Australasian Groundwater & Environmental Consultants

Report on

Underground Water Impact Report 3-Year Review Ironbark No. 1 Mine

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Underground Water Impact Report 3-Year Review Ironbark No. 1 Mine

1 Introduction

Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) was commissioned by Fitzroy Coal Management Pty Ltd (Fitzroy) to prepare a 3-Year Review of the Underground Water Impact Report (UWIR) for the Ironbark No.1 Mine (the mine). This section provides an overview of the mine, explains the background to the UWIR and describes the scope and structure of the UWIR.

1.1 Mine overview and setting

The project involves the development of an underground coal mine approximately 35 km north-east of Moranbah Township (Figure A 1). Fitzroy acquired the mine in November 2016 and obtained an Environmental Authority (EA0001299) for the mine on 13 July 2018.

Construction of the mine portal and decline commenced in December 2021 and the first coal was extracted via longwall mining in 2025. The mine life will be approximately 10 years and the mine will produce up to approximately 6 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal. Coal will be extracted from the Leichhardt coal seam using longwall and bord and pillar mining methods. ROM coal will be hauled by truck to the existing Carborough Downs Coal Mine (CDCM) coal handling and preparation plant (CHPP). Product coal will be loaded onto trains at the CDCM train loading facility for transport to port and exported to overseas markets.

The project site is located adjacent to the Burton open cut coal mine to the north and west, and the Broadlea open cut coal mine to the south (Figure A 1).

The topography of the mine site consists of low-lying gently undulating terrain generally of less than 2% gradient (Figure A 3). Ephemeral drainage lines cross the site from east to west with the majority of the project site located within the catchments of Bullock Creek, Spade Creek and Alpha Creek (Figure A 3).

The geology of the mine site comprises the Permian Rangal Coal Measures and overlying Triassic Rewan Group sediments. These sediments outcrop at the surface or are overlain by Tertiary sediments. Localised deposits of unconsolidated alluvium occur within the creek beds that traverse the mine site.

1.2 UWIR scope and structure

The UWIR is a requirement of the groundwater management framework legislated under Chapter 3 of the Water Act 2000 (Water Act). The main purpose of the UWIR is to describe the groundwater take due to mining (and any associated impacts) over a three-year period (the UWIR period).

This UWIR addresses years 4-6 of the project following the commencement of box cut excavation in early 2022. The mining activities during this UWIR period include the extraction of coal from the longwall mining areas shown in Figure A 2, together with the development of associated underground roadways to support current and future mining operations.

The UWIR has been prepared in accordance with Section 376 of the Water Act and the DES guideline Underground water impact reports and final reports (the UWIR guideline), where relevant.

Consistent with the UWIR guideline, the information supplied in support of the EA approval processes under the EP Act has been used as the basis for the UWIR. Hence, the scope of work for the UWIR is generally limited to a minor update of the existing approved groundwater assessments to allow information specific to the UWIR period to be presented. The specific scope of the UWIR includes:

- a review of relevant groundwater, project development, geological and environmental reports from the mine site to develop an appreciation of the hydrogeological setting of the project;
- an updated review of hydrogeological data held on the Department of Regional Development Manufacturing and Water (DRDMW's) Groundwater Database to identify water supply bores;
- an updated census of water supply bores to confirm the extent of groundwater use in the area and collect relevant groundwater monitoring data;
- review of the conceptual model of the groundwater regime of the mine site and its surrounds, based on all available data;
- refinement of the existing numerical groundwater model to allow the mining effects on groundwater levels to be presented for the UWIR period (mining years 4-6);
- estimation of the groundwater impacts over the second three years of mining; and
- confirmation of the existing approved EA groundwater monitoring program and management measures.

The UWIR includes:

- an introduction to the UWIR (Section 1);
- a description of the relevant regulatory UWIR requirements (Section 2);
- a description of the assessment method (Section 3);
- a description of the groundwater regime and sensitive environmental features (Section 4);
- an assessment of the mine's groundwater impacts (Section 5);
- a description of the groundwater monitoring program (Section 7);
- a description of the process for reviewing and updating the UWIR (Section 8); and
- the key conclusions of the UWIR (Section 9).

2 Regulatory Requirements

Section 376 of the Water Act specifies the UWIR content requirements. Table 2.1 lists the specific content requirements and provides an explanation of where each requirement is addressed in this UWIR.

Table 2.1 UWIR Content Requirements

Water Act Section No.	Water Act Section Content	UWIR Cross Reference
376(1)(a)	An underground water impact report must include each of the following— for the area to which the report relates— (i) the quantity of water produced or taken from the area because of the exercise of any previous relevant underground water rights; and (ii) an estimate of the quantity of water to be produced or taken because of the exercise of the relevant underground water rights for a 3-year period starting on the consultation day for the report;	(i) Groundwater has been produced in the initial mine workings and underground water rights have been exercised. The estimated volume of water take is provided in Section 6.2. (ii) Section 6.2 describes the estimated groundwater take over the entire UWIR period.
376(1)(b)	For each aquifer affected, or likely to be affected, by the exercise of the relevant underground water rights— (i) a description of the aquifer; and (ii) an analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers; and (iii) an analysis of the trends in water level change for the aquifer because of the exercise of the rights mentioned in paragraph (a)(i); and (iv) a map showing the area of the aquifer where the water level is predicted to decline, because of the taking of the quantities of water mentioned in paragraph (a), by more than the bore trigger threshold within 3 years after the consultation day for the report; and (v) a map showing the area of the aquifer where the water level is predicted to decline, because of the exercise of relevant underground water rights, by more than the bore trigger threshold at any time;	(i) and (ii) Section 4.1 describes the groundwater regime in the relevant aquifers. (iii) Section 6.3 presents groundwater levels recorded within UWIR period and predicted future drawdown. Section 6.5 presents groundwater quality changes over the 2023-2025 UWIR period. (iv) Figure A 15 to Figure A 17 and Figure A 19 to Figure A 21 show the areas where depressurisation due to mining is predicted to exceed the bore trigger threshold during the UWIR period. (v) Figure A 18 and Figure A 22 shows the areas where depressurisation due to mining is predicted to exceed the bore trigger threshold during the life of the mine.
376(1)(c)	A description of the methods and techniques used to obtain the information and predictions under paragraph (b);	Section 3 describes the UWIR methodology.
376(1)(d)	A summary of information about all water bores in the area shown on a map mentioned in paragraph (b)(iv), including the number of bores, and the location and authorised use or purpose of each bore;	Sections 3.1.1 and 6.6.2 describes the water bore census undertaken for the UWIR and confirms that there are no water bores within the area of predicted depressurisation.
376(1)(da)	A description of the impacts on environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights;	Section 6.6 presents an assessment of potential impacts on springs, groundwater dependent ecosystems and groundwater quality.

Water Act Section No.	Water Act Section Content	UWIR Cross Reference
376(1)(db)	An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights— (i) during the period mentioned in paragraph (a)(ii); and (ii) over the projected life of the resource tenure;	Section 6 presents an assessment of potential groundwater impacts due to groundwater take.
-	A program for— (i) conducting an annual review of the accuracy of each map prepared under paragraph (b)(iv) and (v); and (ii) giving the chief executive a summary of the outcome of each review, including a statement of whether there has been a material change in the information or predictions used to prepare the maps;	Section 8.2 describes the UWIR review and reporting process for the affected aquifers.
376(1)(f)	A water monitoring strategy;	Section 7 describes the groundwater monitoring program.
376(1)(g)	A spring impact management strategy;	There are no springs within the mine site or its surrounds. Hence, a strategy for spring management is not justified.
376(1)(h)	If the responsible entity is the office— (i) a proposed responsible tenure holder for each report obligation mentioned in the report; and (ii) for each immediately affected area—the proposed responsible tenure holder or holders who must comply with any make good obligations for water bores within the immediately affected area;	Not applicable.
376(1)(i)	The information or matters prescribed under a regulation.	No other relevant information or matters have been prescribed under a regulation.
376(2)	However, if the underground water impact report does not show any predicted water level decline in any area of an affected aquifer by more than the bore trigger threshold during the period mentioned in subsection (1)(b)(iv) or at any time as mentioned in subsection (1)(b)(v), the report does not have to include the program mentioned in subsection (1)(e).	Section 8 describes the UWIR review and reporting process for the affected aquifers.

Section 378 of the Water Act lists the content requirements for the water monitoring strategy. Table 2.2 lists the specific content requirements and provides an explanation of where each requirement is addressed in this UWIR.

Table 2.2 UWIR Water Monitoring Strategy Content Requirements

Water Act Section No.	Water Act Section Content	UWIR Cross Reference
378(1)	A responsible entity's water monitoring strategy must include the following for each immediately affected area and long-term affected area identified in its underground water impact report or final report— (a) a strategy for monitoring— (i) the quantity of water produced or taken from the area because of the exercise of relevant underground water rights; and (ii) changes in the water level of, and the quality of water in, aquifers in the area because of the exercise of the rights; (b) the rationale for the strategy; (c) a timetable for implementing the strategy; (d) a program for reporting to the office about the implementation of the strategy.	Section 7 describes the groundwater monitoring program.
378(2)	The strategy for monitoring mentioned in subsection (1)(a) must include— (a) the parameters to be measured; and (b) the locations for taking the measurements; and (c) the frequency of the measurements	Section 7 describes the groundwater monitoring program.
378(3)	If the strategy is prepared for an underground water impact report, the strategy must also include a program for the responsible tenure holder or holders under the report to undertake a baseline assessment for each water bore that is— (a) outside the area of a resource tenure; but (b) within the area shown on the map prepared under section 376(b)(v).	Not applicable. Sections 3.1.1 and 6.6.2 describes the water bore census undertaken for the UWIR and confirms that there are no water bores within the area of predicted depressurisation.
378(4)	If the strategy is prepared for a final report, the strategy must also include a statement about any matters under a previous strategy that have not yet been complied with.	Not applicable.

3 Assessment methodology

This section describes the methodology adopted for the collection of hydrogeological data to inform the UWIR.

3.1 Desktop study

3.1.1 Database and government mapping reviews for water bores

A search of relevant Queensland databases was undertaken to identify the presence of current water bores within and surrounding the mine. A water bore is a groundwater supply bore.

The following databases and mapping were searched:

- The DRDMW Groundwater Database of registered water bore data from private water bores and Queensland Government groundwater investigation and monitoring bores. Data accessed includes bore location, groundwater levels, construction details, stratigraphic logs, hydrogeological testing and groundwater quality.
- The Queensland Spatial Catalogue (QSpatial), via Queensland Globe. Records of petroleum and coal seam gas (CSG) exploration, production and monitoring wells are contained within this database.

These searches identified 53 registered groundwater bores within 5 km of the project mining area (Figure A 4). Bore installation records available for these bores identify:

- 11 are the mine groundwater monitoring bores.
- One “water supply” bore (RN81908) located on the Burton Mine site which intersects “salty” water with bore casing into the Rewan Group. This bore was identified in the 2008 groundwater impact assessment (AGE, 2008) which concluded that there was no reliance on groundwater for stock watering.
- 6 are mine monitoring bores located on the Burton Mine site.
- 35 are Broadlea North Mine bores and include monitoring bores and water supply bores. Fitzroy is the owner of Broadlea Mine.

There are 15 records of CSG exploration and appraisal wells installed around the mine area, all of which are not operational and identified as “suspended/capped/shut-in” or “plugged and abandoned”. The location of these CSG bores are shown in Figure A 4.

3.1.2 Database and government mapping reviews for sensitive environmental features

The potential for groundwater dependent ecosystems (GDEs) to be present within the project site was reviewed, with the review consisting of:

- a search of the Queensland Springs Database;
- a search of the Bureau of Meteorology’s (BoM) GDE Atlas;
- groundwater field investigations; and
- a desktop review of groundwater monitoring data and modelling results.

The Queensland Springs Database indicated that no spring wetlands are located within the project site or its surrounds.

The BoM GDE mapping indicates several potential GDEs in the project site, namely:

- terrestrial vegetation along the northern and eastern extents of the mining lease which are mapped as low to moderate potential GDEs;
- terrestrial vegetation along Alpha Creek and to a lesser extent Bullock Creek which are mapped as low to moderate potential GDEs;
- aquatic wetland/riverine habitat within watercourses associated with Bullock, Spade and Alpha Creeks that are mapped as high potential GDEs; and
- aquatic wetland/riverine habitat within watercourses associated with Hat Creek that is mapped as moderate potential GDEs.

A desktop review of the spring inventories has been undertaken using the springs database within the GDE Atlas (Queensland Wetland Data – Springs). The nearest mapped spring is located approximately 130 km northeast of the project site. No springs have been identified with 10 km of the project site. This is consistent with field observations from the creeks which show that there are no perennial pools associated with creeks traversing the project site and its surrounds. On the basis, springs are extremely unlikely to be affected by the project mining activities. Hence, there is no technical justification for a spring management strategy.

3.1.3 Previous groundwater studies

The hydrogeology of the Ironbark site was first assessed by AGE as part of feasibility studies and approvals for the former owner of the project (Vale). This assessment included a field program to investigate the local hydrogeology and numerical modelling to assess the project impacts. Monitoring bores were installed adjacent to the ephemeral drainages that traverse the mining lease and indicated a permanent alluvial aquifer does not occur on the project site, with groundwater occurring within the weathered zone of the underlying Rewan Group. Laboratory analyses indicated the groundwater was brackish to saline limiting the beneficial use of the water. No usage of groundwater was identified.

In 2012, additional investigation of groundwater was undertaken by URS. This work included installing two bores and conducting pumping tests to measure yields and estimate hydraulic properties of the Leichhardt Seam. This work indicated the Leichhardt Seam forms a low yielding groundwater system confined by the overlying Permian overburden and Triassic Rewan Group. Further groundwater modelling provided refined estimates of groundwater take to the project during operations.

In 2018, additional groundwater investigations were undertaken in response to queries from the DES. This work included measuring groundwater levels, collecting water samples and further groundwater modelling. The fieldwork confirmed previous conclusions that groundwater occurred primarily within the weathered bedrock and was brackish to saline. As part of the 2018 work, the numerical model was recalibrated and updated to ensure it represented the influence of subsidence induced fracturing as accurately as possible.

This included utilising an empirical method (Ditton and Merrick 2014) to estimate the height of the fracture network above longwall mining areas. The method developed by Ditton and Merrick (2014) uses data on fracture height from operating mines in NSW and Queensland to develop an empirical method to estimate fracture height for greenfield sites. The method accounts for the depth of the mining, the width of the longwall panel, the thickness of coal extracted, and the ability of the rock mass to form ‘spanning beams’ above the panels.

The updated numerical model predicted a reduced seepage rate of groundwater into the mining areas. Updated maps indicating the zone of depressurisation within the coal seam and shallow overburden were developed as part of this work.

A routine groundwater monitoring program was implemented in 2018. The program included monitoring groundwater levels and water quality within the existing monitoring bore network. In October 2018 two monitoring bores were installed in areas upgradient of the approved mining to act as reference bores (IBGWR1 and IBGWR2).

Further updates were made to the numerical model in 2022 to improve the model calibration and provide an assessment of impacts associated with an amendment to the mine plan.

3.1.4 Review of groundwater monitoring data

All relevant data was collated and analysed to develop a conceptual understanding of the groundwater regime. Groundwater data collected from the mine monitoring bores has been used to inform this groundwater conceptualisation. Changes to groundwater level and groundwater quality were assessed over the 2023-2025 UWIR period. Changes to groundwater level were assessed by performing a time vs. groundwater level linear regression to identify significant trends, while changes to groundwater chemistry were assessed by performing a Mann-Whitney test to identify changes to the median value for each parameter, followed by a Mann-Kendall analysis to identify trends. The monitoring point/parameter combinations that showed significant Mann-Whitney and Mann-Kendall tests were evaluated against EA Table E2 (Groundwater quality triggers and limits) to determine whether quality limits were exceeded based on the p80 and p95 values from 2023-2025.

3.1.5 Fitzroy groundwater monitoring network

The groundwater monitoring network for the project site originally comprised eight narrow diameter bores at five sites (EFGW series) and two test pumping bores (PT series). Four bores are screened within the alluvium, four within the Triassic Rewan Group and one in the Leichhardt Seam. Fitzroy installed two reference bores (Ref Bore #1 and Ref Bore #2) in October 2018. Ref Bore #1 targets is in the shallow overburden and Ref Bore #2 targets the alluvium. In 2023, Fitzroy installed observation bore IBGW006, targeting the Leichhardt Seam. IBGW006 is proposed to become a compliance bore once sufficient data has been collected. Table 3.1 summarises the bore construction details with Figure A 1 showing the location of the monitoring bores at the project site.

