	2.	PHILIPPA FAULKNER
Signature	1.		2.	

ⓘ **COMPANY:** Sign in accordance with the *Corporations Act 2001*. If agent, written authority must be provided.

ⓘ **INDIVIDUAL:** Signature must be witnessed by a person who is not a beneficiary of the application.

FORM 21B Mining Act 1971 ("the Act") - Part 9

Government of South Australia

NOTICE OF ENTRY ON LAND

APPENDIX A: FURTHER INFORMATION FOR THE OWNER OF LAND

MINING ACT 1971

Notice under Section 58A(15) of the *Mining Act 1971*

NOTICE is hereby given pursuant to the provision of section 58A(15) of the *Mining Act 1971*, to specify the manner and form of a notice under section 58A(2) of the *Mining Act 1971*.

TAKE notice that I, Daniel van Holst Pellekaan, Minister for Energy and Mining, pursuant to section 58A(15) of the *Mining Act 1971* do hereby:

DETERMINE that a notice under section 58A(2) of the *Mining Act 1971* must be in the following manner and form:

1. state the full name(s) and address(es), as well as the phone numbers and email addresses (if known) of each owner of land;
2. state the full name(s) and business address(es) of the tenement holder(s);
3. provide the name, telephone number and email address of a person who may be contacted about the notice;
4. provide a description of the land, including the title reference (CT or CL) and parcel references, relating to the notice;
5. provide a map clearly showing the following (at a minimum):
   a. relevant property ownership boundaries;
   b. tenement area (if applicable);
   c. area of proposed operations to be conducted within the tenement (if applicable);
   d. an arrow showing North;
   e. the Eastings and Northings of the tenement;
   f. relevant topographical information; and
   g. a scale bar;
6. provide the tenement numbers of the tenements related to the notice being served (tenement information can be found at map.sarig.sa.gov.au);
7. provide a copy of or a link to access the program for environment protection and rehabilitation (PEPR) (if approved) or provide a reasonable description of the type of operations proposed to be carried out on the land;
8. set out a process by which the owner of the land will, on an on-going basis, be:
   a. updated on the operations carried out on the land
   b. notified of the place or places where operations are to be carried out on the land
   c. notified of the proposed timing for the operations and the proposed duration of the operations
   d. provided with reasonable information on the anticipated events and consequences associated with the operations to be carried out on the land (including any potential impacts on native title rights and interests and Aboriginal heritage).
   e. provided the proposed action the tenement holder will take to manage and address those events and consequences (including any potential impacts on native title rights and interests and Aboriginal heritage), in order to enable the owner of the land to make an informed decision about the impact or potential impact of the operations on the land.
9. be accompanied by an Information Sheet relating to:
   a. the owner of land's rights to object to a notice and rights to compensation approved by the Minister and published on the website of the Department for Energy and Mining; and
   b. the owner of land's rights to apply to the Small Business Commissioner approved by the Minister and published on the website of the Department for Energy and Mining.

Links to required information sheets

- Information Sheet M68 Notice of entry: your rights
- Information Sheet M69 Your rights to agreement making and compensation
- Information Sheet M71 Exempt land: court imposed conditions and compensation
- Information Sheet M72 Exempt land: supporting landowners with legal fees
- Information Sheet M73 Your rights to the apply to the Small Business Commissioner

Tenement definition –

A tenement is a mining tenement granted under the Act. A mining tenement can be:

- Exploration Licence (EL)
- Mineral Claim (MC)
- Mining Lease: Extractive Minerals Lease (EML) or Mineral Lease (ML)
- Retention Lease (RL)
- Miscellaneous Purposes Licence (MPL)

FORM 23B Mining Act 1971 (the 'Act') - Part 1

Government of South Australia

WAIVER OF EXEMPTION – LANDOWNER NOTICE

USE THIS FORM TO: Advise a tenement holder of the owner's position in relation to a waiver of the benefit of exemption and the conditions (if any) on which the owner may agree to waive the benefit under section 9AA(1a) of the Act.

Section A: Owners of exemption land

Owner of land	Karen Sanderson		ⓘ Please refer to note below for information on who may be considered to be a landowner with a benefit of exempt land. ⓘ Attach a list if required.
Email			
Address	14 Cameron St		
Suburb/Locality	Kapunda	SA (State)	5373 (Postcode)
Type of owner	Private		

[1] Under the *Mining Act 1971*, the following persons shall be regarded as having the benefit of an exemption under section 9:
- a) The owner of the exempt land; and
- b) In the case of land that is exempt from mining operations under section 9(1)(d) by reason of its proximity to other land on which a building, structure, spring, well, reservoir or dam is situated – the owner of that other land.

Section B: Description of the land

Section, Hundred	Kapunda				ⓘ Address all requirements. ⓘ Identify the land with as much detail as possible (a map may be attached). ⓘ Attach a list if required to reference the land.
Pastoral block					
Land Title reference	CT 5843/524				
	Plan type	Plan number	Parcel type	Parcel number	
	D	56267	AL	40	

Section C: Tenement holder

Full name	Terramin Exploration Pty Ltd		ⓘ Attach a list if required.
Email	Admin@envirocopper.com.au		
Business address	2115 Callington Road		
Suburb/Locality	Strathalbyn	SA (State)	5255 (Postcode)

Section D: Statement by owner of land

Advise the tenement holder of the owner of lands position in relation to the waiver of the benefit of exemption.

x I agree to Waiver

Section E: Conditions (if any)

Indicate conditions (if any) on which the owner may agree to waive the benefit of exempt land.	Not to noisy or invasive for any length of time	ⓘ Attach details or plans as required.

Section F: Declaration that notice is complete and accurate

I declare the information provided in this request is complete and accurate and meets the requirements of section 9AA of the Act.

LANDOWNER 1	Individual or Company Representative 1		Individual's Witness or Company Representative 2		ⓘ Ensure that applicants sign in the correct order, as listed on page 1.
Print Name	1.	Karen Sanderson	2.		
Signature	1.	Karen J Sanderson	2.		

LANDOWNER 2	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.		2.	
Signature	1.		2.	

COMPANY: Sign in accordance with the *Corporations Act 2001*. If agent, written authority must be provided.

INDIVIDUAL: Signature must be witnessed by a person who is not a beneficiary of the application (e.g. not a joint applicant).

TEMPLATE 03 Mining Act 1971 ("the Act") - Part 1

WAIVER OF EXEMPTION - AGREEMENT

Government of South Australia

USE THIS TEMPLATE TO: Enter into an agreement with a person who has the benefit of an exemption under section 9 of the Act to allow exploration and/or mining operations on the land, following service of Form 23 to request the agreement.

Section A: Parties to the Agreement

Mining Operator

Mining Operator	Terramin Exploration Pty Ltd ABN 66 122 765 708		The Mining Operator is the holder of the mining tenement (tenement holder) or the applicant for a mining tenement.
Address line 1	Unit 7, 202-208 Glen Osmond Rd		
Address line 2			
Suburb/Locality		South Australia / State	5063 / Postcode
Type of owner			

Holder of the benefit of exemption

Owner of Land	Mr Russell Weber		The holder of the benefit of the exemption is the owner of the exempt land or if the land is exempt by reason of proximity to the mining operations, the owner of that land.
Address line 1	168 East Terrace		
Address line 2			
Suburb/Locality	Kapunda	South Australia / State	5373 / Postcode
Type of owner	Freehold		

Section B: Term and Conditions of Agreement

Describe the details of the exemption provided under this agreement.

Terramin agrees to:
- minimise the visual impact of any ground access activities its representatives or designates carry out adjacent to the exempt land

- cause no damage to any mining heritage structures or other council managed structures with the exempt land

- Minimise noise and dust impacts as far as is practicable

Confirm work will only be conducted during daylight hours

The Landholder agrees to permit the following:
- access to the exempt land by Terramin representatives or designates to carry out the above listed work

Section C: Certification of consent from holder of the benefit of an exemption under Section 9 of the Act

I hereby waive the exemption in relation to the location identified in Section B above, and subject to the conditions stated in Section B above –

from Start Date	**1/ 2/2019**	to End Date	**1/ 8 /2019**	ⓘ The agreement ceases when operations are complete.
	The exemption will cease when mining operations are completed, or at the end date of this agreement, whichever comes first.			

Cooling off period – In accordance with section 9AA(5) of the Act, the person who has the benefit of an exemption may rescind this agreement by giving written notice to the mining operator before the expiry of the cooling off period (five clear business days after the day on which the agreement is made).

Holder of benefit of exemption	Individual or Company Representative 1		Individual's Witness or Company Representative 2		ⓘ Ensure that holders sign in the correct order, as listed in Section A.
Print Name	1.	Russell Webber	2.		
Signature	1.		2.		
Date		DD/MM/YYYY 7-2-19		DD/MM/YYYY 7/2/19	

Holder of benefit of exemption	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.		2.	
Signature	1.		2.	
Date		DD/MM/YYYY		DD/MM/YYYY

Section D: Certification of the Mining Operator

I certify that the statements above are the matters agreed between the holder of the benefit of the exemption and myself as the mining operator.

Mining Operator	Individual or Company Representative 1		Individual's Witness or Company Representative 2		ⓘ Ensure that mining operators sign in the correct order, as listed in Section A.
Print Name	1.	Eric Whittaker	2.	RtN M-BRIDE	
Signature	1.		2.		
Date		DD/MM/YYYY 18/2/19		DD/MM/YYYY 18/2/19.	

Mining Operator	Individual or Company Representative 1		Individual's Witness or Company Representative 2		
Print Name	1.		2.		
Signature	1.		2.		
Date		DD/MM/YYYY		DD/MM/YYYY	

COMPANY: Sign in accordance with the *Corporations Act 2001*. If agent, written authority must be provided.

INDIVIDUAL: Signature must be witnessed by a person who is not a beneficiary of the application (e.g. not a joint applicant).

FORM 23B Mining Act 1971 (the 'Act') - Part 1

Government of South Australia

WAIVER OF EXEMPTION – LANDOWNER NOTICE

USE THIS FORM TO: Advise a tenement holder of the owner's position in relation to a waiver of the benefit of exemption and the conditions (if any) on which the owner may agree to waive the benefit under section 9AA(1a) of the Act.

Section A: Owners of exempt land

Owner of land	Timothy Ellbourne		ⓘ Please refer to note below for information on who may be considered to be a landowner with a benefit of exempt land. ⓘ Attach a list if required.
Email	tim@ellbourneengineering.com.au		
Address	Lot 125 Perry Rd		
Suburb/Locality	Kapunda	SA (State)	5373 (Postcode)
Type of owner	Private		

[1] Under the *Mining Act 1971*, the following persons shall be regarded as having the benefit of an exemption under section 9:

a) The owner of the exempt land; and

b) In the case of land that is exempt from mining operations under section 9(1)(d) by reason of its proximity to other land on which a building, structure, spring, well, reservoir or dam is situated – the owner of that other land.

Section B: Description of the land

Section, Hundred	Kapunda				ⓘ Address all requirements. ⓘ Identify the land with as much detail as possible (a map may be attached). ⓘ Attach a list if required to reference the land.
Pastoral block					
Land Title reference	CT 5843/524				
	Plan type	Plan number	Parcel type	Parcel number	
	D	56267	AL	40	

Section C: Tenement holder

Full name	Terramin Exploration Pty Ltd		ⓘ Attach a list if required.
Email	admin@envirocopper.com.au		
Business address	2115 Callington Rd		
Suburb/Locality	Strathalbyn	SA (State)	5255 (Postcode)

Section D: Statement by owner of land

Advise the tenement holder of the owner of lands position in relation to the waiver of the benefit of exemption.

I agree

Section E: Conditions (if any)

Indicate conditions (if any) on which the owner may agree to waive the benefit of exempt land.		ⓘ Attach details or plans as required.

Section F: Declaration that notice is complete and accurate

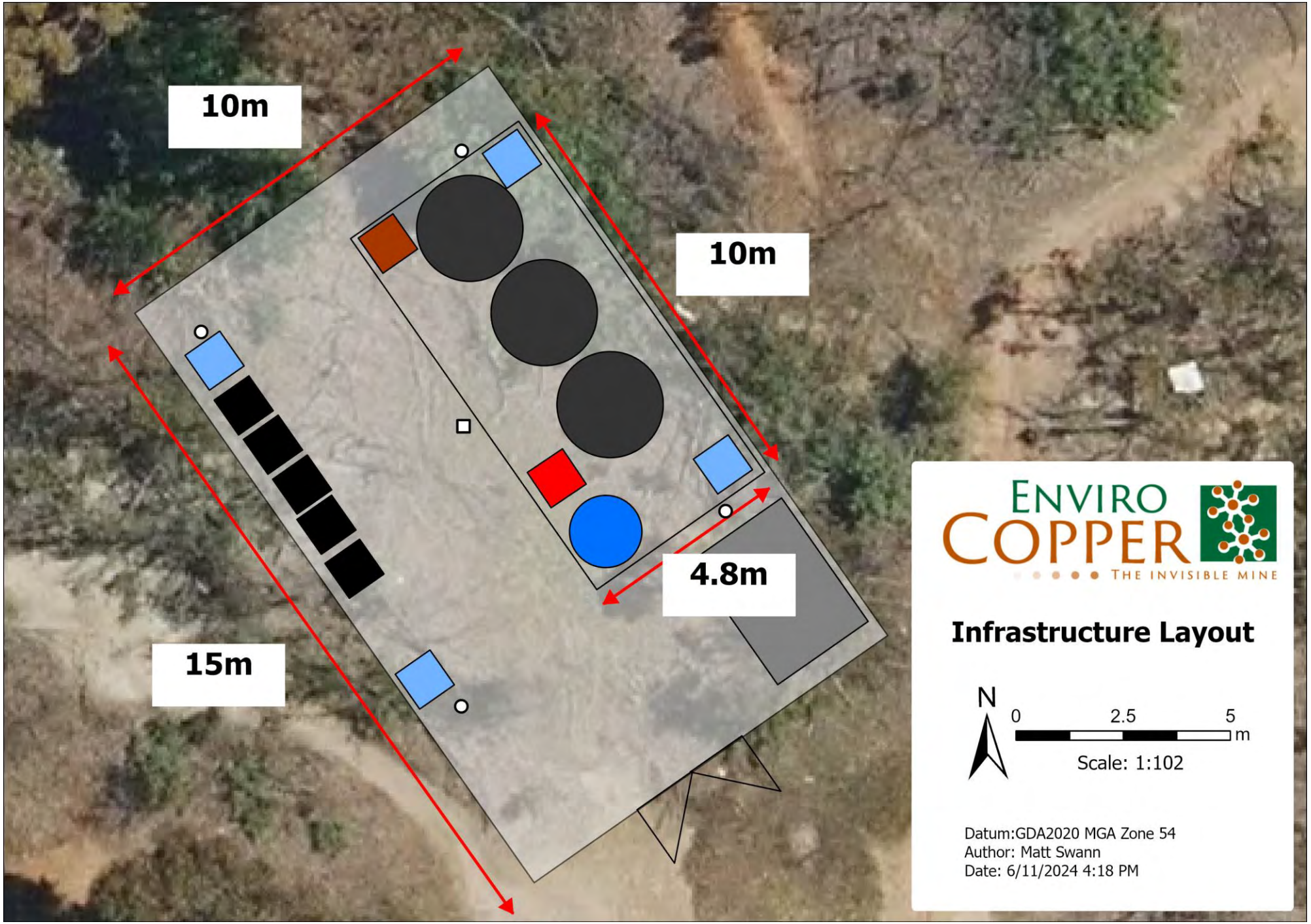
I declare the information provided in this request is complete and accurate and meets the requirements of section 9AA of the Act.

LANDOWNER 1	Individual or Company Representative 1		Individual's Witness or Company Representative 2		ⓘ Ensure that applicants sign in the correct order, as listed on page 1.
Print Name	1.	Tim Ellbourn	2.	Lochlan Verrall	
Signature	1.		2.		

LANDOWNER 2	Individual or Company Representative 1		Individual's Witness or Company Representative 2	
Print Name	1.		2.	
Signature	1.		2.	

COMPANY: Sign in accordance with the *Corporations Act 2001*. If agent, written authority must be provided.

INDIVIDUAL: Signature must be witnessed by a person who is not a beneficiary of the application (e.g. not a joint applicant).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Date: 6/11/2024 4:18 PM

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Author: Matt Swann
Date: 6/11/2024 5:02 PM

Traffic • Parking • Transport

Unit 6, 224 Glen Osmond Road
FULLARTON SA 5063

T: +61 8 8338 8888
F: +61 8 8338 8880
E: mfya@mfy.com.au
W: mfy.com.au

MFY Pty Ltd
ABN 79 102 630 759

JML/23-0309

20 December 2023

Philippa Faulkner
EnviroCopper Ltd
PO Box 65 Main St,
KAPUNDA SA 5373

Dear Philippa,

PROPOSED HERITAGE MINE TRIAL
CORNER PERRY ROAD AND EAST TERRACE, KAPUNDA
TEMPORARY CONSTRUCTION TRAFFIC MANAGEMENT PLAN

I refer to the proposed establishment of a trial site to inform the potential for a copper mine on Allotment 30 and 40, Perry Road, Kapunda.

The proposal will be subject to approval by the Department for Energy and Mining (DEM). In order to assist with the impact assessment of the proposal, this Temporary Traffic Management Plan (TTMP) has been prepared for incorporation into the site's safety and management documentation. It is based upon the Site and Locality Drawing prepared by WGA (WGA231098-SK- CV-0001 Rev B, dated 6 October 2023).

In reviewing the traffic management requirements for the proposal, consideration has been given to the following legislation and invoked documents:

- *Road Traffic Act 1961*;
- *Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices,* issued by the Traffic Services Section of the Department for Infrastructure and Transport;
- Austroads' *Guides to Road Design* and *Guides to Temporary Traffic Management*;
- SA Standards for Workzone Traffic Management;
- Australian Standard, *Manual of Uniform Traffic Control Devices (AS1742)*; and
- Australian Standard, *Parking Facilities Part 2: Off-street commercial vehicle facilities (AS 2890.2:2018)*.