Table 3.1 Groundwater bore details

Bore ID	Screened stratigraphy	Ground Elevation (mAHD)	Screen interval (mbGL)	Bore depth (mbGL)
EFGW1S	Alluvium	282.76	8.7 - 11.7	11.7
EFGW2S*	Alluvium	308.25	1.9 - 4.9	4.9
EFGW2D	Rewan Formation	308.16	25.6 - 28.6	25.6
EFGW3S*	Alluvium	306.04	1.2 - 4.2	4.2
EFGW3D	Rewan Formation	306.14	27.4 - 30.4	30.4
EFGW4S	Alluvium	299.53	1.5 - 4.5	4.5
EFGW4D	Rewan Formation	299.80	37.5 - 40.5	40.5
EFGW5D	Rewan Formation	320.34	56 - 59	59.1
PT1	Leichhardt Seam	329.36	126 - 138	138
IBGWR1	Rewan Formation	325.85	41 – 47	50
IBGWR 2	Rewan Formation	303.69	18 - 24	30
IBGW006	Leichhardt Seam	306.27	410-413	413

Note: * These bores are dry and are not included in Table E1 of the EA.

The groundwater monitoring network described in Table E1 of the EA includes the groundwater bores listed in Table 3.1, with the exception of alluvial bores EFGW2S and EFGW3S. These bores were removed from the EA groundwater monitoring network as results indicate they are dry and therefore don't measure any groundwater.

Spatially distributed groundwater level data were used to characterise groundwater flow directions, gradients and velocities. In addition, time variant variations in groundwater level were used to interpret the rate and distribution of recharge/discharge, depressurisation influence from mining, and pre-development variability in groundwater level.

Groundwater quality data provides useful information on the hydrogeological regime, as it is influenced by interaction with the aquifer matrix, and groundwater recharge/discharge processes.

Salinity is a key constraint to the usability of groundwater resources for productive applications such as potable supply, irrigation, stock watering and industrial applications. If waters with elevated salinity levels are used for incompatible purposes or applications it may result in impacts to agricultural productivity, health and the environment.

A categorisation scheme for salinity proposed by FAO (2013) is presented in Table 3.2. Groundwater salinity in each project monitoring bore sampled in April 2025 has been categorised using these criteria. Note that bore IBGWR1 was inaccessible during April 2025, and so the January 2025 monitoring data was substituted in this case. DNRME bores within 5 km of the project mining area with available groundwater quality data were also categorised.

Although there is one monitoring point (EFGW4S) that has 'fresh' water quality, this bore has only been able to be sampled thrice over the life of the project, as it is frequently inaccessible. The low salinity reported at this point not characteristic of the otherwise brackish to saline regional groundwater in the project area. There are no records indicating that 'fresh' groundwater has otherwise been encountered within 5 km of the project site.

Table 3.2 Salinity Classification Scale

Salinity	Range (TDS mg/l)	# project bores with corresponding salinity	# registered bores within 5 km with corresponding salinity data
Fresh	<500	1	0
Brackish	500 – 1,500	1	20
Moderately saline	1,500 – 7,000	1	7
Saline	7,000 – 15,000	5	0
Highly saline	15,000 – 35,000	3	0
Brine	>35,000	0	0
	Total	**11**	**27**

Major ion data for water quality data collected to date from the project monitoring bores are summarised on a Piper plot (Figure A 6) which categorises water type based on the normalised, relative proportion of each major cation and anion. The data shows minimal variation the groundwater quality within the project area which can be classified as sodium-chloride type water. The piper diagram is based on the relative proportions of the major cations and anions. The results of the groundwater quality data collated for the project are summarised in Appendix C.

3.2 Numerical modelling

The mine has an existing 3D numerical groundwater model that was developed as part of the previous groundwater impact assessments described in Section 3.1.3. The groundwater model results have been used to support the EA application and subsequent EA amendments.

The groundwater model has also been used to inform the UWIR. The model has specifically been used to predict groundwater take and resulting groundwater depressurisation. These predictions have been used to identify Immediately Affected Areas (IAA) and Long Term Affected Areas (LTAA) and assess the impacts of the project on groundwater users and the surrounding environment.

To increase the accuracy of the UWIR, the model was updated to incorporate additional details of the mine layout, reflecting mining progress to date and incorporating the future mining progression as provided by Fitzroy (Figure A 1). Key changes to the mine plan included the removal of the bord and pillar zones, as these will no longer be mined, and updates to the longwall progression as per the schedule provided by Fitzroy.

The key aspects of the model are detailed as follows:

- The numerical groundwater model was developed from the collated dataset (described in Sections 4.2 to 4.5) using MODFLOW software and represents the conceptual groundwater regime described in Section 4.1.
- The model represents the key geological units using 23 model layers and extends 35 km north-south and 27 km east west. The mining area is located in the west part of the model domain.
- Model development was supplemented by published geological maps, digital geology surfaces and information from mining operations near the project mining area and data from the DRDMW groundwater database.
- The Australian Groundwater Modelling Guidelines (Barnett et al., 2012) were used to frame the original model calibration process, which was presented in the previous UWIR. The model was calibrated in steady-state to observed water levels from 36 site and regional bores, and was guided by measurements of hydraulic conductivity from packer tests and pumping tests within the coal seam, as well as operational observations of groundwater inflow into the neighbouring Carborough Downs Coal Mine. The model calibration achieved SRMS of 8.1%.
- For this assessment, the model calibration was assessed against recent groundwater level observations. The hydraulic conductivity of the Leichardt coal seam was reduced to improve model fit to the observed drawdown for bore PT1, ensuring properties remained with reasonable estimates of coal seam hydraulic conductivity. The numerical modelling and sensitivity of predictions is discussed further in Appendix B.
- The numerical model was used to predict the effects of the mining activities on the groundwater regime for the UWIR period. The modelling results were used to inform assessments of the impacts on groundwater users and the surrounding environment. Section 6 describes the groundwater model predictions.
- The sensitivity of the model predictions to the input parameters was tested and involved varying key model parameters in isolation and assessing the influence the change made on predictions of drawdown and groundwater take. Key model parameters were selected based on their potential to influence model predictions. The sensitivity of the model predictions to input parameters was assessed by varying the key parameters in isolation and evaluating their effect on predicted drawdown and groundwater take. The sensitivity analysis tested the range of likely uncertainty by reducing hydraulic conductivity by one and two orders of magnitude, varying specific yield from 0.5-5%, and varying specific storage by an order of magnitude in both directions.
- The changes used to test the model sensitivity include extremes in the potential parameter ranges and encompass the full range of relevant measured values for these parameters.

Appendix B provides the model parameters.

4 Groundwater regime

4.1 Overview

The project site is located on the north-western flank of the Bowen Basin, a sedimentary basin comprising Permian to Triassic age geology (Figure A 13). A veneer of more recent weathered sediments typically overlies the Bowen Basin strata (Figure A 10). Localised basalt and alluvium deposits are also present within the mine site and its surrounds.

The relevant hydrogeological units of the mine site and its surrounds broadly comprise:

- thin localised Quaternary alluvium associated with Bullock Creek, Spade Creek, Alpha Creek and Hat Creek;
- a thin, highly weathered and heterogeneous veneer of semi-consolidated sandstone, mudstone and other minor sediments associated with the Tertiary Suttor Formation, duricrusted palaeosols at the top of deep weathering profiles, colluvium and regolith;
- low permeability sediments of the Rewan Group which also include a surface weathering profile; and
- permian sediments of the Rangal Coal Measures (including the target Leichhardt Seam) and the deeper Fort Cooper Coal Measures and Moranbah Coal Measures.

Figure A 7 shows a conceptual cross-section of the geology and groundwater regime within the mine site and its surrounds. This illustrates the main hydrogeological processes and mechanisms relevant to the project groundwater regime, including recharge, flow directions, discharge, and anthropogenic activities (i.e. mining).

The main groundwater-bearing formations are the coal seams of the Permian sediments. The coal seams have been significantly depressurised and impacted by mining and gas production activities at nearby operations. The Rewan Group is a low permeability formation that is a regionally recognised aquitard.

The alluvium and Tertiary sediments do not form permanent, saturated aquifers, and persistent groundwater occurs only where these sediments extend below the regional water table.

The Tertiary sediments include the Tertiary Suttor Formation which is predominantly a quartzose sandstone/conglomerate unit with minor multicoloured claystone and mudstone and bands of ironstone and silcrete. The Suttor Formation unconformably overlies the Permian and Triassic strata and forms a capping on the hills and ridges (prominent ridge escarpments), rising up to 40 m above the surrounding land surface. These escarpments occur on the eastern boundary and part of the northern and southern boundaries, and as remnant knolls within the project area. They do not form permanent, saturated aquifers, as they occur above the regional groundwater table.

The Clematis Group and basalt are not a significant feature of the local groundwater regime due to their distance from the mining activities.

Recharge occurs predominantly via direct and diffuse rainfall to the Tertiary sediments, localised areas of alluvium, and weathered Triassic/Permian strata. A portion of the rainfall moves downwards to the groundwater table then moves through the system following the hydraulic gradient. This interaction will be enhanced during periods of creek flow (e.g. resulting from significant rain events). Recharge to the Tertiary sediments, Rewan Group and Permian sediments will occur where these units sub-crop below the alluvium.

The regional water table varies within 5 m to 13 m of the surface along the creeks where they are incised into the topography. In areas of higher topographic elevation, the water table deepens from 20 m to over 60 m below the ground surface. That is, the regional groundwater flow is a subdued reflection of the topography from northeast to the southwest (as shown on Figure A 9), towards lower lying areas and the existing the Broadlea North Coal Mine to the south. A gentle hydraulic gradient of approximately 0.005 (1:200) has been calculated from local groundwater levels.

Groundwater quality within the project site and its surrounds ranges from moderately saline to highly saline. Regionally, groundwater generally is saline within the Triassic and Permian sediments. There are no known groundwater users in the project site or its surrounds.

Similarly, and as discussed in Section 3.1.1, there is no take of groundwater from the surrounding CSG wells which are all exploration and appraisal wells of which none are operational.

4.2 Quaternary Alluvium

4.2.1 Distribution

As discussed in Section 4.1, alluvium is mapped as occurring along parts of Bullock Creek, Spade Creek, Alpha Creek and Hat Creek. The distribution of mapped alluvium is shown on Figure A 10. Monitoring bores drilled within the mapped alluvium extents did not intersect alluvial sediments except in EFGW2S, EFGW1S and IBGWR2. Similarly, alluvium was not encountered elsewhere within the project site. Its occurrence is confined to a narrow band along the creeks and tributary channels and is relatively thin between <1 m and 10 m, averaging a few metres in thickness. Where alluvium is present, saturated alluvium was only intersected in the lower reaches of Alpha Creek before it flows into Bullock Creek, where it was assessed to be 10 m deep with the lower half saturated. The saturated extents of alluvium are shown in Figure A 11. Figure A 12 shows the variable nature of the creek beds within the mine site, ranging from a sandy base to rock bars where there is no alluvium. The bed sands within the creek will be inundated during periods of rainfall and following ephemeral creek flow. However, the bed sands are thin and will dry rapidly following cessation of creek flows.

4.2.2 Hydrogeological parameters

The hydraulic conductivity of the alluvium is highly variable depending on whether the alluvium consists of clayey or silty sands or clean sands and gravels. Due to the thin saturated thickness and localised occurrence of groundwater in the alluvium, yields are very low. There are no farm bores that have been constructed in the alluvium which confirms that the saturated sections are localised and that the yield is unreliable.

4.2.3 Recharge, flow, and discharge

Recharge to the alluvium occurs via:

- direct rainfall infiltration to the alluvium; and
- seepage of perennial surface water flows into the creek bed resulting in localised continuous recharge through the alluvium that will dissipate to the surrounding groundwater regime.

4.2.4 Groundwater quality

Groundwater monitoring data shows that the quality of groundwater in the alluvium reflects recharge by river flow and by direct infiltration of rainfall. Groundwater is variable from typically brackish to moderately saline with an acidic to slightly alkaline pH and low concentrations of metals.

4.2.5 Groundwater yields and use

There are no water supply bores targeting the alluvium within 5 km of the project site.

4.3 Tertiary Sediments

4.3.1 Distribution

As discussed in Section 4.1, the Tertiary sediments which include remnant Tertiary sandstone that outcrop east of the project site, are elevated well above the surrounding land surface and are expected to be unsaturated. Elsewhere, these sediments therefore comprise a shallow, highly weathered and heterogeneous veneer of low permeability Tertiary sediments that do not contain any significant volumes of groundwater and are often dry. The distribution of mapped Tertiary sediments are shown on Figure A 10.

The Tertiary sediments are not a significant aquifer for the purposes of this assessment.

4.3.2 Hydrogeological parameters

The Tertiary sediments have a low hydraulic conductivity range due to a predominantly low bulk hydraulic conductivity that is dominated by clay (regionally it would be comparable to that for the underlying weathered Rewan Group).

4.3.3 Recharge, flow, and discharge

The Tertiary sediments are recharged by direct infiltration from rainfall where these sediments are present at the surface. Recharge also occurs via seepage from the alluvium, where present.

Recharge rates are low due to the predominately clayey nature of the formation. Within the mine, the Tertiary sediments were assessed to be dry with groundwater not intersected in any of the monitoring bores drilled on site.

4.3.4 Groundwater quality

Where present, regional groundwater quality within the Tertiary sediments is typically brackish to saline. The groundwater quality is therefore broadly comparable to the underlying Rewan Group.

4.3.5 Groundwater yields and use

The Tertiary sediments are commonly regarded as an aquitard and typically exhibit very low yields (less than 0.1 L/s).

No groundwater supply bores are known to target the Tertiary sediments within 5 km of the project site.

4.4 Triassic Rewan Group

4.4.1 Distribution

As discussed in Section 4.1, the Rewan Group sub-crops within the project site. The mapped extents of the Rewan Group are shown on Figure A 10.

The Rewan Group is uniformly saturated at depth (i.e. below the groundwater table) and may become unsaturated where it outcrops or sub-crops above the regional groundwater table. The Rewan Group typically host the regional groundwater table in the vicinity of the mine site and is therefore typically saturated within the mine site and its surrounds.

The Rewan Group is a recognised regional aquitard and acts as a confining unit overlying the Permian sediments.

4.4.2 Hydrogeological parameters

In-situ permeability testing at the mine site as part of the initial studies in 2008 indicated a low permeability for shallow sections of the Rewan Group, with hydraulic conductivity values between 0.03 and 0.08 m/d (AGE, 2008).

The Rewan Group is characterised by low primary porosity and as a result, groundwater movement is controlled by local fracture sets. Where fractures are intersected this unit shows slightly higher permeability, and conversely, where limited fractures are intersected this unit shows lower permeability associated with the primary porosity. Bulk permeability of this unit is therefore constrained by the degree of connection between any localised fractures.

4.4.3 Recharge, flow, and discharge

The Rewan Group is recharged via direct rainfall infiltration in outcropping areas and via seepage from overlying units including the Tertiary sediments and alluvium, where present. The rates of recharge are considered to be relatively low, compared to the alluvial aquifer. Regionally, the groundwater flow direction follows the regional topography toward the southwest where it slowly discharges to the underlying Permian sediments (Figure A 9).

4.4.4 Groundwater quality

Groundwater monitoring data shows that groundwater quality at the project site and its surrounds is brackish to saline and neutral to slightly alkaline with low concentrations of metals. The groundwater quality is therefore broadly comparable to the Permian sediments. The low permeability of this formation and long groundwater residency times is reflected in the concentrations of dissolved minerals that are elevated in comparison to the alluvium.

4.4.5 Groundwater yields and use

The Rewan Group exhibits low yields within the project site and its surrounds (typically less than 1 L/s) that would commonly be regarded as characteristic of an aquitard.

No groundwater supply bores are known to target the Rewan Group within 5 km of the project site.

4.5 Permian Sediments

4.5.1 Distribution

As discussed in Section 4.1, the Permian sediments include the Rangal Coal Measures and the underlying Fort Cooper Coal Measures. The mapped extents of these Permian sediments are shown on Figure A 10.

Groundwater storage and movement occurs within fractures and cleats that intersect the coal seams. Other sediments in the coal overburden and interburden sequence exhibit very low permeability and form discrete confining units between the coal seams. The Permian sediments may therefore be categorised into the following hydrogeological units:

- hydraulically "tight" and hence very low yielding to essentially dry sandstone and siltstone that comprise the majority of the inter-burden/overburden; and
- low to moderately permeable coal seams which are the primary water bearing strata within the Permian sediments.