1 EXSITING CONDITIONS

The subject site is located on the northern eastern corner of the intersection of Perry Road and East Terrace, Kapunda. It has an existing access gate in the vicinity of the proposed access to the site. The subject site is identified in Figure 1.

Figure 1: Subject site

Perry Road and East Terrace are local roads within the control of the Light Regional Council. The roads are two-lane sealed rural roads with sealed shoulders in proximity to the proposed access. They both have a posted speed limit of 80 km/h. The intersection of the two roads has recently been treated with a channelised right-turn lane for drivers turning from East Terrace to Perry Road.

Both roads would be subject to relatively low traffic volumes (likely to be in the order of 1,000 vehicles per day or lower) and would accommodate general access vehicles up to 19 m semi-trailers. Given the rural nature of the road network, it is anticipated that the commercial vehicle percentage on the road could be in the order of 10-15% of the daily traffic volumes.

The pedestrian and cyclist volumes along the subject roads will be low. While there was previously a connection to the Heysen Trail route in proximity to the site, this has since been amended to direct walkers into the Kapunda Town Centre to the east of the subject site, as shown in Figure 2.

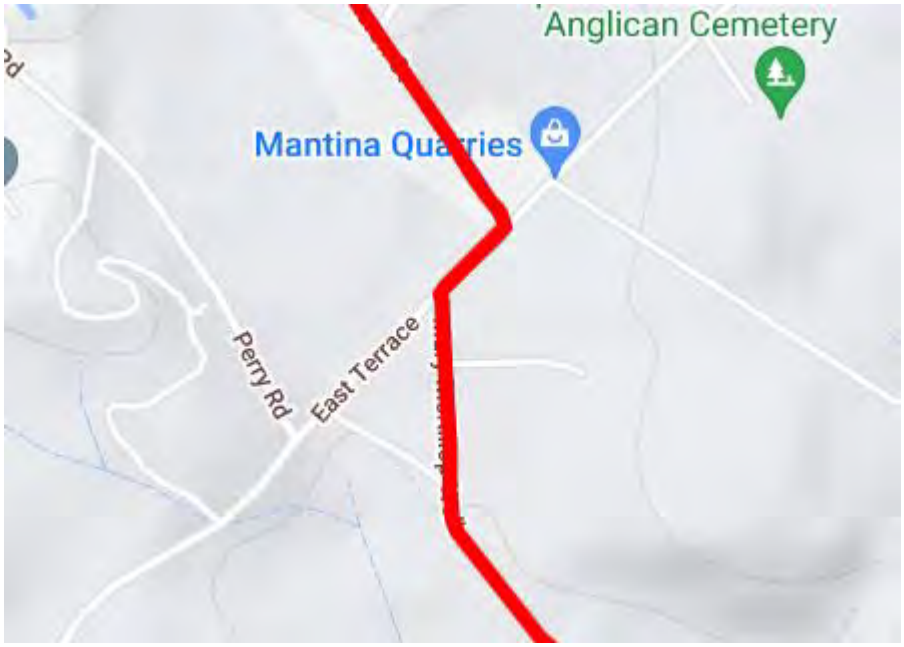

Figure 2: Heysen Trail route (source: https://heysentrail.asn.au/)

There is anticipated to be a demand for cyclists accessing the subject land based on existing informal tracks and mounds. This demand would typically occur outside of work days (i.e. evenings or weekends). Notwithstanding these low volumes, the potential impact of the proposal has been assessed against all traffic in the public realm, including vulnerable road users.

2 THE PROPOSAL

It is proposed to construct a test facility to determine the viability of a mining operation at the site. An unsealed internal roadway to provide access to the trial site location with access to the site being in the vicinity of the existing gate on East Terrace. The movements to/from the site will typically be left-in and right-out.

The site will provide two parking spaces for domestic vehicles, which will access the site infrequently (up to two vehicles per day). The site will be serviced by medium rigid vehicles up to 8.8 m in length (MRVs). These vehicles will also access the site infrequently (a few times per week).

The proposed access will comply with the requirements of relevant Standards and Guidelines for a permanent access to the site. As shown in Figure 3, it will be more than 6 m from the intersection tangent point in accordance with the requirements of AS 2890.2:2022.

Figure 3: Compliant access offset from intersection

The access will accommodate the swept paths for the largest vehicle anticipated to enter and exit the site, as demonstrated in Figure 5.

Figure 4: Swept paths (MRV)

A turnaround area will be provided adjacent to the site to allow drivers of these vehicle to turn and thereby enter and exit in a forward direction, as shown in Figures 5.

Figure 5: Truck turnaround

It is noted that this turnaround facility will need to be widened compared to that shown on the WGA plan in order to accommodate the design vehicle. This modification can be readily accommodated within the proposed site area.

When exiting the site, the proposed access location will provide appropriately sightlines to oncoming traffic in accordance with the requirements of Austroads' *Guide to Road Design Part 4A: Unsignalised and signalised intersections (AGRD4A)*.

Accordingly, the location and design of the proposed access will be able to safely accommodate vehicles entering and exiting the site.

3 TRAFFIC MANAGEMENT REQUIREMENTS

The *Road Traffic Act 1961* requires an assessment as to whether or not a work area on a road involves a hazard to workers or a greater than normal level of hazard for persons using the road.

In undertaking this assessment, it is necessary to seek to protect the safety of workers, road users and other members of the public whilst having due regard to the inconvenience caused by traffic disruptions and the need to maintain reasonable traffic flows.

The following elements have been considered for the subject site when reviewing the impact of the proposal:

- the proposed access design and operation will meet the requirements for a permanent access in this location;
- the internal facilities will ensure that drivers will be able to turn on site and therefore enter and exit the site in a forward direction;
- drivers will enter and exit the site in accordance with the Australian Road Rules; and
- drivers will have sufficient sightlines to judge appropriate gaps in on-coming traffic based on the speed environment of the road.

Accordingly, it is not considered that the proposed access design and location will result in a greater than normal level of hazard for persons using the road. This is contingent upon the access and internal roadway being maintained such that trucks do not drag debris into the through lane. The road should be monitored and swept regularly if this was to occur.

In the event that traffic volumes associated with the proposed site increase, consideration could be given to installing a truck warning sign (as shown in Figure 6) on the approaches.

Figure 6: Truck warning sign (W5-22)

However, the Standard notes that installation of this sign is only necessary where trucks enter or leave the road at a frequency and in circumstances which create a hazard, and that the sign should only be displayed where the need exists. It is not considered warranted for the low volume of MRV vehicles which will access the site during the trial period.

4 SUMMARY

In summary, subject to the management of dragout, the proposed construction traffic will not create an undue hazard to the public, particularly as the design of the proposed access will comply with the requirements of a permanent facility.

The proposed truck volumes will be low and will not alter the nature and function of the adjacent road network. Accordingly, no specific traffic management is warranted for the safe operation of the proposed access.

Yours sincerely,
MFY PTY LTD

JAYNE LOVELL
Senior Associate

RCI Labscan Limited

SAFETY DATA SHEET

According to Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
Revision Date Dec 06, 2017

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name	SULFURIC ACID 50%
CAS-No.	7664-93-9
Product code	AR1184, GP1184, SM1184

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Chemical for analysis and production.

1.3 Details of the supplier of the safety data sheet

Company	Chem-Supply Pty Ltd 38 - 50 Bedford Street, Gillman SA 5013 Australia
Telephone number	(08) 8440 2000
Fax number	(08) 8440 2001

1.4 Emergency Telephone Number

Emergency phone	
Monday - Friday 8:30am - 5:00pm ACST	(08) 8440 2000
After hours: CHEMCALL	1800127406 / +6449179888

1.5 Manufacturer

Company	RCI LABSCAN LIMITED. 24 Rama 1 Road, Pathumwan, Bangkok 10330 Thailand

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to WHS Regulations (Australia)

Corrosive to metals (Category 1), H290
Skin corrosion (Category 1A), H314
For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

C	Corrosive	R35

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Pictogram

Signal word	Danger

Hazard statement(s)

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

Precautionary statement(s)

P234	Keep only in original container.
P260	Do not breathe dusts or mists.

P264	Wash hand thoroughly after handling.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P405	Store locked up.
P406	Store in corrosive resistant/ container with a resistant inner liner.

2.3 Other hazards None

SECTION 3: Composition/information on ingredients

3.1 Substances

Not applicable

3.2 Mixture

Sulfuric acid

Synonyms Dihydrogen sulfate, Dipping acid, Electrolyte acid, Mattling acid, Sulphuric acid.