The Permian sediments are uniformly saturated within the majority of the project site. Where the coal measures outcrop in the east of the project site and beyond, they may become unsaturated.

4.5.2 Hydrogeological parameters

The hydraulic conductivity within the Permian sediments is a function of fracturing and grain size within the various sedimentary units of the coal measures. The spacing and nature of cleating are the primary controls on hydraulic conductivity within the coal seams.

Regionally, the coal seams and the sediments between, above and below the coal seams have a hydraulic conductivity ranging from and 5.3 x 10^{-6} m/day to 0.01 m/day (AGE, 2008). The permeability data has been determined from permeability testing for the Burton Coal Mine, coal seam gas investigations at MCG Ellensfield No. 1 well and the nearby Carborough Downs Coal Mines.

4.5.3 Recharge, flow, and discharge

The Permian sediments are recharged slowly by direct rainfall on (predominantly where coal seams outcrop) and downward seepage from the overlying strata. The rate of recharge may be enhanced where the coal measures subcrop against the overlying strata. Overall, the rate of recharge remains low.

Regionally, groundwater flow is to the southwest and potentially to mining areas such as nearby Broadlea North Coal Mine (Figure A 8). Groundwater discharge into overlying formations is negligible within the vicinity of the project site.

4.5.4 Groundwater quality

Groundwater quality at the project site and its surrounds is slightly alkaline to alkaline and moderately saline to saline with low concentrations of metals.

4.5.5 Groundwater yields and use

Regionally, groundwater yields from the coal seams are typically low, (i.e. less than 1 L/s). There are no known groundwater supply bores in the Permian sediments within 5 km of the project site.

5 Environmental values

Environmental Values and Water Quality Objectives for the Isaac River Sub-basin surface waters and groundwaters are described by DEHP (2011). DEHP (2011) divide the Isaac River basin into a series of surface water catchments, and groundwater zones. For surface water the site is located within the "Upper Isaac northern tributaries" catchment that includes Teviot Brook. For groundwater the site is within the "Isaac Groundwaters" Zone 34. Zone 34 is a zone of commonly saline groundwater with a Sodium-Chloride water type composition. Table 5.1 summarises the types of Environmental values identified for surface water and groundwater within the Northern Isaac River catchment zone.

Table 5.1 Summary of Environmental Values – Isaac Northern Tributaries and Isaac Groundwaters (DEHP 2011)

Environmental value	Isaac - Northern Tributaries Surface Waters	Isaac Groundwaters
Aquatic ecosystems	✓	✓
Irrigation	✓	✓
Farm supply/uses	✓	✓
Stock water	✓	✓
Aquaculture	✓	
Human consumer	✓	
Primary recreation	✓	✓
Secondary recreation	✓	
Visual recreation	✓	
Drinking water	✓	✓
Industrial use	✓	
Cultural and spiritual values	✓	✓

The Environmental Values identified as occurring elsewhere in the Northern Isaac catchment do not apply at the site as there are no permanent surface water bodies within the tributaries of Teviot Brook. The creeks are ephemeral and there are no permanent pools or wetlands. The water table at the mine site is deeper than the level of the creek beds and does not flow into surface water bodies. The groundwater is brackish to saline meaning that the only potential Environmental Value for groundwater at the site is for stock water in areas where salinity permits this usage.

The site is only in the early stages of the project life, and therefore exercise of underground water rights is not expected to have created any historical impacts to Environmental Values. Section 6.6.76.6.7 discusses potential impacts on environmental values due to the exercise of underground water rights for the three UWIR year period, and over the life of the resource tenure.

6 Groundwater impact assessment

6.1 Introduction

The project involves the development of an underground mine that utilises longwall mining methods. Longwall mining will involve dewatering the underground workings which will result in depressurisation of the overlying and surrounding strata.

Longwall mining will also result in subsidence of the strata above the mined longwall panels due to physical removal of coal from the target seam. Subsidence is predicted to fracture the overlying strata, and this has the potential to enhance the depressurisation effects of mine dewatering.

Although some areas of bord and pillar workings were originally proposed, they were not mined as expected during project years 1-3. It is pertinent to note that the bord and pillar mine layout was specifically designed with sufficient roadway and pillar strength to ensure that there would be no caving and the underground workings will be stable and safe, and consequently no significant subsidence was expected to occur above the workings.

The following sections provide a detailed assessment of the potential impacts of these activities, as follows:

- Section 6.2 presents the predicted groundwater take over the UWIR period.
- Section 6.3 presents the groundwater drawdown during the UWIR period.
- Section 6.4 presents the groundwater drawdown over the mine life.
- Section 6.5 presents changes to groundwater quality.
- Section 6.6 describes potential impacts to groundwater users and the environment.

6.2 Groundwater take

Changes to the mining schedule resulted in a reduced volume of ROM coal extracted, and consequently the predicted volume of groundwater inflows for the first three years of mining is lower than previously estimated. Table 6.1 shows the predicted and revised predicted groundwater inflows for mining years 1-6 with the updated numerical model, compared to the original predicted inflows from the first UWIR. The values in parenthesis indicate the sensitivity of predicted inflows to the specific yield of the coal seam, which was varied by half an order of magnitude during the modelling process (from 0.5 to 5% specific yield) as per the previous UWIR.

As anticipated, the volume of predicted inflows increases for the current UWIR period, as development intersects the water table and there is increased drainage from the overlying strata in the fracture zone above the mined longwall panels.

Table 6.1 Predicted volume of groundwater take

Mining Year	UWIR	Current UWIR Predicted Inflow (ML) Base Case and Sensitivity of Coal Seam Sy	Previous UWIR Predicted Inflow (ML)
Year 1	1st UWIR period	7 (5 – 27)	37
Year 2		19 (14 – 60)	107
Year 3		39 (32 – 94)	85
Year 4	Current UWIR period	87 (70 – 222)	-
Year 5		136 (109 – 351)	-
Year 6		127 (105 – 296)	-

The modelled groundwater take represents the theoretical volume of groundwater that could be removed from the groundwater regime. The actual volume of groundwater pumped from the underground mining area is commonly less that that predicted by the numerical model, as a component of the groundwater will be lost to wetting of surfaces, ventilation and retained moisture within the extracted coal. The groundwater take presented in Table 6.1 does not account for the abovementioned losses that will occur when converting groundwater take to mine dewatering rates.

A point-in-time estimate of mine inflows was provided by Fitzroy (personal communication, 30 September 2023) by taking the difference between the pumped inflows and outflows at Ironbark. Fitzroy calculated that at present, the water take is thought to be around 0.67 ML/day, which is 245 ML/year. This is consistent with the range of inflows predicted by the groundwater model. It should be noted that inflows will be highest during active mining of a longwall panel and will decline rapidly following depressurisation of the overlying fractured strata.

Further validation of the modelled inflows could not be achieved, as the recent site water balance report (HydroBalance, 2025) used coal production rates based on the original proposed mine plan (HEC, 2018) which exceeds the current rate; a visual inspection (refer to Figure 3.5 of HydroBalance, 2025) shows predicted inflows of around 1.15ML/day during 2025. Hydrobalance (2025) note that the groundwater inflows used for their reporting may be overestimated.

6.3 Groundwater drawdown during the UWIR period

Groundwater levels measured in the monitoring bore network are shown in Figure A 14. The groundwater levels remain stable, with the only drawdown observed to date at bore PT1, which is screened in the target Leichhardt Seam. This is to be expected as mine development operations only intersected groundwater in July 2022 and mining progression has been slower than first proposed.

The trend analysis (Table 6.2) confirms that the predicted groundwater levels are consistent with those previously modelled. The alluvial water levels have increased although there is no significant trend, and water levels in the Rewan Formation have increased or decreased, with both significant and insignificant trends. In the Leichhardt Seam, drawdown has occurred as expected at PT1, while there is no drawdown at IBGW006. Current model predictions show that IBGW006 remains outside of the IAA and LTAA over the life of mine.

Table 6.2 Groundwater level trends 2023-2025

Bore	Formation	Slope	R-Squared	p-value	Trend	Significance
EFGW1S	Alluvium	4.2E-04	0.01	0.822	Increasing	Not significant
EFGW2D	Rewan Formation	7.8E-05	0.21	0.179	Increasing	Not significant
EFGW2S	Alluvium	-	-	-	Bore dry	-
EFGW3D	Rewan Formation	-8.0E-04	0.72	0.002	**Decreasing**	**Significant**
EFGW3S	Alluvium	-	-	-	Bore dry	-
EFGW4D	Rewan Formation	-1.4E-04	0.17	0.241	Decreasing	Not significant
EFGW4S	Alluvium	1.1E-03	0.30	0.101	Increasing	Not significant
EFGW5D	Rewan Formation	-3.7E-04	0.01	0.792	Decreasing	Not significant
PT1	Leichhardt Seam	-1.4E-02	0.81	0.000	**Decreasing**	**Significant**
IBGWR1	Rewan Formation	1.1E-04	0.48	0.039	**Increasing**	**Significant**
IBGWR2	Rewan Formation	-3.5E-04	0.72	0.002	**Decreasing**	**Significant**
IBGW006	Leichhardt Seam	1.6E-04	0.33	0.174	Increasing	Not significant

Figure A 15 to Figure A 17 show the predicted depressurisation within the water table for the coming UWIR period. Figure A 19 to Figure A 21 show the predicted depressurisation within the target Leichhardt Seam. During the UWIR period, depressurisation of the water table and Leichhardt Seam is generally localised to the mining area in the northern part of the project site and its surrounds within approximately 1 km of the project site boundary. The extent of depressurisation is constrained by the physical limit of the coal seam to the west of the mining area.

The figures also show the extent of the IAA in the water table and Leichhardt Seam respectively. The IAA encompasses the area where drawdown is predicted to exceed the applicable bore trigger threshold of 5 m for consolidated aquifers over the three year UWIR period. There are no water supply bores within the IAA.

No depressurisation is predicted to occur in the Tertiary sediments or the alluvium as a result of mining in the project mining area. Sensitivity analysis of key model parameters showed little impact to the extent of the IAA for the current UWIR period (Appendix B).

6.4 Groundwater drawdown over the mine life

Figure A 18 and Figure A 22 shows the approved predicted maximum drawdown and depressurisation within the water table and Leichhardt Seam respectively at the end of mining.

Figure A 18 shows the drawdown at the water table is most significant within the northern portion of the mining footprint where the coal seam and associated fracture network generated by mining is closer to the surface and the water table. In this area the model predicts approved drawdown to the base of the coal seam and therefore full dewatering of the Rewan Group overlying the mining areas. The model also indicates that drawdown will propagate from the mining area in the north along the strike of the coal seam towards the west in areas where the coal seam remains relatively shallow and relatively more permeable. Further to the south the magnitude of the drawdown from the approved mine plan within the mining footprint reduces as the mining and associated fracture network becomes deeper, and the coal seam hydraulic conductivity reduces due to pressure from the overlying strata.

The mine will locally depressurise the Leichhardt Seam within the mining area and its surrounds by up to approximately 400 m over the life of the mine (Figure A 22). Depressurisation is greatest in the southern part of the mine site, where the depth of mining is greatest (approximately 450 m below ground level), and therefore the groundwater pressure is greatest.

Figure A 18 and Figure A 22 also show the extent of the LTAA in the water table and Leichhardt Seam. The LTAA encompasses the area where drawdown over the life of the mine is predicted to exceed the applicable bore trigger threshold of 5 m for consolidated aquifers. There are no water supply bores within the LTAA.

6.5 Groundwater quality

The quarterly groundwater quality samples were assessed over both the UWIR period 2023-2025 and the entire period of record to determine whether significant ($p < 0.05$) changes were present (refer to Appendix C for water quality data). First, summary statistics were prepared for each monitoring point, to facilitate comparison of the 2023-2025 UWIR period against historic data (Appendix D). Next, statistical tests were conducted. For bores with five or more observations, a Mann-Whitney test was used to identify significant shifts in the median value for each bore/parameter combination. Second, a Mann-Kendall analysis was used to identify significant trends, both increasing and decreasing, over the UWIR period. Where the tests showed significant changes to both median and trend, the 80th and 95th percentiles were compared to EA Table E2 (Groundwater quality triggers and limits) to identify exceedances.

For compliance bore EFGW1S, screened in alluvium, the increased iron levels over the UWIR period (Table 6.3) were attributed to two factors. Prior to 2024, the bore was not purged prior to sampling, and this resulted in elevated concentrations of both iron and arsenic. Second, enhanced solubility of iron as a function of increasing chloride concentration followed a groundwater recharge event in 2024 (C&R Consulting, 2025), resulting in temporarily increased iron concentration. The last two rounds of sampling (Appendix C) have shown iron concentrations below the limit of reporting (LOR).

For EFGW4D, screened in the shallow overburden of the Rewan Formation, enhanced Sulfate and dissolved Manganese levels were also attributed to chloride enrichment (C&R Consulting, 2025). For the last two rounds of sampling, Sulfate concentrations remained below the 80th percentile Limit A, while Manganese increased to a value between the 80th and 95th percentiles following a period of non-exceedance from mid-2023.

For PT1 in the Leichhardt seam, the Electrical Conductivity (EC) was last below the 80th percentile limit in August 2022. However, the EC of PT1 (12,200 µS/cm in July 2025) is consistent with the new Leichhardt seam bore IBGW006 (12,600 µS/cm) at the same date. As IBGW006 is outside of the IAA and LTAA, it is likely that the elevated EC is within normal range for the coal seam aquifer, and a future update to the groundwater quality triggers and limits should be considered once sufficient data has been collected for IBGW006.

Table 6.3 Significant bore/parameter water quality changes for 2023-2025 UWIR period

Bore	Parameter	# Obs	# Obs pre-2023	# Obs 2023-2025	Mann-Kendall Trend	80th% 2023-2025	95th % 2023-2025
EFGW1S	Arsenic	37	26	11	Decreasing	No concern	No concern
EFGW1S	Iron	37	26	11	**Increasing**	**Exceedance**	**Exceedance**
EFGW1S	Sulfate	37	26	11	Decreasing	No concern	No concern
EFGW2D	Electrical Conductivity	38	27	11	Decreasing	No concern	No concern
EFGW2D	Manganese	38	27	11	Decreasing	No concern	No concern
EFGW2D	Sulfate	38	27	11	Decreasing	No concern	No concern
EFGW4D	Manganese	35	25	10	**Increasing**	**Exceedance**	**Exceedance**
EFGW4D	Sulfate	35	25	10	**Increasing**	**Exceedance**	**Exceedance**
PT1	Arsenic	38	27	11	Decreasing	No concern	No concern
PT1	Electrical Conductivity	38	27	11	**Increasing**	**Exceedance**	**Exceedance**

6.6 Environmental impacts

This section describes the operational impacts of the project for the UWIR reporting period on:

- groundwater resources;
- groundwater users;
- surface water features;
- springs;
- groundwater dependent ecosystems; and
- groundwater quality.

The groundwater assessment also investigated potential impacts on groundwater quality due to the use of hydrocarbons and chemicals.

6.6.1 Impacts on groundwater resources

Groundwater resources within the project site and its surrounds are located within the Isaac Connors Groundwater Management Area (GMA). The Isaac Connors GMA is managed under the Water Plan (Fitzroy Basin) and comprises two groundwater units. Groundwater Unit 1 includes the Isaac River alluvial aquifer and Groundwater Unit 2 comprises all other sub-artesian aquifers.

The Isaac River alluvium is located 15 km west of the project site at its closest point. There is no drawdown within the Isaac River alluvium as a result of the project, hence there will be no groundwater take from alluvium (i.e. Groundwater Unit 1). As a result, the project will not impact on this groundwater resource.

Groundwater depressurisation is limited to the coal seam and Permian and Triassic sediments which form part of Groundwater Unit 2. Table 6.1 shows the predicted groundwater take associated with the mine, and hence, Groundwater Unit 2. The project is predicted to result in a total groundwater take of up to approximately 349 ML from Groundwater Unit 2 over the UWIR period.

As discussed in Section 1.2, the project's groundwater take and associated groundwater impacts have been approved under the EP Act.

6.6.2 Impacts on groundwater users

A bore census was carried out to identify water supply bores within and surrounding the project site that could potentially be impacted by the project. The bore census drew upon information gathered through previous groundwater studies, consultation with landholders, advice from the proponent, and a search of the DNRME groundwater database.

The bore census was targeted towards bores and properties that could potentially be impacted by the project due to their proximity to proposed mining activities. The local hydrogeology was also taken into account in planning the bore census. The bore census included a conservative search radius of 5 km beyond the boundary of the project mining lease area.

The bore census indicated that groundwater use is uncommon in the area. Where used it is typically opportunistic and dispersed over a wide area due to the generally low yields and access to alternative supplies (i.e. surface water dams).

The bore census confirmed that there are no water supply bores within the mine site. There are also no water supply bores within the IAA or the LTAA. The bore census did confirm the presence of a single water supply bore (RN81908) approximately 1.3 km south of the project site southern mining lease boundary (Figure A 3). As discussed in Section 3.1.1, this bore is located on the Burton Mine site, which is operated by Bowen Coking Coal. The land underlying the Ironbark No. 1 Mine is owned by Malcolm Burston. It is understood that the owner has access to an alternative water supply and therefore this bore is not used as a sole water supply to the property.

This bore is screened in the Rewan Group. As discussed in Section 6.3, the mine is not predicted to result in any depressurisation in the vicinity of Bore RN81908. As a result, this bore is unlikely to be affected by the project.

The Broadlea water supply borefield is located to the south-east of the project site and targets the Tertiary basalt aquifer. This borefield is owned by Fitzroy. As discussed in Section 6.3, the project is not predicted to result in any depressurisation of the Tertiary basalt in the vicinity of these bores and therefore the Broadlea water supply borefield is unlikely to be affected by the project.

As discussed in Section 1.2, the project's impacts on groundwater users has been approved under the EP Act.

6.6.3 Impacts on surface drainage

Figure A 3 shows the drainage setting of the project.

The mine site is traversed by Spade Creek, Hat Creek, Alpha Creek and their tributaries. Bullock Creek is located on the western boundary of the project site and is a tributary of Teviot Brook. These creeks and their tributary drainage features are ephemeral and are characterised by short duration, surface water flows that are typically restricted to periods during and immediately after rainfall events. This is consistent with creek observations made during the 2008 and 2018 field investigations. This is also supported by surface water flow data collected from DNRME's surface water gauging stations sited downstream of the project mining area and groundwater modelling predictions, which both indicate no perennial flows in the vicinity of the project site.

Groundwater is currently located at depths of approximately 5 m to 13 m below ground level in the vicinity of the main channels of Spade Creek and the tributary of Bullock Creek, respectively. The depth to groundwater increases to approximately 30 m below ground level further to the northeast of the project site.

The separating depth between the bed of these creeks and the groundwater table means that there is no direct interconnection between the groundwater table and surface water flows in this area. Groundwater does not provide baseflow to surface waters in the vicinity of the project site.

As discussed in Sections 6.3 and 6.4, the mine is not predicted to lower the regional groundwater table. The project will therefore not result in impacts on surface waters or any reduction in stream baseflow.

As discussed in Section 1.2, the project's impacts on surface drainage have been approved under the EP Act.

6.6.4 Impacts on springs

As discussed in Section 3.1.2, there are no springs within the project site or its surrounds.

6.6.5 Impacts on groundwater dependent ecosystems

The Australian Groundwater Dependent Ecosystem Toolbox (GDE Toolbox), prepared by the National Water Commission (2011), defines GDEs as:

> *"Ecosystems that require access to groundwater to meet all or some of their water requirements so as to maintain the communities of plants and animals, ecological processes they support, and ecosystem services they provide".*

The potential for GDEs to be present within the project site was reviewed, with the review consisting of:

- a search of the Queensland Springs Database;
- a search of the Bureau of Meteorology's (BoM) GDE Atlas;
- groundwater field investigations; and
- a desktop review of groundwater monitoring data and modelling results.

The Queensland Springs Database indicated that no spring wetlands are located within the project site or its surrounds.

The BoM GDE mapping (described in Section 3.1.2) indicates several potential GDEs in the project site, namely Bullock, Spade and Alpha Creeks and associated drainage lines.

As discussed, in Section 4.1, the main groundwater-bearing formations are the (Leichhardt) coal seams of the Permian sediments. The regional groundwater table in the project site is at least 5 m below ground level, and more typically more than 10 m below ground level. The regional groundwater table is located in the Tertiary basalt, Tertiary sediments and deeper alluvium where these units extend below the regional groundwater surface. These geological formations overlie the coal measures, including the target Leichhardt Seam. The groundwater assessment predicted that the mine will locally depressurise the Leichhardt Seam around the project mining area, but will not affect the regional groundwater table located in the Tertiary and alluvial formations, nor will it change the depth of groundwater within these formations within the project site or surrounds.

As a result, the project is not anticipated to affect the availability of groundwater for any vegetation communities, including for any groundwater dependent communities which may be located in the project site. This conclusion is consistent with observations of vegetation communities at other local mining operations, where there has been no observed effect on riparian vegetation from mining activities. It is therefore concluded that the project will not impact GDEs.

As discussed in Section 1.2, the project's impacts on GDEs have been approved under the EP Act.

6.6.6 Impacts on groundwater quality

The mine will involve the limited use of chemicals and hydrocarbons as part of the mining activities.

The storage of hydrocarbon and chemicals will be managed in accordance with the EA which requires Fitzroy resources to implement and maintain a Waste Management Plan for the mine. This will include the use of bunding and immediate clean-up of spills which are standard practice and a legislated requirement at mine sites that will prevent the contamination of the groundwater regime.

Given the limited activities proposed, and the controls that will be adopted, the project has a very limited potential to give rise to groundwater contamination as a result of hydrocarbon and chemical contamination.

Water samples are collected from the groundwater monitoring network and analysed for the presence of hydrocarbons. No significant contamination is evident in the dataset.

As discussed in Section 1.2, the project's impacts on groundwater quality have been approved under the EP Act.

6.6.7 Impacts on formation integrity and environmental values

Over the 3-year UWIR period and the life of the project, the formations overlying the Leichardt Seam will experience fracturing associated with subsidence, with the height of the fracturing being related to the depth of the mining, the width of the longwall panels, the thickness of coal extracted, and the ability of the rock mass to form 'spanning beams' above the panels. As the mine progresses down dip to the east, the zone of fracturing will occur at an increasing depth below the surface. This is reflected in the zone of predicted drawdown that becomes less extensive towards the east due to the increasing depth of mining and reducing permeability of the coal seams.

There are no geological formations within the stratigraphic sequence at the site that form productive aquifers, and also no stratigraphic units that form aquitards that need their integrity maintained to protect overlying aquifers from subsidence fracturing and depressurisation impacts. The entire Permian and Triassic sequence has a moderate to low permeability comprised of hydraulically "tight" and hence very low yielding to essentially dry sandstone and siltstone that comprise the majority of the inter-burden/overburden. The Environmental Values identified as occurring in the Northern Isaac catchment do not apply in the area of the site as there are no permanent surface water bodies in proximity to mining. The water table at the site is deeper than the level of the creek beds, and groundwater therefore does not provide baseflow to surface water bodies. The groundwater is brackish to saline meaning that the only potential Environmental Value for groundwater at the site is for stock water in areas where salinity permits this usage. There are no private water supply bores within the IAA or LTAA and therefore subsidence fracturing and associated drawdown during the three year UWIR period, and over the life of the resource tenure are of no consequence to Environmental Values. Therefore, the exercise of underground water rights, whilst effecting groundwater levels locally around the mining area will not have a significant environmental impact on the groundwater regime.

7 Groundwater monitoring program

7.1 Groundwater level and quality monitoring

The mine operates an extensive groundwater monitoring network in accordance with the Ironbark No.1 EA. In accordance with Table E1 of the EA and as described in Section 3.1.5, the EA groundwater monitoring network comprises nine monitoring bores located on the mine site (Figure A 5), with IBGW006 to be added as a compliance bore once sufficient data has been collected.

The purpose of the EA groundwater monitoring network is to monitor groundwater levels and water quality within the coal seams, shallow overburden and alluvium in response to mining.

The design of the existing EA groundwater monitoring network is based on the relatively low risk groundwater regime at the site, where no productive aquifers occur, and the only Environmental Value is for stock water. Whilst there is potential for use of groundwater as stock water, there are no private water supply bores installed for this purposes located within the IAA or LTAA.

The existing EA groundwater monitoring program targets key formations in the mining area and its surrounds and is therefore suitable for monitoring the effects of the mine on the groundwater regime and will continue to be utilised throughout the life of the project. Given the low risk groundwater regime at the site the existing EA monitoring program is considered fit for purpose.

In accordance with the requirements of the Ironbark No.1 EA, the following monitoring will be undertaken at the EA groundwater monitoring bores:

- Groundwater levels will be recorded on a quarterly basis, which will enable natural groundwater level fluctuations (such as seasonal responses to rainfall) to be distinguished from potential water level impacts due to depressurisation resulting from mining activities. It is also designed to monitor changes in the IAA and the LTAA.
- Groundwater quality monitoring will be undertaken on a quarterly basis to enhance the existing baseline dataset available prior to commencement of the project. This will be used to detect any changes in groundwater quality during and post-mining. Water quality samples will be analysed for physico-chemical parameters including pH, electrical conductivity, alkalinity, hardness, major ions (Ca, Mg, Na, K, Cl and SO4), metals and metalloids (As, Al, Pb, Fe, Zn and Mn) and total petroleum hydrocarbons.

The monitoring program and rationale is summarised in Table 7.1.

Table 7.1 Summary of groundwater monitoring program

Bore ID	Screened stratigraphy	Water level measurement	Water quality analysis ^	Frequency	Rationale
EFGW1S	Alluvium	✓	✓	quarterly	downstream monitoring of shallow water table
EFGW2S*	Alluvium	✓	✓	quarterly	detect any ephemeral perched water table
EFGW2D	Rewan Formation	✓	✓	quarterly	assess changes in water levels and water quality because of the exercise of relevant underground water rights
EFGW3S*	Alluvium	✓	✓	quarterly	detect any ephemeral perched water table
EFGW3D	Rewan Formation	✓	✓	quarterly	assess changes in water levels and water quality because of the exercise of relevant underground water rights
EFGW4S	Alluvium	✓	✓	quarterly	detect any ephemeral perched water table
EFGW4D	Rewan Formation	✓	✓	quarterly	assess changes in water levels and water quality because of the exercise of relevant underground water rights
EFGW5D	Rewan Formation	✓	✓	quarterly	assess changes in water levels and water quality because of the exercise of relevant underground water rights
PT1	Leichhardt Seam	✓	✓	quarterly	assess changes in water levels and water quality because of the exercise of relevant underground water rights
IBGWR1	Rewan Formation	✓	✓	quarterly	reference conditions
IBGWR2	Rewan Formation	✓	✓	quarterly	reference conditions
IBGW006	Leichhardt Seam	✓	✓	quarterly	reference conditions

Notes: * These bores are dry and are not included in Table E1 of the EA.

^ pH, electrical conductivity, alkalinity, hardness, major ions (Ca, Mg, Na, K, Cl and SO4), metals and metalloids (As, Al, Pb, Fe, Zn and Mn) and total petroleum hydrocarbons.

All samples for groundwater quality shall be collected after the bore is appropriately purged. Groundwater samples will be collected in accordance with the relevant guidelines and conventions specified in the "Monitoring and Sampling Manual" (DES, 2018), and in compliance with e.g. AS/NZS 5667:11 1998 (Australian/New Zealand Standards, 2016). The samples will be preserved and forwarded to a NATA accredited water laboratory for analysis.

The groundwater monitoring data will be reviewed annually, and the groundwater monitoring program revised, as necessary. The monitoring data and will be provided to OGIA on an annual basis.

In the event that the monitoring program identifies a significant departure from the prediction, an investigation will be undertaken to identify the cause and manage any unexpected impacts associated with the project.

No water bores are present on the project site, hence a Baseline Assessment Plan (BAP) and associated monitoring is not required.

7.2 Groundwater take monitoring

Fitzroy has an existing obligation to quantify its actual groundwater take under the Mineral Resources Act 1999 (MR Act). The DNRME Guideline for quantifying the volume of take of associated water under a mining lease or mineral development license (Groundwater Take Guideline) describes the acceptable methods for monitoring and quantifying actual groundwater take under the MR Act. The acceptable methods include direct measurement, water balance modelling, and numerical/analytical groundwater flow modelling.

In accordance with the requirements of the MR Act, Fitzroy will continue to assess actual groundwater take using the acceptable methods. The method used will be reviewed annually and revised, as necessary. The groundwater monitoring will provide data that can be used to validate the modelled estimates of water take, and identify any unexpected groundwater effects due to mining operations.

The actual groundwater take assessed under the MR Act requirements will be compared to the predicted groundwater take presented in this UWIR. This comparison will be undertaken annually. If the monitoring program shows groundwater take exceeds the predictions presented in this UWIR, an investigation will be undertaken to confirm whether the actual impacts on groundwater users or sensitive environmental features are likely to be significantly greater than expected. The investigation outcomes will be considered as part of the annual UWIR review described in Section 8.

8 UWIR Review and updates

8.1 Roles and responsibilities

Fitzroy is responsible for ensuring that the UWIR is implemented.

8.2 Review and revision

As discussed in Section 5, depressurisation of the water table Leichhardt Seam is expected to exceed the bore trigger threshold.

Hence, Fitzroy will undertake an annual review of the accuracy of the IAA and LTAA mapping, as required by Section 376(1)(e) of the Water Act.

The review process will comprise:

- An initial review of any new geology or groundwater data to identify potentially significant departures from the data used in the UWIR to develop the IAA and LTAA mapping.
- Where potentially significant departures are identified, the potential effect of these departures on the IAA and LTAA will be investigated.
- If the investigation concludes that the IAA or LTAA are likely to have been under-estimated and additional water bores are likely to be affected, the IAA and LTAA will be revised.

The UWIR has been designed to align with the current EA groundwater conditions. It is therefore necessary to review and update the UWIR in response to any material changes to the EA groundwater conditions.

8.3 Reporting and record keeping

The outcome of each annual review will be reported to the DES and the Office of Groundwater Impact Assessment following completion of each annual review. The reported outcomes will include a statement of whether there has been a material change in the information or predictions used to prepare the maps.

9 Conclusions

The key conclusions of this UWIR are as follows:

- The impacts of the project over the UWIR period and the life of the mine have been assessed and approved under the EP Act as part of the grant of the Ironbark No.1 EA.
- The approved mining operations will result in localised drawdown in the water table and depressurisation of the Leichhardt Seam.
- The other potential aquifers and shallow formations (i.e. the Tertiary basalt, Tertiary sediments and alluvium) are largely unsaturated, and are not predicted to be affected by the project.
- The project will not impact surface waters or alluvial aquifers during the UWIR period because:
  - alluvium is mostly absent from the project site and its surrounds;
  - where present, alluvium is typically dry and unsaturated and does not represent a significant aquifer; and
  - the significant depth of cover over the project mining area during the UWIR period (up to 200 m) and the low permeability interburden of the Permian and Triassic sediments will reduce significant depressurisation of the shallow formations.
- There are no groundwater users or other sensitive receptors near the mining area and therefore no significant groundwater impacts as a result of the project.
- There is a very low potential for groundwater contamination as a result of the project.

10 References

Australasian Groundwater and Environmental Consultants Pty Ltd. (AGE), 2008, *"Ellensfield Coal Mine Project, Groundwater Impact Assessment"*, Project No. G1407 prepared by Australasian Groundwater and Environmental Consultants Pty Ltd for Ellensfield Coal Management Pty Ltd, December 2008.

Barnett et al, (2012), *"Australian groundwater modelling guidelines"*, Waterlines report, National Water Commission, Canberra.

Hansen Bailey, 2018, *"Ironbark No.1 Project, Response to Additional Information Request",* letter report to Department of Environment and Science.

Australian/New Zealand Standards, 2016, *"Water Quality – "Sampling, Part 11: Guidance on sampling of groundwaters"*, AS/NZS 5667.11:1998, ISO 5667-11:1993, Reconfirmed 2016.

C&R Consulting, 2025, "*Ironbark No. 1 Coal Mine. Annual Groundwater Monitoring Report*". Prepared for Fitzroy, March 2025.

DES. 2021. *"Guideline: Underground water impact reports and final reports*". Brisbane: Department of Environment and Science Government.

DES. 2018. *"Monitoring and Sampling Manual"*: Environmental Protection (Water) Policy. Brisbane: Department of Environment and Science Government.