CAS-No	EC-No	EC-Index-No	Formula	Molecular Weight	Weight %
7664-93-9	231-639-5	016-020-00-8	H_2SO_4	98.08 g/mol	49 - 51

Hazardous ingredients according to WHS Regulations (Australia)

Component	Concentration	Classification
Sulfuric acid		
CAS-No 7664-93-9 EC-No 231-639-5 EC-Index-No 016-020-00-8	49 - 51%	Corrosive to metals (Category 1), H290 Skin corrosion (Category 1A), H314

Hazardous ingredients according to Directive 1999/45/EC

Component	Concentration	Classification
Sulfuric acid		
CAS-No 7664-93-9 EC-No 231-639-5 EC-Index-No 016-020-00-8	49 - 51%	C, Corrosive, R35

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice	Show this safety data sheet to the doctor in attendance.
Inhalation	Move to fresh air in case of accidental inhalation of vapors. Keep patient warm. In case of shortness of breath, give oxygen. Apply artificial respiration only if patient is not breathing

	or under medical supervision. No artificial aspiration mouth to mouth or mouth to nose. Use suitable instruments/apparatus.
Skin contact	Remove contaminated clothing and wash affected skin with soap and water. Dab with polyethylene glycol 400. If signs of poisoning appear, treat as for inhalation. Obtain medical attention. Wash contaminated clothing before reuse.
Eye contact	If the substance has got into the eyes, immediately wash out with plenty of water at least 15 minutes. Obtain medical attention.
Ingestion	After swallowing: make victim drink water (two glasses at the most), avoid vomiting, risk of perforation. Immediately call in physician. Do not attempt to neutralize.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in section 2.2 and section 11

4.3 Indication of any immediate medical attention and special treatment needed

Not Available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

In adaption to materials stored in the immediate neighborhood.

5.2 Special hazards arising from the substance or mixture

Non-combustible. Development of hazardous combustion gases or vapors possible in the event of fire. Hydrogen may form upon contact with metals (danger of explosion). The following may develop in event of fire: Sulfur oxide.

5.3 Advice for firefighters

Do not stay in dangerous zone without self-contained breathing apparatus. In order to avoid contact with skin, keep a safety distance and wear suitable protective clothing.

5.4 Hazchem Code

2R

5.5 Further information

Contain escaping vapors with water. Prevent fire-fighting water from entering surface water or ground water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate personnel to safe areas. Do not breathe vapors or spray mist. Wear a positive-pressure supplied-air respirator, flame retardant antistatic protective clothing. Shut off leaks if without risk. Keep people away from and upwind of spill/leak.

6.2 Environmental precautions

Contain or absorb leaking liquid with sand or earth, consults an expert. Prevent liquid entering sewers, basements and workpits. If substance has entered a water course or sewer or contaminated soil, advise police.

6.3 Methods and materials for containment and cleaning up

Spillage : soak up with inert absorbent material (e.g. sand, silica gel). Prevent liquid entering sewers, basements and workpits. Transfer to covered drums. Dispose of promptly.

6.4 Reference to other sections

For disposal see **Section 13**.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Provision of good ventilation in the working area. The floor must be acid resistant. Suitable materials: generally resistant: Glass, Enamel. At lower temperatures: Polyethylene PE, Polyvinyl chloride, Polypropylene PP. At different concentrations and range of temperatures the resistance of metals may vary greatly. Before choosing materials of construction obtain specialized information. Unsuitable materials: non-noble metals. Do not leave container open. Avoid any contact when handling the substance.

7.2 Conditions for safe storage, including any incompatibilities

Keep tightly closed at room temperature in a dry, cool and well-ventilated place. Keep out of direct sunlight and away from heat, water and incompatible materials. Requirements for containers, no metal containers.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Exposure limit (Safe Work Australia)

TWA: 1 mg/m^3
STEL: 3 mg/m^3

8.2 Exposure controls

Appropriate engineering controls

The product should only be used in ventilation hoods and fans.

Individual protection measures (Personal protective equipment, PPE)

Eye/face protection

Goggles giving complete protection to eyes.

Skin protection

Chemical resistant apron / corrosive protective clothing, heavy duty work shoes.
Handle with gloves

- Full contact wears gloves from viton material.
- Splash contact wears gloves from butyl rubber material.

The select protective gloves have to satisfy the specifications of EU Directive 89/686 EEC and standard EN 374 derived from it.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment. Required when vapor/aerosols are generated filter P2 (EN 141 or EN 14387).

Environmental exposure controls

Prevent liquid entering sewers, basements and workpits.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance: From	Liquid
: Color	Colorless
Odour	Odorless
Odour Threshold	Not Available
pH	Strongly acid at 20ºC
Melting point/range	-36.5ºC

Boiling point/range	123.3ºC
Flash point	Not Available
Evaporation rate	Not Available
Flammability (solid, gas)	Not Available
Explosion limits: lower	Not Available
upper	Not Available
Vapor Pressure	Not Available
Relative Vapor Density	Not Available
Density	1.39 g/ml at 20ºC
Water solubility	Soluble at 20ºC (caution, development of heat)
Partition coefficient (n-octanol/water)	Not Available
Auto-Ignition temperature	Not Available
Decomposition Temperature	ca. 335 °C
Viscosity	Not Available
Explosive properties	Not Explosive
Oxidizing properties	Oxidizing potential.

SECTION 10: Stability and reactivity

10.1 Reactivity

Unsuitable working materials: metals, metal alloys. Acts oxidizing with increasing temperature. Concentrated sulfuric acid can destroy organic substances by dehydration under charring.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Risk of explosion in contact with: combustible substances, potassium, potassium hydroxide, bases, sodium, sodium hydroxide, organic substances, water, hydrogen peroxide, acetic aldehyde, benzyl alcohol (heat), bromates, carbides, chlorates, chlorosulfonic acid, cyclopentadiene, diethylamine, alkaline earth hydroxides, hydrofluoric acid, fulminates, potassium tert-butoxide, methyl ethyl ketone peroxide, sodium tetrahydroborate, sodium oxide, nitromethane, N-nitromethylamine, nitrotoluene, picrates, mercury nitride, nitric acid + organic substances, trinitrotoluene.

The substance can react dangerously with: aluminium, organic substances, reducing agents, nitric acid, acetonitrile, acrylonitrile, aminoethanol, conc. Ammonia, aniline, bromine pentafluoride, calcium hydride, p-chloronitrobenzene + sulphur trioxide (heat), chlorine trifluoride, hydrogen chloride + conc. sulphuric acid, 1,4-diazidobenzene, diethyl ether, p-dimethylaminobenzaldehyde, alkaline earth oxides, acetic acid, acetic anhydride, ethylene cyanohydrin, ethylenediamine, lithium silicide, highly flammable solvents, 4-methylpyridine, sodium carbonate, sodium thiocyanate, p-nitroacetanilide (heat), p-nitroaniline (heat), p-nitroaniline sulphate (heat), p-nitroanilinesulphonic acid (heat), m-nitrobenzenesulphonic acid, phosphorus red and white, phosphorus trioxide, propene oxide, mercury, tetramethylbenzene, 1,2,4,5- tetrazine, water + conc. acid, sugar.

The substance polymerize in contact with: 1-chloro-2,3-epoxypropane

10.4 Conditions to avoid

Strong heating.

10.5 Incompatible materials

Alkali metals, alkali compounds, ammonia, alkaline earth metals, alkaline earth compounds, alkalis, acid, combustible substances, organic solvents, halogenates, permanganate.
Incompatible with various metals and metal alloys generates of sulfur oxide and Hydrogen gas.

10.6 Hazardous decomposition products

Has a corrosive effect incompatible with metals, animals, vegetable tissues. Sulfur oxide, Hydrogen (Hazardous decomposition products from under contact with metals, danger of explosion).

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Mixture

Acute toxicity

LC_{50} (inhalation, rat): 510 mg/m^3/ 2h (calculated on the pure substance).

Acute oral toxicity

Severe pain (risk of perforation), nausea, vomiting and diarrhora. After a latency period of several weeks possibly pyloric stenosis.

Acute inhalation toxicity

Damage to the affected mucous membranes.

Skin corrosion/irritation

Severe burns with formation of scabs.

Serious eye damage/eye irritation

Burns, corneal lesions.

Respiratory or skin sensitization

Not Available

Germ cell mutagenicity

Bacterial mutagenicity; Ames test is negative.

Carcinogenicity

Not Available

Reproductive toxicity

Not Available

Teratogenicity

No teratogenic effect in animals experiments.

Specific target organ toxicity (STOT) - single exposure

Not Available

Specific target organ toxicity (STOT) - repeated exposure

Not Available

Aspiration hazard

Not Available

Further information

The product should be handled with the care usual when dealing with chemicals.

SECTION 12: Ecological information

Mixture

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC_{50} Daphnia magna: 29 mg/l/24h (calculated on the pure substance)

12.2 Persistence and degradability

Not Available

12.3 Bioaccumulative potential

Not Available

12.4 Mobility in soil

Not Available

12.5 Other adverse effects

Harmful effect on aquatic organisms. Harmful effect due to pH shift. Toxic effect on fish and algae. Caustic even in diluted form. Does not cause biological oxygen deficit. Endanger drinking water supplies if allowed to enter soil and/or waters in large quantities. Neutralization possible in waste water treatment plants. Do not allow to enter waters, waste water or soil.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

There are no uniform EC Regulations for the disposal of chemicals or residues. Chemical residues generally count as special waste. The disposal of the latter is regulated in the EC member countries through corresponding law and regulations. We recommend that you contact either the authorities in charge or approved waste disposal companies which will advise you on how to dispose of special waste or burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Contaminated packaging

Disposal in compliance with official regulations. Handle contaminated packaging as hazardous waste in the same way of the substance itself. If not officially specified differently, non-contaminated packaging may be treated like household waste or recycled.