Department of Environment and Heritage Protection (DEHP 2011). *"Environmental Protection (Water) Policy 2009 Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Isaac River Sub-basin (including Connors River)"* September 2011.

Ditton and Merrick (2014). *"A new subsurface fracture height prediction model for longwall mines in the NSW coalfields"*, Australian Earth Sciences Convention Newcastle7-10 July 2014.

DNRME. 2020*. "Guideline: Quantifying the volume of associated water taken under a mining lease or mineral development licence".* Brisbane: Department of Natural Resources, Mines and Energy.

Food and Agricultural Organisation of the United Nations (2013), *"The use of saline waters for crop production",* Chapter 2, by J.D. Rhoades, A. Kandiah and A.M. Mashali.

HydroBalance, 2025, "*Ironbark No. 1 Coal Mine. Water Balance Model Report*", Fitzroy Coal Management Pty Ltd, Doc. Ref.: FCM-010-B1, 28 July 2025.

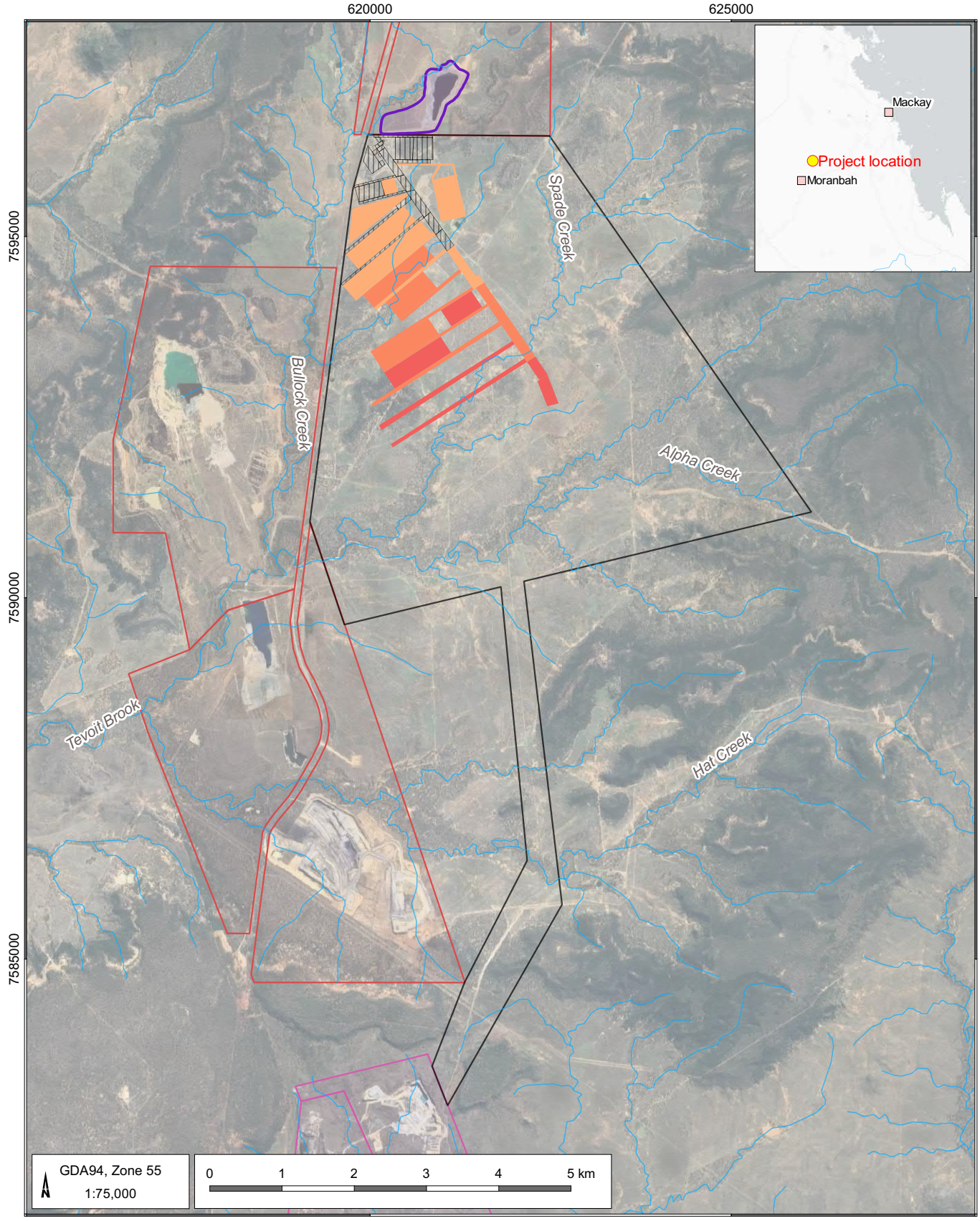
National Water Commission (2011), *"Australian groundwater-dependent ecosystems toolbox part 1: assessment framework",* Commonwealth of Australia, 2011.

Panday S., Langevin C.D., Niswonger R.G., Ibaraki M. and Hughes, J.D. (2013): *"MODFLOW-USG version 1: An unstructured grid version of MODFLOW for simulating groundwater flow and tightly coupled processes using a control volume finite-difference formulation";* U.S. Geological Survey Techniques and Methods, book 6, chap. A45, 66 p.

HydroAlgorithmics, 2014 *"Algomesh User Guide, Version 1.4",* March 2014.

Appendix A

Figures



LEGEND

- Creeks
- Project Mining Lease Boundary
- Broadlea North Coal Mine
- Burton Coal Mine
- Burton Pit

Mine Progression (Year)

- End of 2025
- Year 1 (End of 2026)
- Year 2 (End of 2027)
- Year 3 (End of 2028)

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

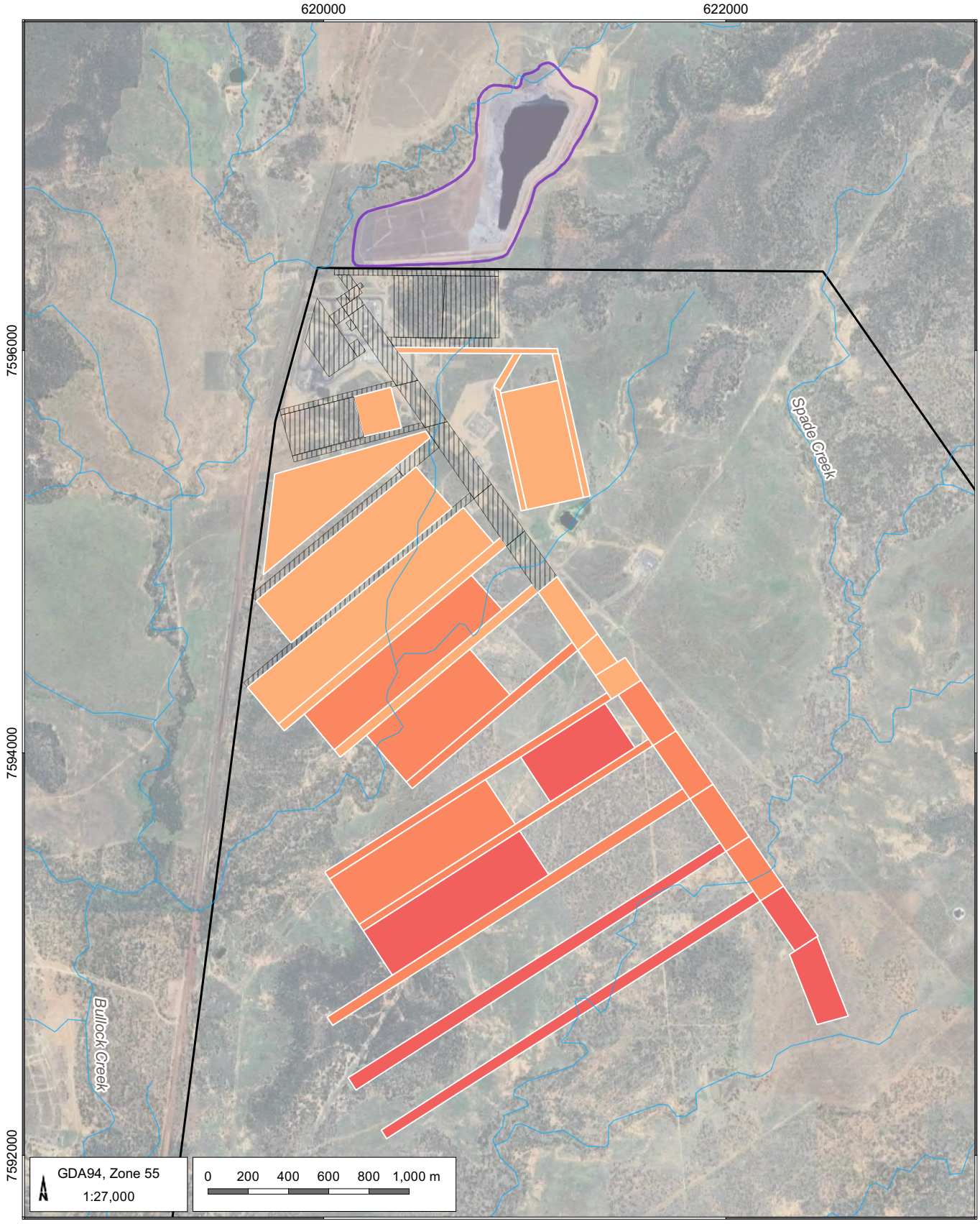
Mine location and setting

AGE

DATE
01/10/2025

FIGURE No:
A 1

G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 01_IRB5005_Mine location and setting.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Burton Pit

Mine Progression (Year)

- End of 2025
- Year 1 (End of 2026)
- Year 2 (End of 2027)
- Year 3 (End of 2028)

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Mine layout

AGE

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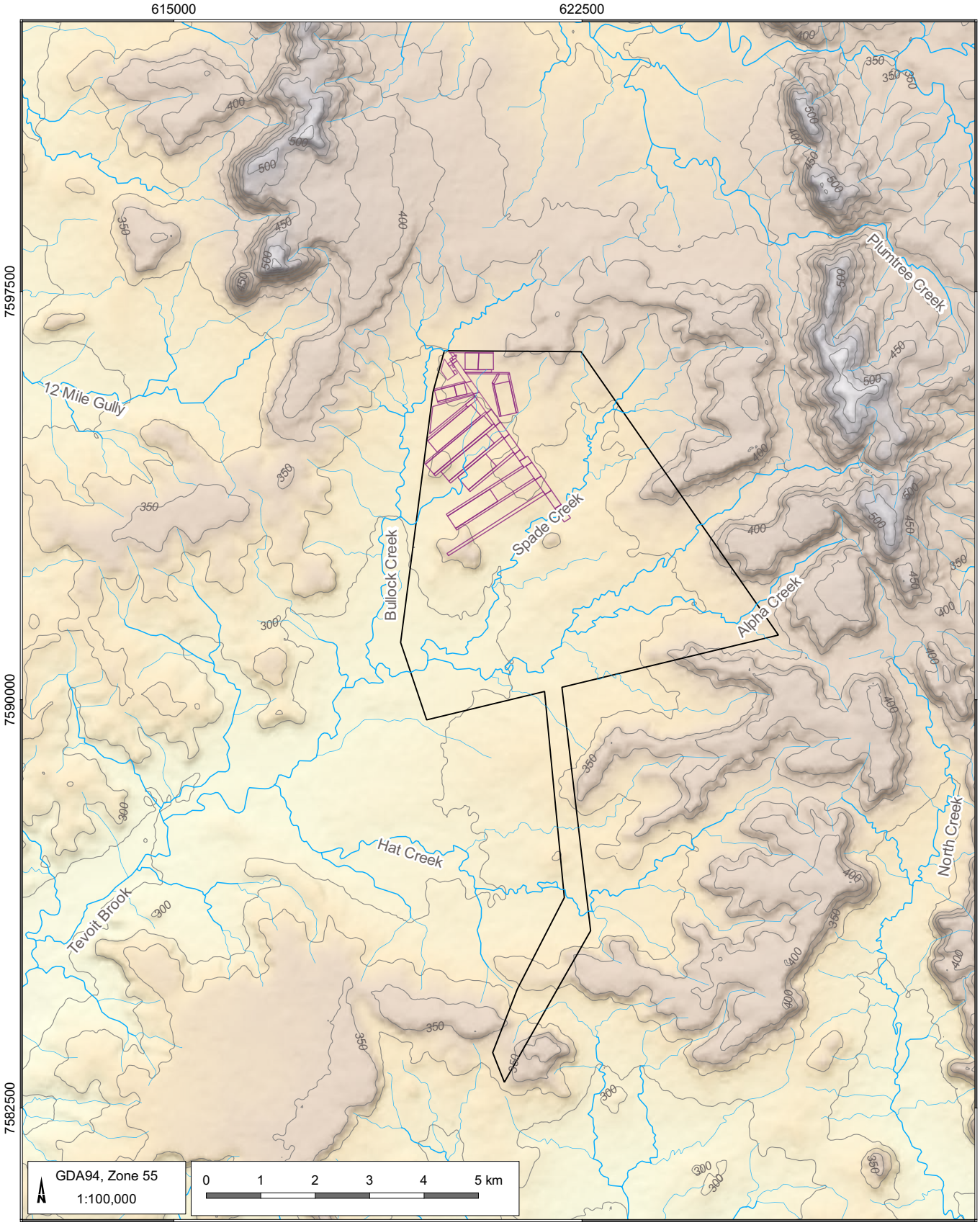
FIGURE No: **A 2**

G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 02_IRB5005_Mine layout.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Mine Plan

Elevation (mAHD)

- 275
- 325
- 350
- 450
- 500
- 550
- Elevation contour

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

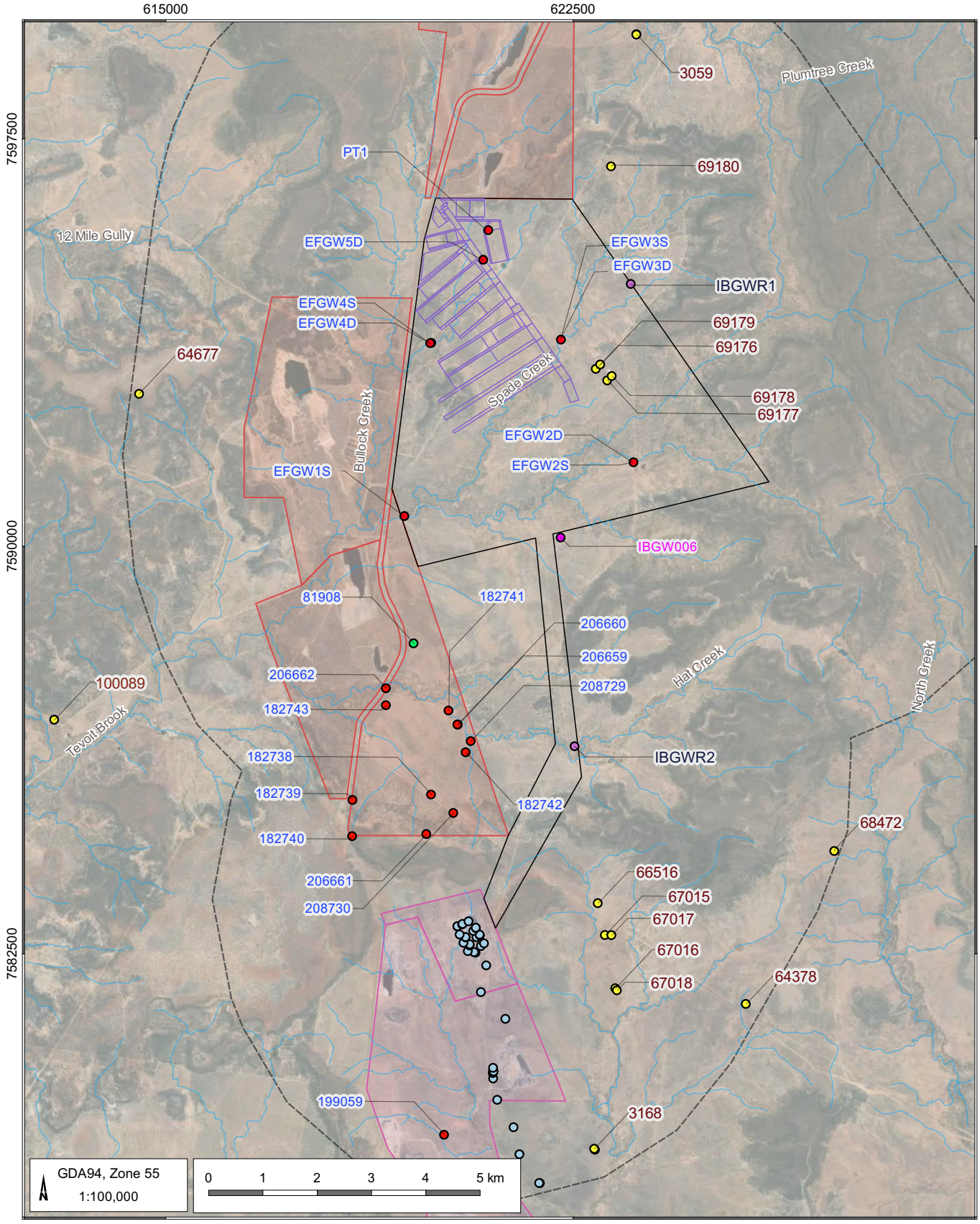
Topography and drainage

AGE

DATE 01/10/2025

FIGURE No: **A 3**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 03_IRB5005_Topography and drainage.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Broadlea North Coal Mine
- Burton Coal Mine
- Mine Plan
- 5km radius Project Mining Lease Boundary
- Mine groundwater monitoring bores
- Reference bore
- Registered watersupply bore
- Broadlea North Mine borefield;groundwater monitoring network
- CSG appraisal well
- Proposed compliance bore

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

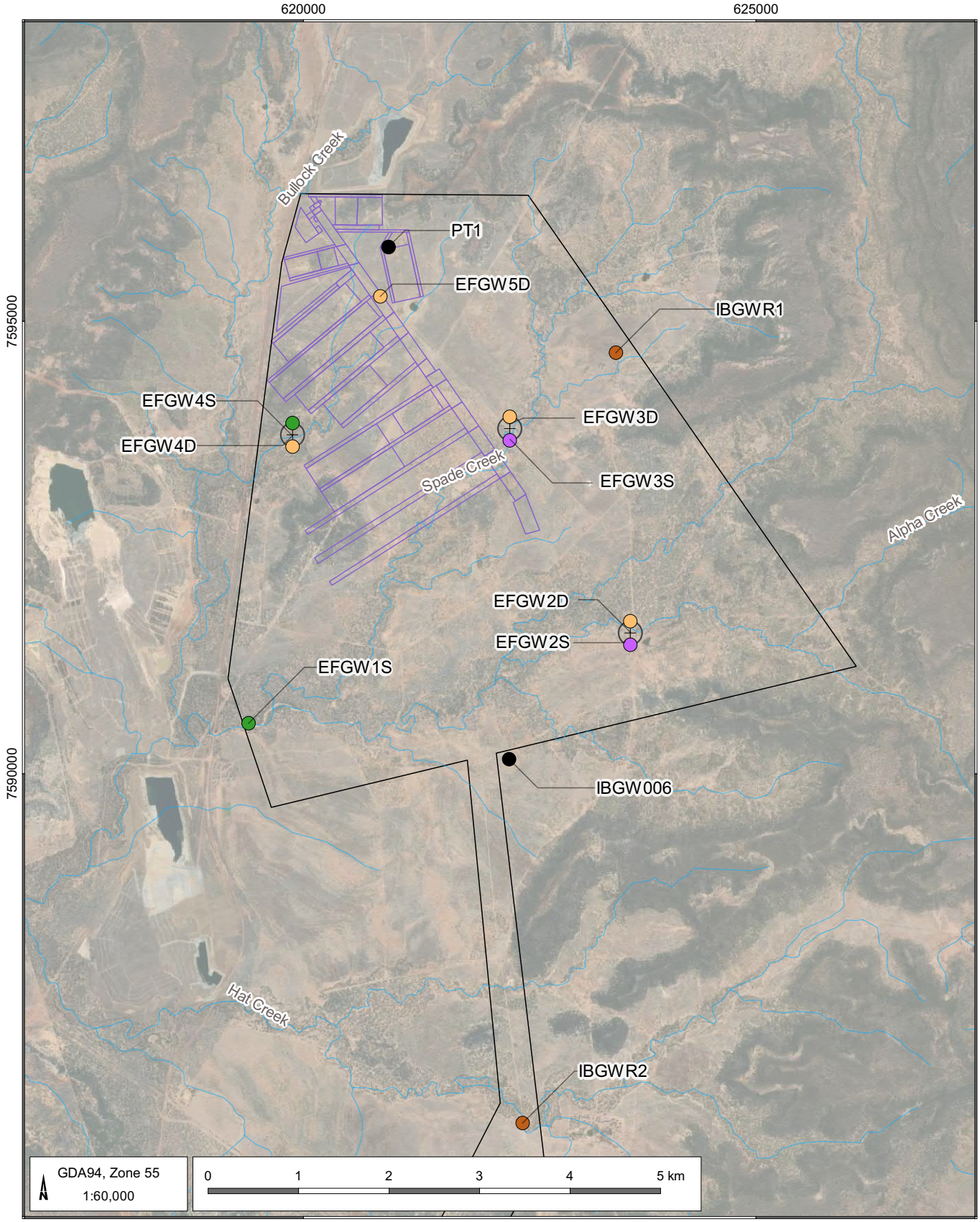
DNRM Registered bores

AGE

DATE 01/10/2025

FIGURE No: **A 4**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 04_IRB5005_DNRM Registered bores.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Mine Plan

EA Table E1 groundwater monitoring bores

- Alluvial bores
- Dry alluvial bores
- Shallow overburden bores
- Leichhardt Seam bores
- Reference bore

EFGW1S : BoreID

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Mine groundwater monitoring network

AGE

DATE
01/10/2025

FIGURE No:
A 5

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 05_IRB5005_Mine groundwater monitoring network.qgz

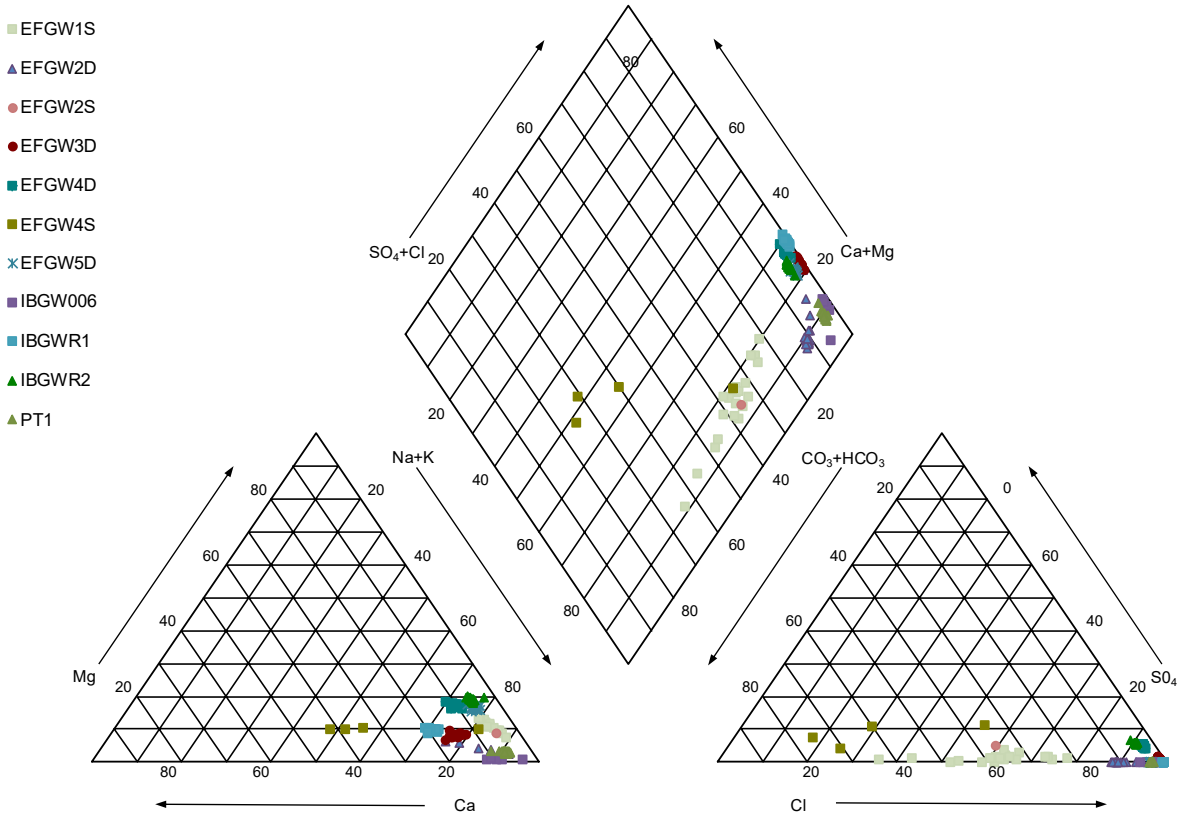
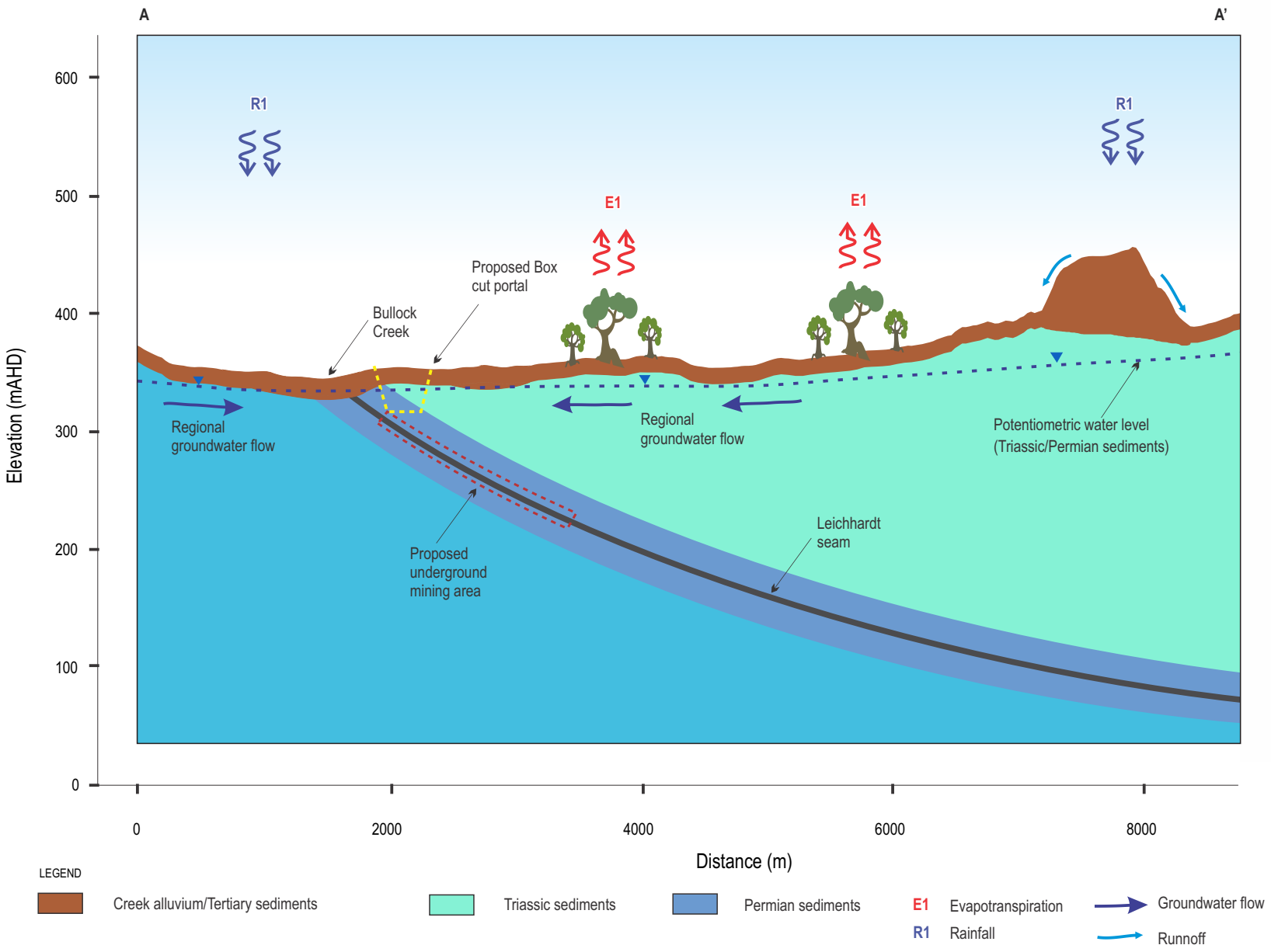


Figure A 6 Piper diagram

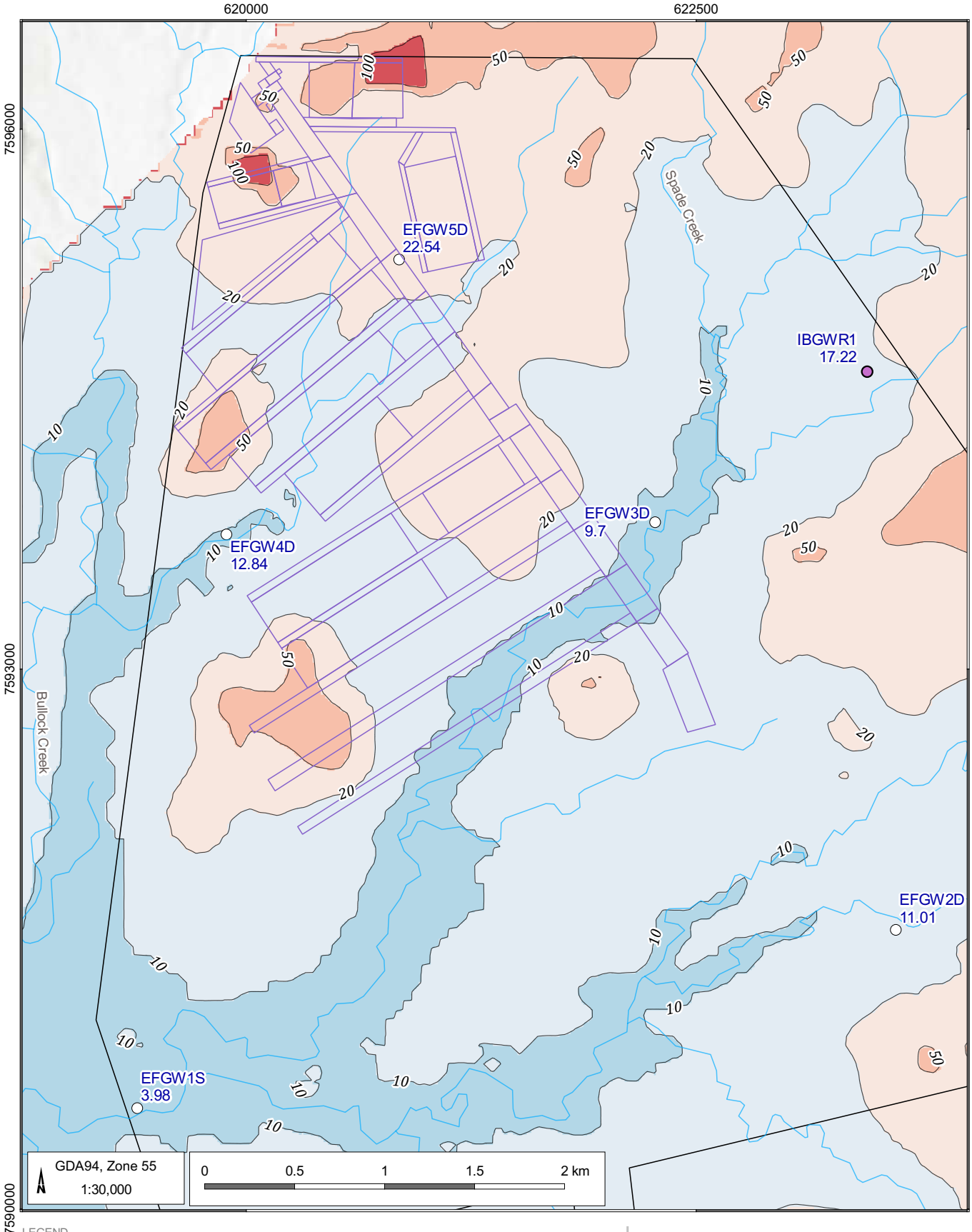


Conceptual hydrogeological model

Figure - A 7

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

AGE



LEGEND

- Creeks
- Project Mining Lease Boundary
- Mine plan
- Contour line
- Mine monitoring bore
  EFGW2D : BoreID
  13.2 : Water table depth (mbgl)
- Reference bore