SECTION 14: Transport information

Land Transport (ADG Code)

UN Number	2796
UN proper shipping name	SULPHURIC ACID
Transport hazard class(es)	8
Hazchem Code	2R
Packing group	II
Environmental hazards	No
Special precautions for user	Yes

Sea transport (IMDG)

UN Number	2796
UN proper shipping name	SULPHURIC ACID
Transport hazard class(es)	8
Packing group	II
Marine pollutant	No
Special precautions for user	Yes
EmS	F-A S-B

Air transport (IATA)

UN Number	2796
UN proper shipping name	SULPHURIC ACID
Transport hazard class(es)	8
Packing group	II
Environmental hazards	No
Special precautions for user	No

River transport (AND/ADNR)
(Not examined)

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulatory Information	Listed in the Australian Inventory of Chemical Substances (AICS).
Poisons Schedule	S6

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

Full text of R-phrases referred to under sections 2 and 3

C	Corrosive.
R35	Causes severe burns.

Recommended restrictions

Take notice of labels and safety data sheets for the working.

Reference

Globally Harmonized System of Classification and Labelling of Chemicals (GHS).
Labelling according to Code of Practice for the Lebelling of Workplace Hazardous Chemicals (Safe Work Australia).
Transportation information according to Recommendations on the Transport of Dangerous Goods, Model Regulations. Twelfth revised edition. United Nations.
Institute for Occupational Safety and Health of the German Social Accident Insurance in Sankt Augustin/Germany, Source: IFA for Databases on hazardous substances (GESTIS).

Further information

Contact Chem – Supply Pty Ltd Ph. (08) 8440 2000.

Revision Date

06/12/2017

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

Licence No. 51363

ISSUED:
01 Jul 2023

EXPIRY:
30 Jun 2028

ACN:
620 419 810

ENVIRONMENTAL COPPER RECOVERY SA PTY LTD

Environmental Authorisation
under Part 6 of the
Environment Protection Act 1993

South Australian Environment Protection Authority
GPO Box 2607
Adelaide SA 5001
Tel: 08 8204 2004

Government of South Australia
Department for Environment and Water

Water Licensing Branch

81-95 Waymouth Street
ADELAIDE SA 5000

GPO Box 1047
ADELAIDE SA 5001

Telephone 08 8463 6876
Email dewwaterlicensing@sa.gov.au

www.sa.gov.au
www.environment.sa.gov.au

Ref: 449074, 449075, 449076 & 449077

EMM CONSULTING PTY LTD
LEVEL 4
74 PIRIE STREET
ADELAIDE SA 5000

Attention: Tavis Kleinig

Dear Tavis

Approval is granted to your applications for four Water Affecting Activity permits to drain or discharge water into a well associated with the Kapunda Insitu Recovery Project undertaken by Environmental Copper Recovery Pty Ltd, pursuant to Section 112 of the *Landscape South Australia Act 2019* ('the Act').

Please find enclosed Permits 449074, 449075, 449076 and 449077 which are valid for a term of three years from the date of issue. It is your responsibility to ensure any draining or discharging of water into a well is performed in accordance with the conditions on your permits.

Under Section 216 (1)(b)(ii) of the Act, you have a right of appeal through the Environment, Resources and Development Court against the imposition of any condition on the licence. Enclosed is a procedure for lodging an appeal, however I bring to your attention that the appeal must be lodged within six weeks of the date of the licence being issued and that a copy must also be served on the Minister for Environment and Water at the address provided on the enclosed procedure.

If you require further information please contact the Water Licensing Team on (08) 8463 6876 or via email: dewwaterlicensing@sa.gov.au

Yours faithfully

Craig Cooney
TEAM LEADER, HILLS AND FLEURIEU
DELEGATE OF MINISTER FOR CLIMATE, ENVIRONMENT AND WATER

Date: 10/11/2023

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

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

Permit No:	449074
Expiry Date:	10/11/2026

Permission is hereby granted to: EMM CONSULTING PTY LTD
ACN 141 736 558
LEVEL 4
74 PIRIE STREET
ADELAIDE SA 5000

To undertake the draining or discharge of water from the following source:

Type of Water to be Drained or Discharged: Well

Well Construction Permit Reference: 434205

CONDITIONS:

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

   CT 5502/698
   Allotment 30 in Filed Plan 7985
   Hundred of Kapunda

2. The Department for Environment and Water, Water Licensing shall be notified upon completion of well drilling as authorised under this permit.
3. The permit holder must not drain or discharge any water into any well other than a well approved by the Minister.
4. The permit holder must not drain or discharge any water into the aquifer where the water being drained or discharged is likely to degrade ecosystems dependent on the underground water.
5. The permit holder must not drain or discharge water directly or indirectly into the well and aquifer under this permit in any way that detrimentally affects the ability of any other person to lawfully take underground water from the aquifer.
6. Should the well overflow, the drainage or discharge activity is to cease immediately, until water levels return to acceptable levels.
7. The permit holder must not drain or discharge more than 2,305 kilolitres at a rate no greater than 1.0 litres per second.
8. The headworks for the draining or discharge of water shall be constructed so that extraction and draining and discharge operations can be metered without interference.

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

9. The headworks for the draining or discharge of water shall be constructed so that water cannot leak if the well becomes clogged. Note: For the purposes of this plan, the term headworks means any assembly on top of a well and located between the well casing and the water delivery system.
10. Wells constructed for the draining or discharge of water at pressures greater than gravity must be pressure-cemented along the full length of the casing. This does not exempt the need to follow the general specifications for well construction.
11. Copies of the finalised Groundwater Monitoring and Management Plan for these works and detailed work plans for the circulation trial, as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation, are to be provided to the Department for Environment and Water, Water Licencing prior to commencement of works. These descriptions will include a summary of how water from the circulation test is to be disposed.
12. Copper impregnated lixiviant water extracted during the circulation trial must be disposed of at an appropriately licenced waste disposal facility.
13. Copies of any reports provided to the Department for Energy and Mining that detail water level, water quality and hydrochemistry collected for compliance purposes for the injection test and circulation test as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation and Groundwater Monitoring and Management Plan, are to be provided to the Department for Environment and Water, Water Licencing at the conclusion of works.

NOTES:

1. This permit is not transferable.
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.

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: 10/11/2023

Craig Cooney
Team Leader [Adelaide]
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

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

Permit No:	449075
Expiry Date:	10/11/2026

Permission is hereby granted to: EMM CONSULTING PTY LTD
ACN 141 736 558
LEVEL 4
74 PIRIE STREET
ADELAIDE SA 5000

To undertake the draining or discharge of water from the following source:

Type of Water to be Drained or Discharged: Well

Well Construction Permit Reference: 434206

CONDITIONS:

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

   CT 5502/698
   Allotment 30 in Filed Plan 7985
   Hundred of Kapunda

2. The Department for Environment and Water, Water Licensing shall be notified upon completion of well drilling as authorised under this permit.
3. The permit holder must not drain or discharge any water into any well other than a well approved by the Minister.
4. The permit holder must not drain or discharge any water into the aquifer where the water being drained or discharged is likely to degrade ecosystems dependent on the underground water.
5. The permit holder must not drain or discharge water directly or indirectly into the well and aquifer under this permit in any way that detrimentally affects the ability of any other person to lawfully take underground water from the aquifer.
6. Should the well overflow, the drainage or discharge activity is to cease immediately, until water levels return to acceptable levels.
7. The permit holder must not drain or discharge more than 2,305 kilolitres at a rate no greater than 1.0 litres per second.
8. The headworks for the draining or discharge of water shall be constructed so that extraction and draining and discharge operations can be metered without interference.

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

9. The headworks for the draining or discharge of water shall be constructed so that water cannot leak if the well becomes clogged. Note: For the purposes of this plan, the term headworks means any assembly on top of a well and located between the well casing and the water delivery system.
10. Wells constructed for the draining or discharge of water at pressures greater than gravity must be pressure-cemented along the full length of the casing. This does not exempt the need to follow the general specifications for well construction.
11. Copies of the finalised Groundwater Monitoring and Management Plan for these works and detailed work plans for the circulation trial, as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation, are to be provided to the Department for Environment and Water, Water Licencing prior to commencement of works. These descriptions will include a summary of how water from the circulation test is to be disposed.
12. Copper impregnated lixiviant water extracted during the circulation trial must be disposed of at an appropriately licenced waste disposal facility.
13. Copies of any reports provided to the Department for Energy and Mining that detail water level, water quality and hydrochemistry collected for compliance purposes for the injection test and circulation test as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation and Groundwater Monitoring and Management Plan, are to be provided to the Department for Environment and Water, Water Licencing at the conclusion of works.