Depth to water table (m)

- <= 0
- 0 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 80 - 100
- >100

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Interpreted depth to water table

AGE

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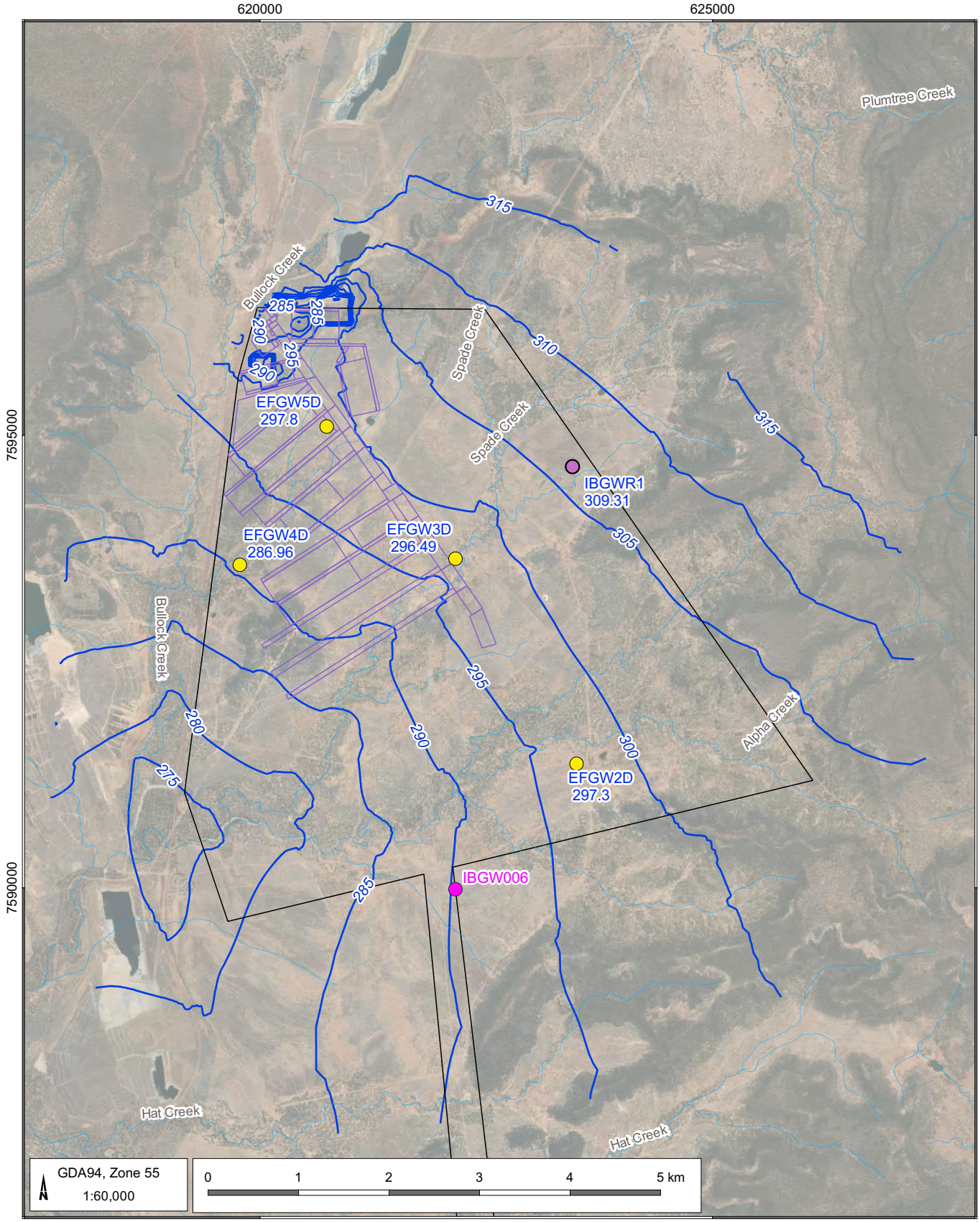
FIGURE No: **A 8**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 08_IRB5005_Depth to regional water table.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Mine Plan
- Depth bore (EFGW - series)
  EFGW2D : BoreID
  297.31 : Groundwater elevation (mAHD)
- Reference bore
- Proposed compliance bore

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Interpolated groundwater contours

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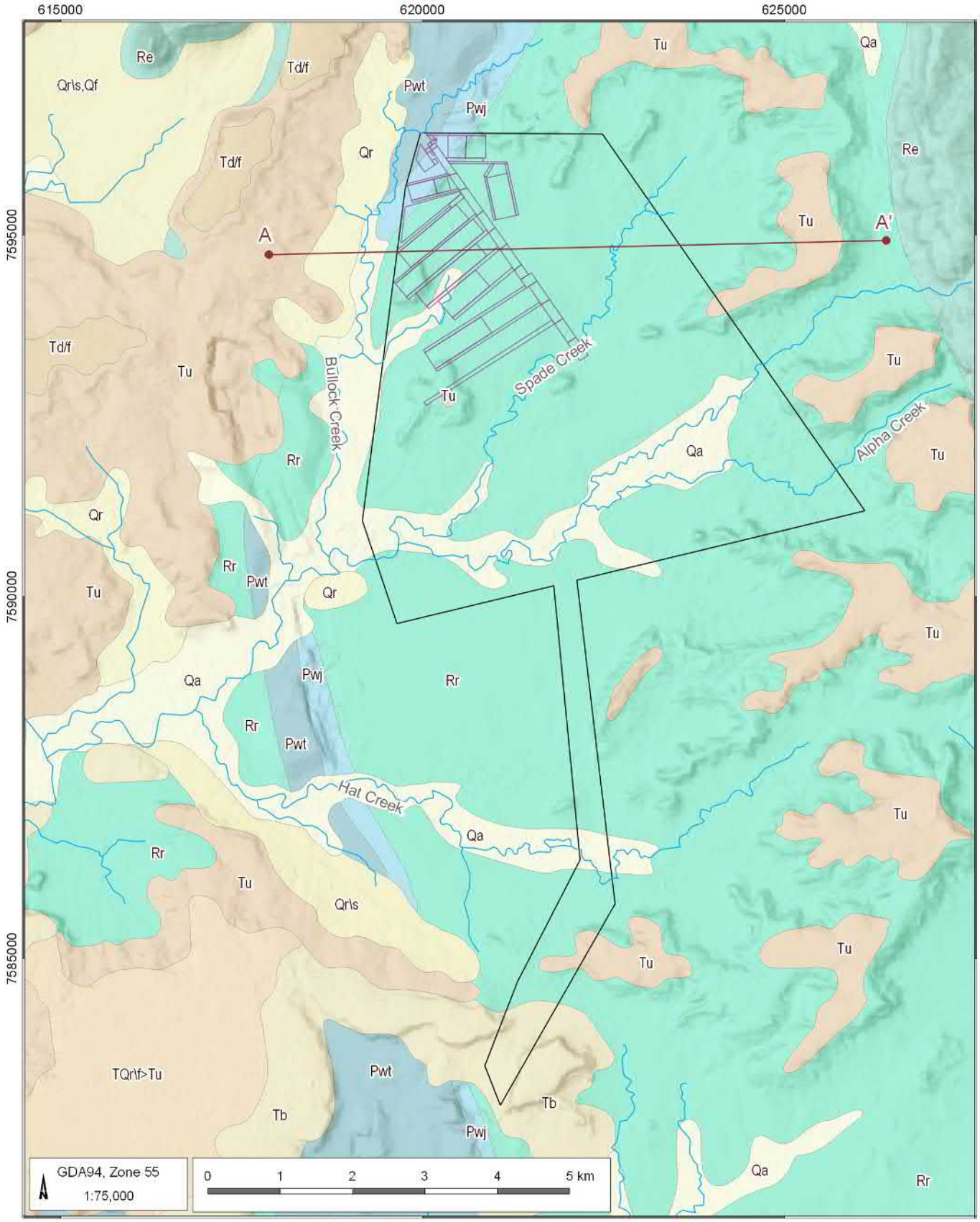
01/10/2025

FIGURE No:
A 9

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 09_IRB5005_Interpolated groundwater contours.qgz



LEGEND

- Creeks
- Conceptual Cross Section line (A -A')
- Project Mining Lease Boundary
- Mine Plan

Creek Alluvium

- Qa - Quaternary alluvium
- Qa\f - Alluvial fan
- Qr\s -Residual soil/colluvium
- Qr - Residual soil/colluvium

Tertiary Sediments

- TQr\f >Tu - Suttor Formation
- Tb - Tertiary basalt
- Td\f - Ferricrete
- Tu - Tertiary sediments

Triassic Sediments

- Re - Clematis Group
- Rr - Rewan Group

Permian Sediments

- Pwj - Rangal Coal Measures
- Pwt - Fort Cooper Coal Measures

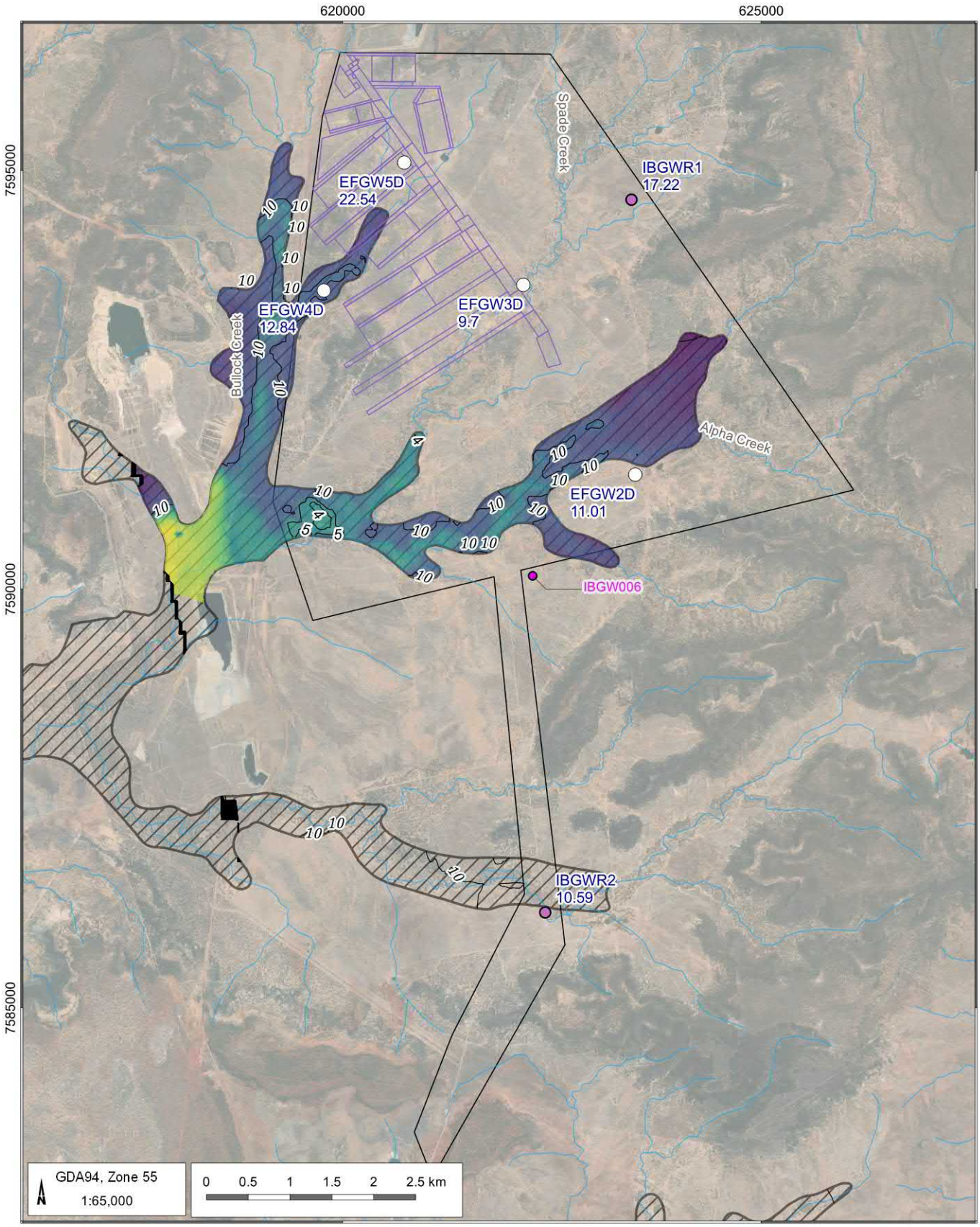
Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Surface geology

AGE

DATE 01/10/2025

FIGURE No: **A 10**



LEGEND

- Creeks
- Project Mining Lease Boundary
- Alluvium extent
- Deep bore
- Reference bore
- Proposed compliance bore
- Contour line

Depth to water table (m)

- 1
- 5
- 8
- 10
- 20

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Saturated alluvium extents

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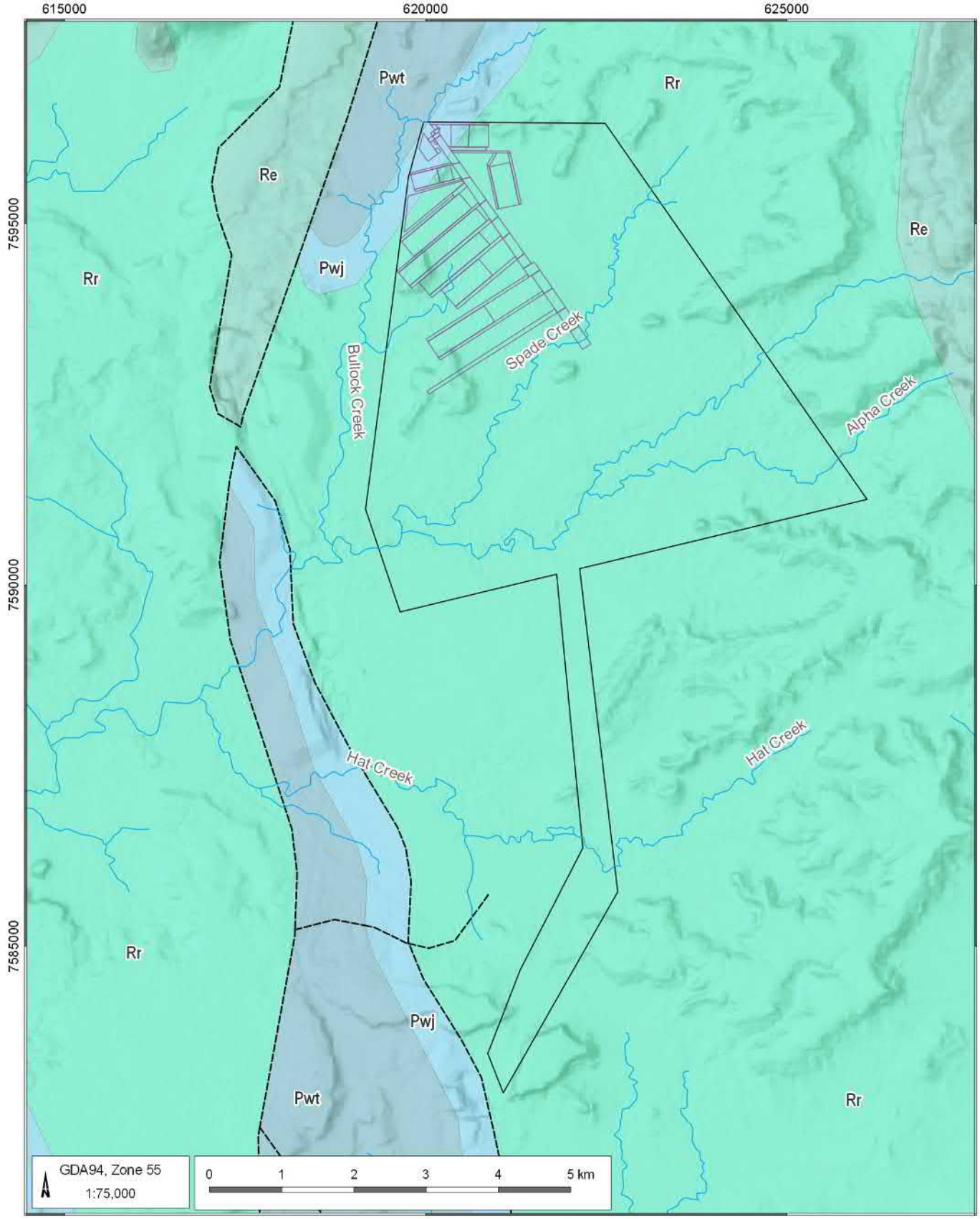
FIGURE No. **A 11**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 11_IRB5005_Saturated alluvium extents.qgz