NOTES:

1. This permit is not transferable.
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Date: 10/11/2023

Craig Cooney
Team Leader [Adelaide]
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

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

Permit No:	449076
Expiry Date:	10/11/2026

Permission is hereby granted to: EMM CONSULTING PTY LTD
ACN 141 736 558
LEVEL 4
74 PIRIE STREET
ADELAIDE SA 5000

To undertake the draining or discharge of water from the following source:

Type of Water to be Drained or Discharged: Well

Well Construction Permit Reference: 434207

CONDITIONS:

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

   CT 5502/698
   Allotment 30 in Filed Plan 7985
   Hundred of Kapunda

2. The Department for Environment and Water, Water Licensing shall be notified upon completion of well drilling as authorised under this permit.
3. The permit holder must not drain or discharge any water into any well other than a well approved by the Minister.
4. The permit holder must not drain or discharge any water into the aquifer where the water being drained or discharged is likely to degrade ecosystems dependent on the underground water.
5. The permit holder must not drain or discharge water directly or indirectly into the well and aquifer under this permit in any way that detrimentally affects the ability of any other person to lawfully take underground water from the aquifer.
6. Should the well overflow, the drainage or discharge activity is to cease immediately, until water levels return to acceptable levels.
7. The permit holder must not drain or discharge more than 2,305 kilolitres at a rate no greater than 1.0 litres per second.
8. The headworks for the draining or discharge of water shall be constructed so that extraction and draining and discharge operations can be metered without interference.

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

9. The headworks for the draining or discharge of water shall be constructed so that water cannot leak if the well becomes clogged. Note: For the purposes of this plan, the term headworks means any assembly on top of a well and located between the well casing and the water delivery system.
10. Wells constructed for the draining or discharge of water at pressures greater than gravity must be pressure-cemented along the full length of the casing. This does not exempt the need to follow the general specifications for well construction.
11. Copies of the finalised Groundwater Monitoring and Management Plan for these works and detailed work plans for the circulation trial, as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation, are to be provided to the Department for Environment and Water, Water Licencing prior to commencement of works. These descriptions will include a summary of how water from the circulation test is to be disposed.
12. Copper impregnated lixiviant water extracted during the circulation trial must be disposed of at an appropriately licenced waste disposal facility.
13. Copies of any reports provided to the Department for Energy and Mining that detail water level, water quality and hydrochemistry collected for compliance purposes for the injection test and circulation test as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation and Groundwater Monitoring and Management Plan, are to be provided to the Department for Environment and Water, Water Licencing at the conclusion of works.

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Date: 10/11/2023

Craig Cooney
Team Leader [Adelaide]
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

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

Permit No:	449077
Expiry Date:	10/11/2026

Permission is hereby granted to: EMM CONSULTING PTY LTD
ACN 141 736 558
LEVEL 4
74 PIRIE STREET
ADELAIDE SA 5000

To undertake the draining or discharge of water from the following source:

Type of Water to be Drained or Discharged: Well

Well Construction Permit Reference: 434208

CONDITIONS:

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

   CT 5502/698
   Allotment 30 in Filed Plan 7985
   Hundred of Kapunda

2. The Department for Environment and Water, Water Licensing shall be notified upon completion of well drilling as authorised under this permit.
3. The permit holder must not drain or discharge any water into any well other than a well approved by the Minister.
4. The permit holder must not drain or discharge any water into the aquifer where the water being drained or discharged is likely to degrade ecosystems dependent on the underground water.
5. The permit holder must not drain or discharge water directly or indirectly into the well and aquifer under this permit in any way that detrimentally affects the ability of any other person to lawfully take underground water from the aquifer.
6. Should the well overflow, the drainage or discharge activity is to cease immediately, until water levels return to acceptable levels.
7. The permit holder must not drain or discharge more than 2,305 kilolitres at a rate no greater than 1.0 litres per second.
8. The headworks for the draining or discharge of water shall be constructed so that extraction and draining and discharge operations can be metered without interference.

DEPARTMENT FOR ENVIRONMENT AND WATER

Adelaide Office | GPO Box 1047 | Adelaide SA 5001 | [P] 8463 6876

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

DRAIN or DISCHARGE PERMIT

9. The headworks for the draining or discharge of water shall be constructed so that water cannot leak if the well becomes clogged. Note: For the purposes of this plan, the term headworks means any assembly on top of a well and located between the well casing and the water delivery system.
10. Wells constructed for the draining or discharge of water at pressures greater than gravity must be pressure-cemented along the full length of the casing. This does not exempt the need to follow the general specifications for well construction.
11. Copies of the finalised Groundwater Monitoring and Management Plan for these works and detailed work plans for the circulation trial, as described in the relevant Exploration Plan for Environmental Protection and Rehabilitation, are to be provided to the Department for Environment and Water, Water Licencing prior to commencement of works. These descriptions will include a summary of how water from the circulation test is to be disposed.
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Date: 10/11/2023

Craig Cooney
Team Leader [Adelaide]
Delegate of Minister for Climate, Environment and Water

13 November 2024 Reference: NJ-08-03

Matt Swann
Geologist
Environmental Copper Recovery SA Pty Ltd
Adelaide South Australia 5000

RE: ECL Pump Testing of Bore KPSELTX01, Kapunda Copper ISR Project, Kapunda, South Australia

Dear Matt,

Land & Water Consulting (LWC) is pleased to present Environmental Copper Recovery SA Pty Ltd (Enviro Copper) with the analysis of the hydrogeological testing of groundwater bore KPSELTX01 completed in October 2024.

The outcomes of the investigation are presented in Attachment A and a summary of key findings is as follows:

- Aquifer parameters calculated from the October pump test by Enviro Copper are as follows:

Well	Transmissivity (m^2/d)	Specific Yield (%)
KPSELTX01	0.08	-
KPSELTI01	0.07	0.1
KPSELTI02	0.02	0.1
KPSELTI03	0.08	0.02
KPSELTI04	0.02	0.1

- The lower transmissivity observed in KPSELTI02 and KPSELTI04 is consistent with field observations and results from the August injection testing.
- The calculated values for specific yield (Sy), which is also representative of drainable porosity, were significantly lower than the values derived from the previous drawdown test in March 2024. The previous pump test on bores KPSELTI01 and KPSELTX01 by LWC in March reported average specific yield (Sy) of 1.7%. The specific reasons for this are unclear but could be related to the recent pumping / development / pumping of bore KPSELTX01 influencing near-well parameters to a significant degree given the very low flow rates and also low permeability of the aquifer beyond the bore construction zone. The LWC test in March 2024 was also a longer duration which will produce more representative estimates of aquifer properties. It is considered that Sy values obtained from the LWC test in March are more likely to represent bulk aquifer drainable porosity.
- WatSec Environmental has provided a number of approaches for future trials that comprise injection into the 4 surrounding wells and simultaneous extraction from central bore KPSELTX01. The recommended approach is to Adopt 80% of the total injection rate into bores KPSELTI01 and KPSELTI03 and 20% of the total injection rate into bores KPSELTI02 and KPSELTI04. This reflects the relative transmissivities for the bores and is most likely to produce sustainable test conditions with regard to pressure head build-ups.
- Further recommendations, stipulations and alternative approaches for future trials are detailed in Attachment A.

LWC's statement of limitations associated with this report provided in Attachment B.

If you have any questions regarding the above information, please don't hesitate to call the undersigned.

Yours sincerely,

Emily Picken | Principal Hydrogeologist

Land & Water Consulting

4-8 Goodwood Road, WAYVILLE, SA 5034
P: +61 8 8271 5255| M: +61 417 909 233
epicken@lwconsulting.com.au

Dr James Fox | Principal Geochemist

Land & Water Consulting

4-8 Goodwood Road, WAYVILLE, SA 5034
P: +61 8 8271 5255| M: +61 417 585 058
jfox@lwconsulting.com.au

ATTACHMENTS

Attachment A	Enviro Copper Kapunda ISR Project Analysis of Pump Testing of Bores KPSELTX01 and KPSELTI01
Attachment B	Statement of Limitations

ATTACHMENT A

Analysis of Enviro Copper Kapunda Pump Testing of Bores KPSELTX01

13th November 2024

Levi Wilkins
Senior Environmental Geoscientist
Land & Water Consulting (LWC)

Enviro Copper Kapunda ISR Project
ECL Pump Testing of Bore KPSELTX01, October 31st 2024

1. Introduction

This report presents the results of analysis of pump test data carried out on bore KPSELTX01 on 31st October 2024. Full details of the test methodology are provided in the ECL memo appended to this letter. A location plan showing the Site B layout and the pumped bore (red arrow) and observation bores (blue arrows) is shown below on Figure 1.

Figure 1: Bore Location Plan (after Enviro Copper)

2. Previous pump testing and injection testing results

The results of a pump testing trial on bores KPSELX01 and KPSELTI01 undertaken by LWC in March 2024 and reported in WSE (2024a)[1] found that:

[1] WatSec Environmental (2024a). Enviro Copper Kapunda ISR Project. Analysis of Pump Testing of Bores KPSELTX01 and KPSELTI01. Letter report to Land & Water Consulting, April 2024.

- The geological formations tested are of low average hydraulic conductivity and specific yield of 0.003 m/d and 1.7%, respectively.
- A hydraulic response in each bore to pumping from the other bore was observed, as was a recovery response after cessation of pumping.
- Some geological structures could provide a pathway for hydraulic connection between the bores.

The data provided for that study also indicated that the groundwater levels at the site are likely to be within a weathered zone at ~9m bgl comprising oxidised and kaolinised rock with quartz veining and Cu-oxide / sulphide mineralisation.

A Bromide solution injection trial was undertaken by LWC in August 2024 where the solution was injected into bore KPSELTX01 with regular sampling of the 4 observation bores. Analysis of the test results reported in WSE (2024b)[2] concluded that there appears to be an overall hydraulic connectivity across the area of the injection trial with the relative degree of hydraulic connection to bore KPSELTX01 possibly increasing from south to north.

3. ECL pump testing of KPSELTX01, 31st October 2024

ECL provided their pump testing records of bore pumping rates and logger water levels for analysis. The data required some adjustments to ensure consistency with field manual water levels and to confirm the total average pumping rate.

The water level data shown in the appended ECL report indicates there is greater drawdown connection established between the pumped bore KPSELTX01 and observation bores KPSELTI01 and KPSELTI03 compared to bores KPSELTI02 and KPSELTI04. This implies a possible zone of higher aquifer transmissivity in the north-south direction compared to the east-west direction.

Drawdown data for each of the 5 bores was analysed in Aqtesolv and the resultant hydraulic parameters are listed in Table 1.

Table 1: Aqtesolv hydraulic parameters

Well	Solution	T (m^2/d)	S	Sy
KPSELTX01	Neuman	0.08	-	-
KPSELTI01	Neuman	0.07	0.0005	0.1%
KPSELTI02	Neuman	0.02	0.0005	0.1%
KPSELTI03	Neuman	0.08	0.0003	0.02%
KPSELTI04	Neuman	0.02	0.0005	0.1%

The Aqtesolv results provide values of transmissivity (T) and storage coefficient (S) which are similar to, or slightly higher than, the values derived for bores KPSELTX01 and KPSELTI01 and reported in WSE (2024a). The values for specific yield (Sy), or drainable porosity, are an order of magnitude lower. The reasons for this are unclear

[2] WatSec Environmental (2024b). Enviro Copper Kapunda ISR Project. Bromide Solution Injection Testing of Bore KPSELTX01. Letter report to Land & Water Consulting, September 2024.

but could be related to the recent pumping / development / pumping of bore KPSELTX01 influencing near-well parameters to a significant degree given the very low flow rates and also low permeability of the aquifer beyond the bore construction zone. The LWC test in March 2024 was also for a longer duration which will produce more representative estimates of aquifer parameters.

In summary, although consistent aquifer transmissivity values from this test and the previous test have been obtained, it is likely that the Sy values obtained from the LWC testing in March are more likely to represent the bulk aquifer drainable porosity. For reference, these results are provided in Table 2 below.

Table 2: Aqtesolv hydraulic parameters from LWC March 2024 pump test

Pumped bore	Observation bore	Aquifer thickness (m)[3]	Analytical solution	T (m^2/d)	K (m/d)	S (-)	Sy (%)
KPSELTI01	KPSELTI01	18	Moench	0.050	0.003	0.00023	1.7
	KPSELTX01	15	Moench	0.061	0.004	0.00010	2.0
KPSELTX01	KPSELTI01	18	Neuman	0.042	0.002	0.00041	1.6
	KPSELTX01	15	Moench	0.057	0.004	0.00054	1.6
Average of all results				**0.053**	**0.003**	**0.00032**	**1.7**

4. Recommendations for proposed injection / extraction trial

It is understood that ECL are planning further testing at site B which would comprise injecting water into the 4 surrounding wells KPSELTI01, KPSELTI02, KPSELTI03 and KPSELTI04 and simultaneously extracting from the central bore KPSELTX01.

Based on the information provided by the sequence of pumping and injection testing described above there is likely to be a better hydraulic connection from KPSELTX01 to KPSELTI01 and KPSELTI03 compared to KPSELTI02 and KPSELTIO4.

Any recommended bore injection rates will depend on several factors including length of injection, aquifer pressure head limitations imposed by e.g. license conditions, seepage to ground surface or practicalities of pressure injection into the bore(s). At this stage with the trial required to provide additional data on how the injection / extraction would perform, it is recommended that allowance be made to adjust injection rates into each of the bores in response to observed pressure build-up responses.

Ther are 3 potential approaches regarding bore injection rates:

- Adopt 80% of the total injection rate into bores KPSELTIO1 and KPSELTIO3 and 20% of the total injection rate into bores KPSELTIO2 and KPSELTIO4. This reflects the relative transmissivities for the bores and is most likely to produce sustainable test conditions with regard to pressure head build-ups. This is the recommended option.
- Adopt an equal injection rate for each of the 4 bores to enable different responses to the same injection rate to be observed and analysed. This would allow direct comparison between bores to analyse aspects such as relative

[3] Aquifer thickness assumed to be from water table to base of slotted casing

bore pumping / injection and drawdown / build-up efficiencies and for comparison with the pumping and injection testing to date. This option may result in larger pressure build-ups at bores KPSELTIO2 and KPSELTIO4 which would require close monitoring and manipulation of the injection rate.

- Use only bores KPSELTIO1 and KPSELTIO3 for injection and maintain bores KPSELTIO2 and KPSELTIO4 as monitoring bores only. This option may reduce the overall scheme recovery efficiency.

If there are any test constraints currently imposed, or likely to be imposed, such as limiting head build-up in the bore to ground surface then additional analytical or numerical modelling should be carried out to inform the test design. This will also be required to determine a recommended injection rate for each bore based on the preferred injection test length.

5. Closing

WSE appreciates the opportunity to provide this report, and if any further information is required, please contact me directly.

Yours Sincerely

Nick Watkins
Principal

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Consulting in the water and environmental industries

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APPENDIX: ECL Pump Testing Memo

ECL Pump Test Overview:

- ECL carried out pump test using submersible pump in KPSELTX01 on 31st October 2024. Depth to pump inlet was at 20.5mbgl. Summary below:

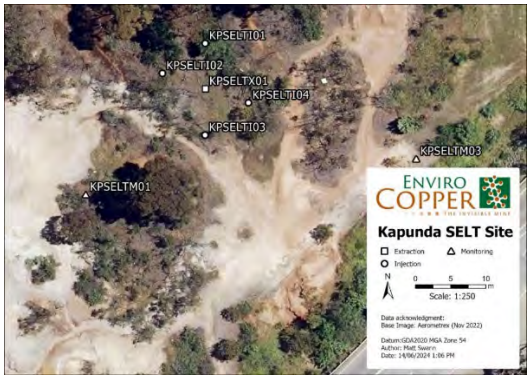
Bore ID	Pump Time (mins)	Average Pump Rate (L/min)	Volume Removed (L)	Bore Storage Volume (L)	Bore Volume Removed
KPSELTX01	30	2.78	83	157	0.53
KPSELTX01	120	0.89	107	157	0.68
KPSELTX01	60	1.02	61	157	0.39
KPSELTX01	60	1.22	73	157	0.47
KPSELTX01	30	0.98	29	157	0.19
TOTAL	**300**	**1.378**	**354**	**157**	**2.25**

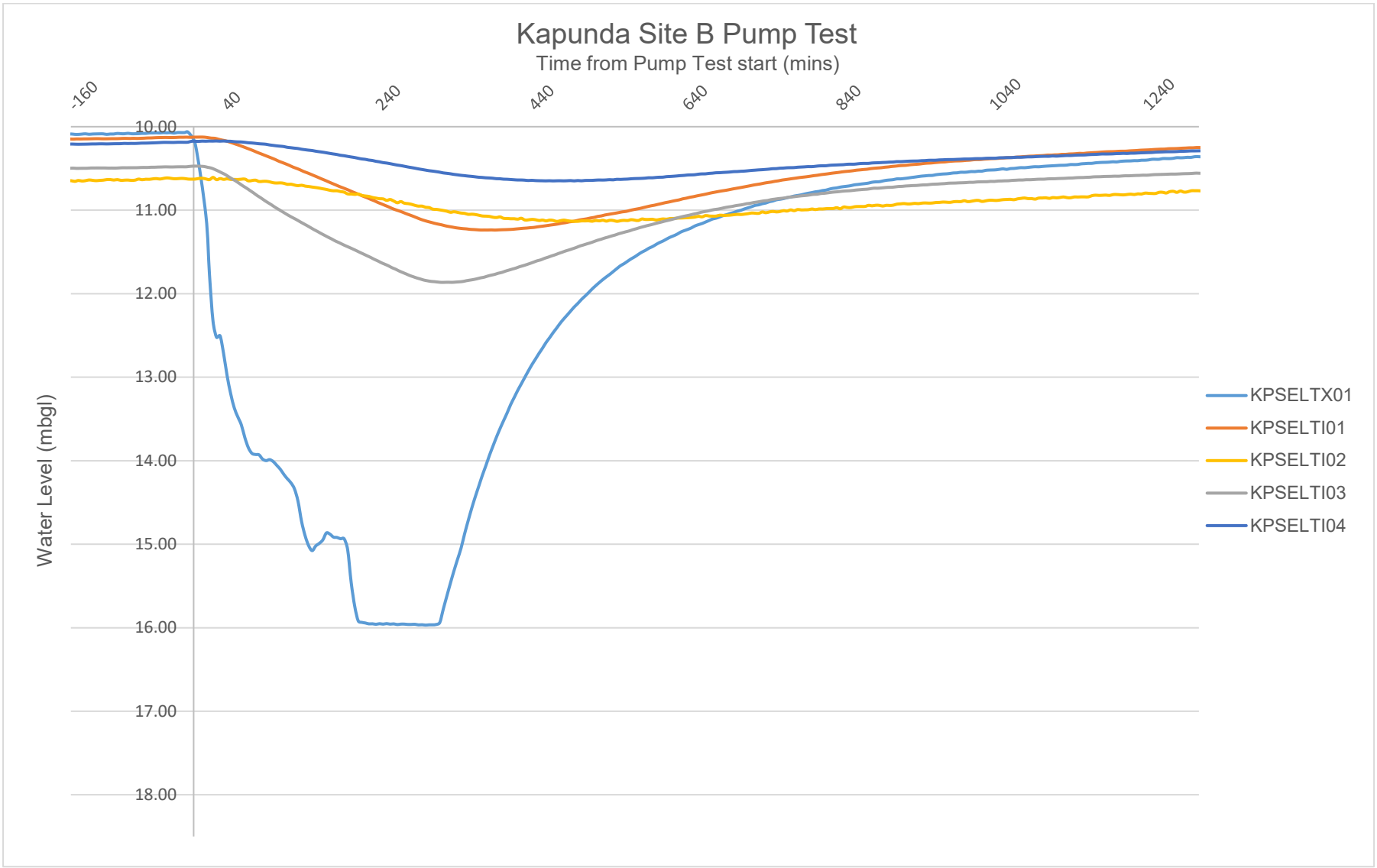
- Data loggers placed in KPSELTX01, I01, I02, I03 & I04 recorded water level changes every 5 minutes from approximately 14:00pm on the 30th October 2024 to approximately 8:10am on 1st November 2024. All data attached.
- All water level data measured at below collar level and retrospectively corrected to below ground level (mbgl). Summary below:

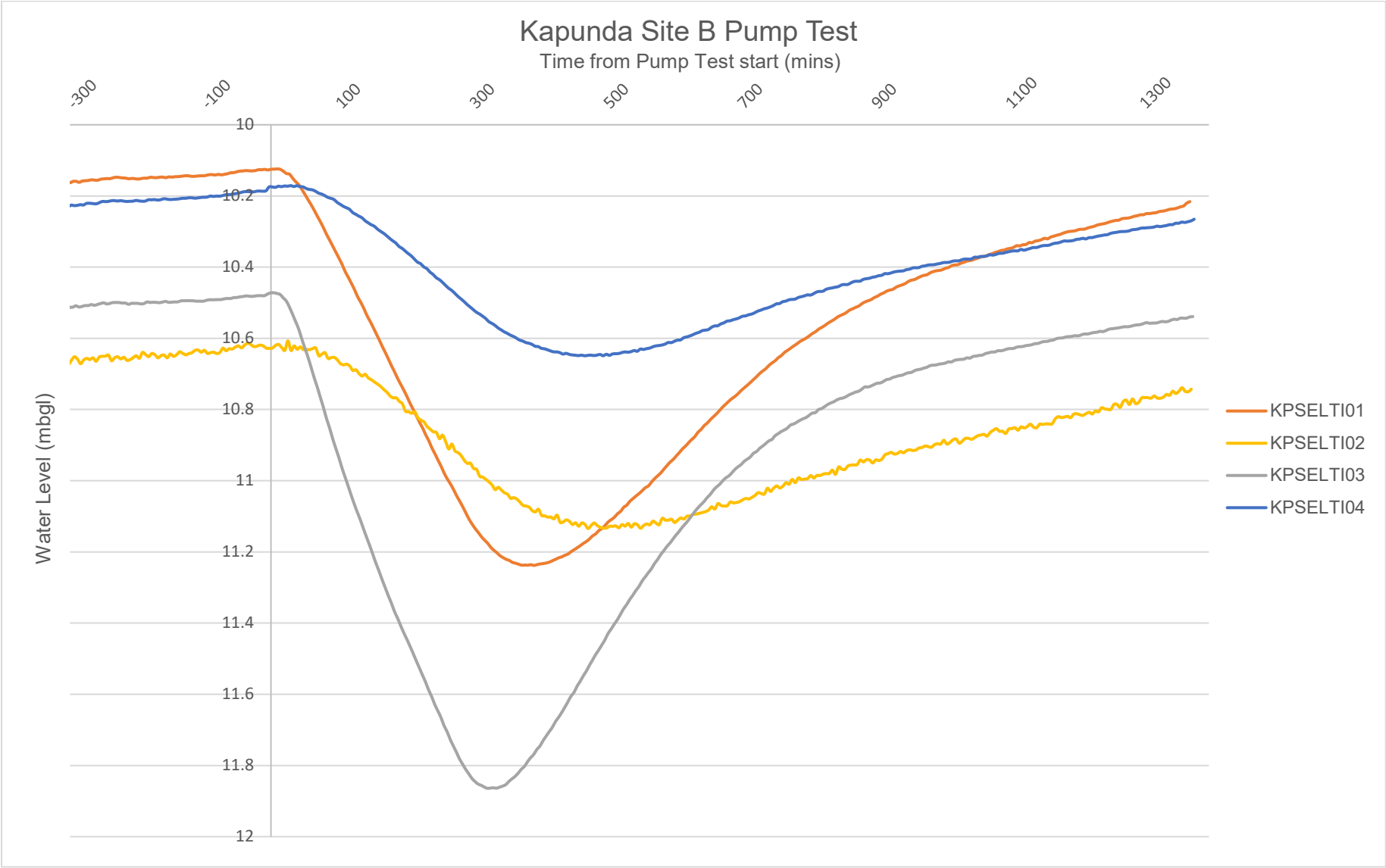
Bore ID	Start WL (mbgl)	End WL (mbgl)	Logger Depth (mbgl)	Logger Serial Number
KPSELTI01	10.13	10.22	23.08	549688
KPSELTI02	10.13	10.75	20.68	540190
KPSELTI03	10.68	10.54	18.04	471264
KPSELTI04	10.46	10.27	22.82	557133
KPSELTX01	10.38	10.34	18.40	495902

*Note pump in bore for all KPSELTX01 readings.

- All logged data was readjusted with water level using a correction factor. This was calculated using a measured water level at 8:10am on 1st November 2024 (End WL in figure above). Then subtracted from the data logger value for that time and applied to all the logged data.
- Location Map for reference:




Kapunda Site B Pump Test
Time from Pump Test start (mins)
-160
40
240
440
640
840
1040
1240
Water Level (mbgl)
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
KPSELTX01
KPSELTI01
KPSELTI02
KPSELTI03
KPSELTI04


Kapunda Site B Pump Test
Time from Pump Test start (mins)
-300
-100
100
300
500
700
900
1100
1300
Water Level (mbgl)
10
10.2
10.4
10.6
10.8
11
11.2
11.4
11.6
11.8
12
KPSELTI01
KPSELTI02
KPSELTI03
KPSELTI04

ATTACHMENT B

Statement of Limitations

STATEMENT OF LIMITATIONS & IMPORTANT INFORMATION REGARDING YOUR REPORT

INTRODUCTION

This report has been prepared by Land & Water Consulting for you, as Land & Water Consulting's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Land & Water Consulting may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Land & Water Consulting has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

No warranty or guarantee of the site conditions is intended.

This report was prepared for the sole use of you, the Client and may not contain sufficient information for purposes of other parties or for other uses. Any reliance on this report by third parties shall be at such parties sole risk. This report shall only be presented in full and may not be used to support any other objectives than those set out in the report, except where written approval with comments are provided by Land & Water Consulting.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

LIMITATIONS OF THE REPORT

The scope of works undertaken and the report prepared to complete the assessment was in accordance with the information provided by the client and the specifications for works required under the contract. As such, works undertaken and statements made are based on those specifications (such as levels of risks and significance of any contamination) and should be considered and interpreted within this context. The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

Your environmental report should not be used without reference to Land & Water Consulting in the first instance:

- When the nature of the proposed development is changed, for example if a residential development is proposed instead of a commercial one;
- When the size or configuration of the proposed development is altered;
- When the location or orientation of the proposed structures are modified;
- When there is a change in ownership;
- For application to an adjacent site.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

ENVIRONMENTAL ASSESSMENT "FINDINGS" ARE PROFESSIONAL ESTIMATES

The information in this report is considered to be accurate with respect to conditions encountered at the site at the time of investigation and considering the inherent limitations associated with extrapolating information from a sample set. Note however that site assessment identifies actual subsurface conditions only at those specific points where samples are taken, when they are taken. Environmental data derived through sampling and analysis are interpreted by consultants who then render an opinion about overall subsurface conditions, the nature and extent of contamination and potential impacts on the use of the land. Actual conditions may differ from those inferred to exist as no professional and no subsurface assessment program can reveal every detail within the ground across a site. Subsurface conditions can vary across a particular site and no practical degree of sampling can ever eliminate the possibility that conditions may be present at a site that have not been represented though sampling.

SUBSURFACE CONDITIONS CAN CHANGE

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Land & Water Consulting should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions. Since subsurface conditions (including contamination concentrations) can change within a limited period of time and space, this inherent limitation to the representation of site conditions provided by this report should always be taken into consideration particularly if the report is used after a delay in time.

DATA SHOULD NOT BE SEPARATED FROM THE REPORT

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

RESPONSIBILITY

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.