Figure A 12 Drainage line photographs in Project area



LEGEND

- Creeks
- Fault
- Project Mining Lease Boundary
- Mine Plan

Solid geology

- Re-Clematis Group
- Rr-Rewan Formation
- Pwj-Rangal Coal Measures
- Pwt-Fair Hill Formation/Fort Cooper Coal Measures

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Bowen Basin geology

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FIGURE No: **A 13**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
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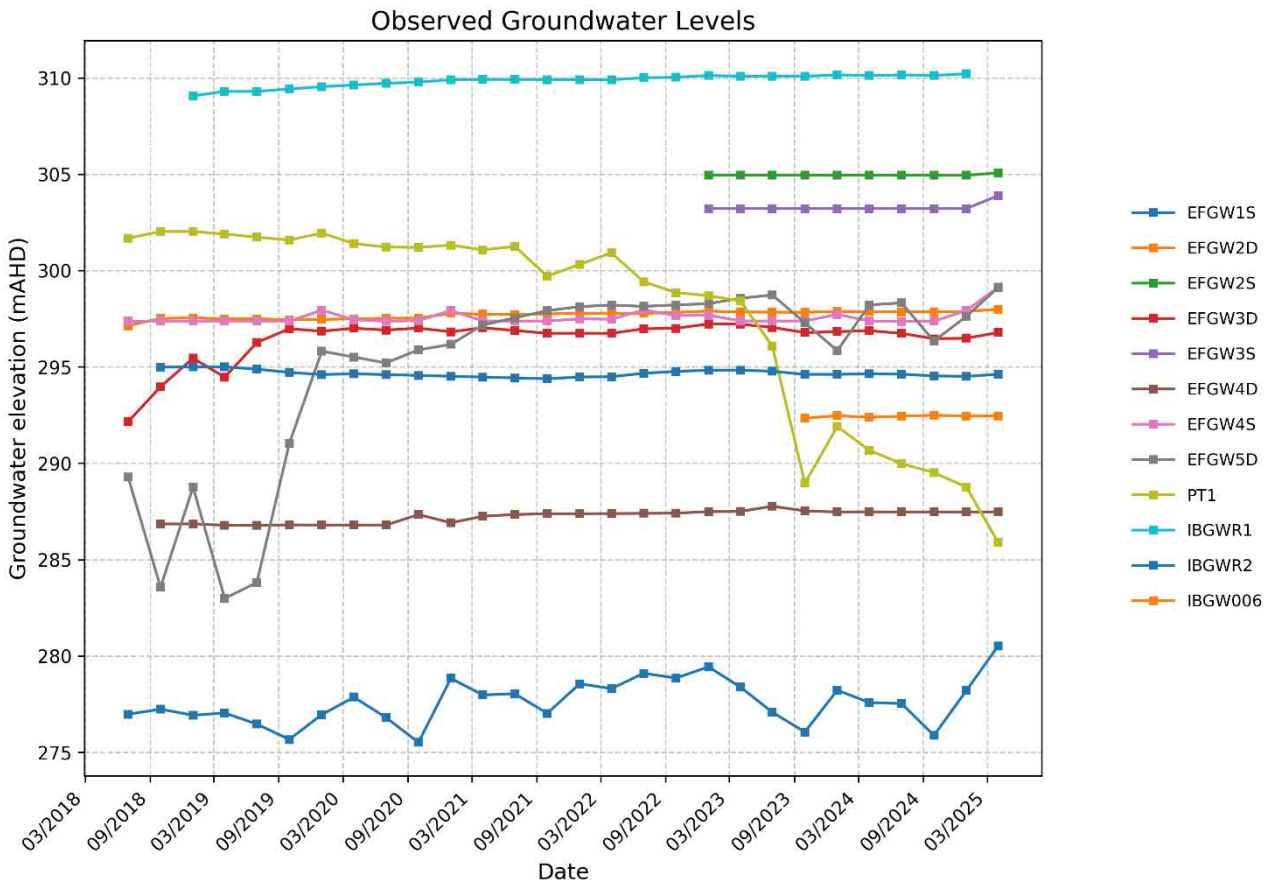
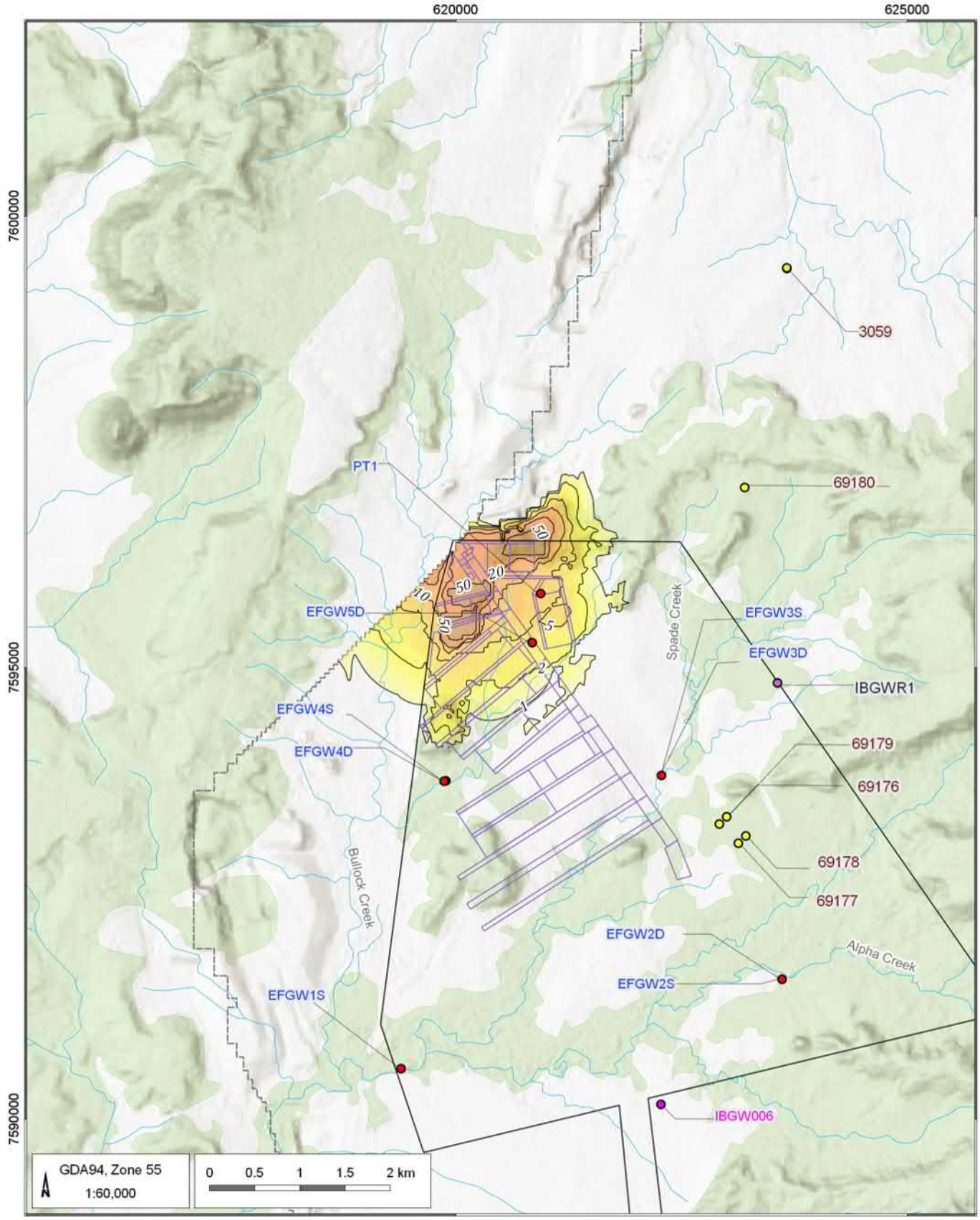


Figure A 14 Measured groundwater levels in monitoring bores



LEGEND

- Creeks
- Drawdown contour (m)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0
- 1
- 2
- 5
- 10
- 20
- 50
- 100
- 200
- 500

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

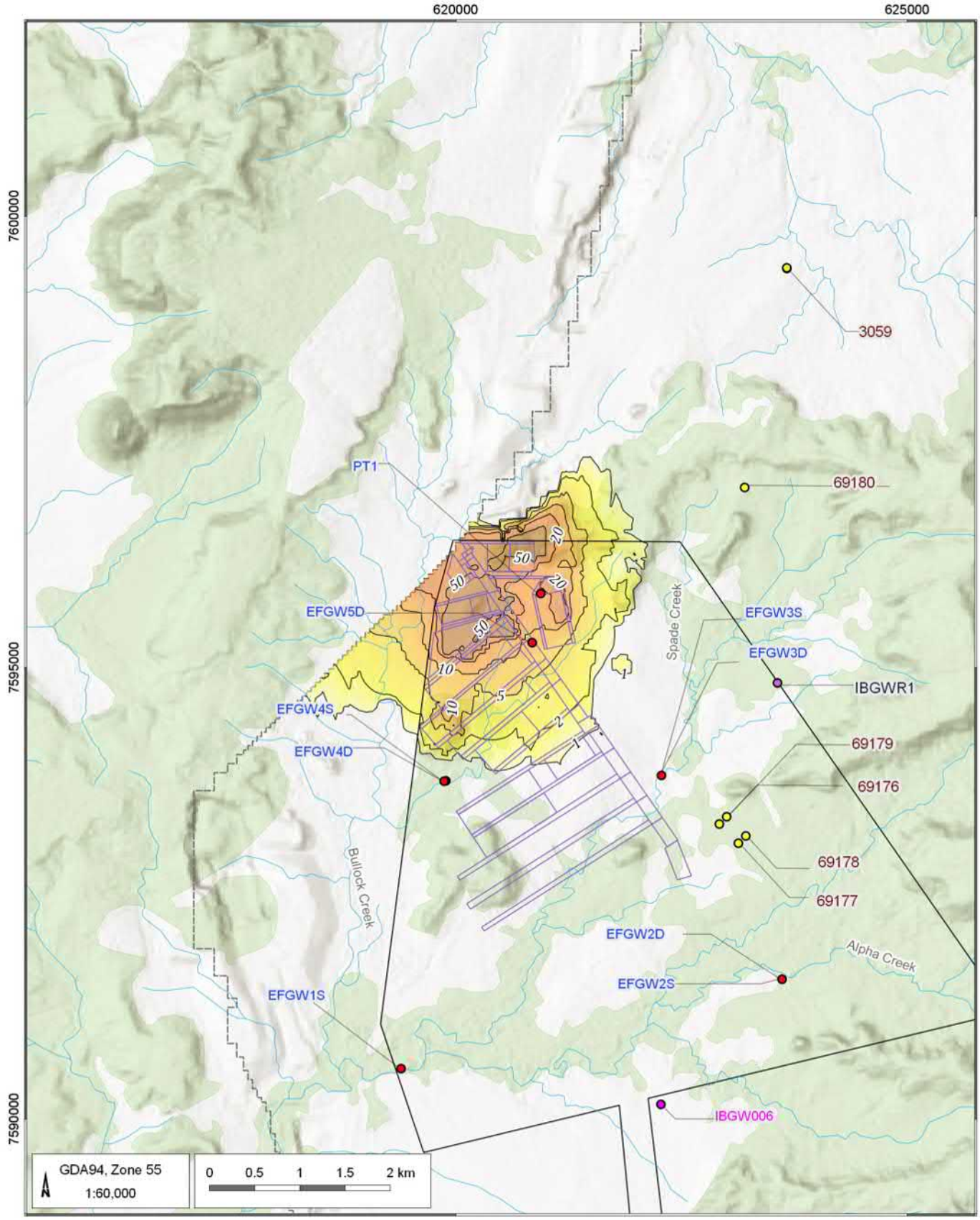
Predicted drawdown in water table at the end of UWIR Year 1 (End of 2026)

AGE

DATE 01/10/2025

FIGURE No: **A 15**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 15_IRB5005_Predicted drawdown in water table at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0
- 1
- 2
- 5
- 10
- 20
- 50
- 100
- 200
- 500

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

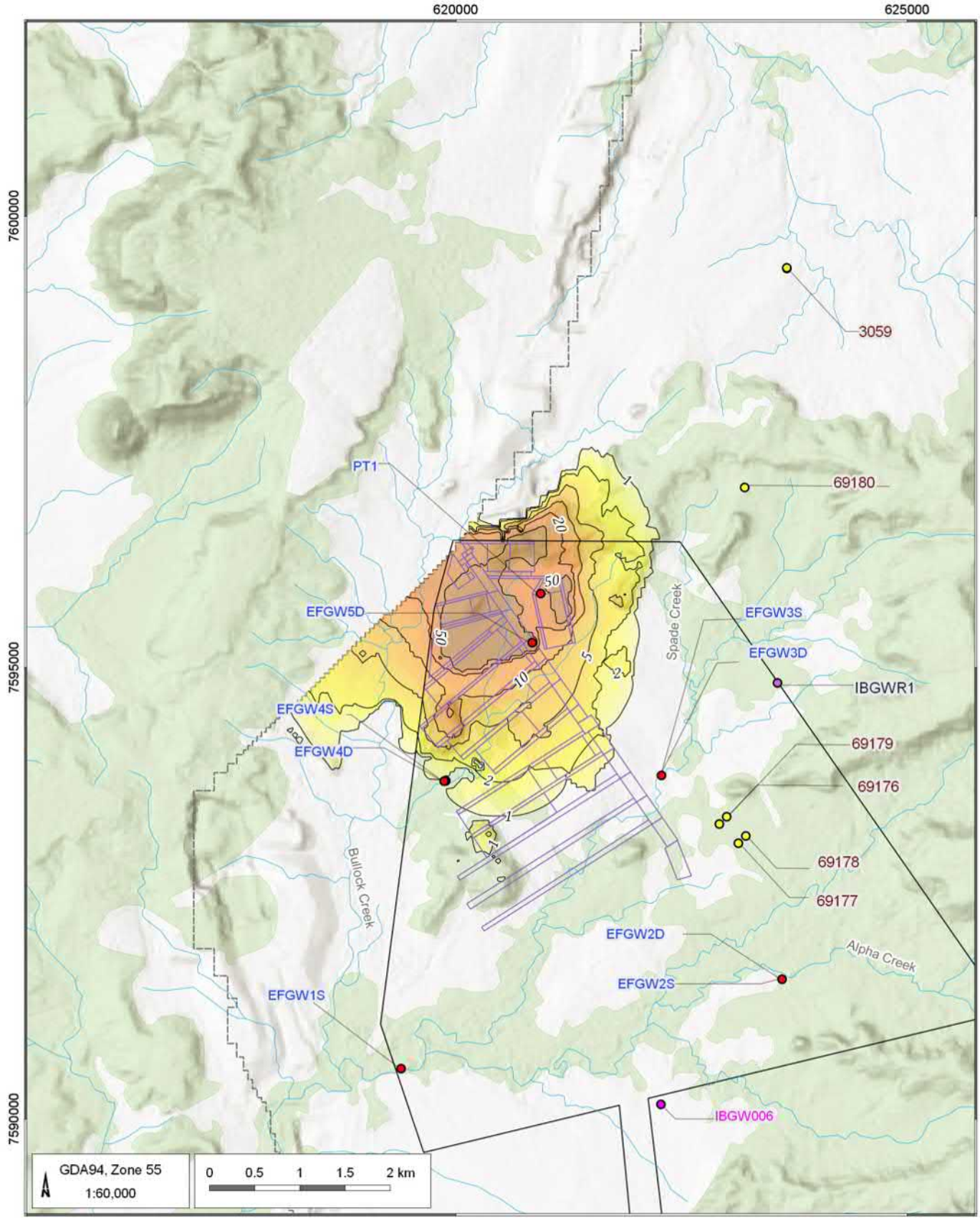
Predicted drawdown in water table at the end of UWIR Year 2 (End of 2027)

AGE

DATE 01/10/2025

FIGURE No: **A 16**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 15_IRB5005_Predicted drawdown in water table at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0
- 1
- 2
- 5
- 10
- 20
- 50
- 100
- 200
- 500

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

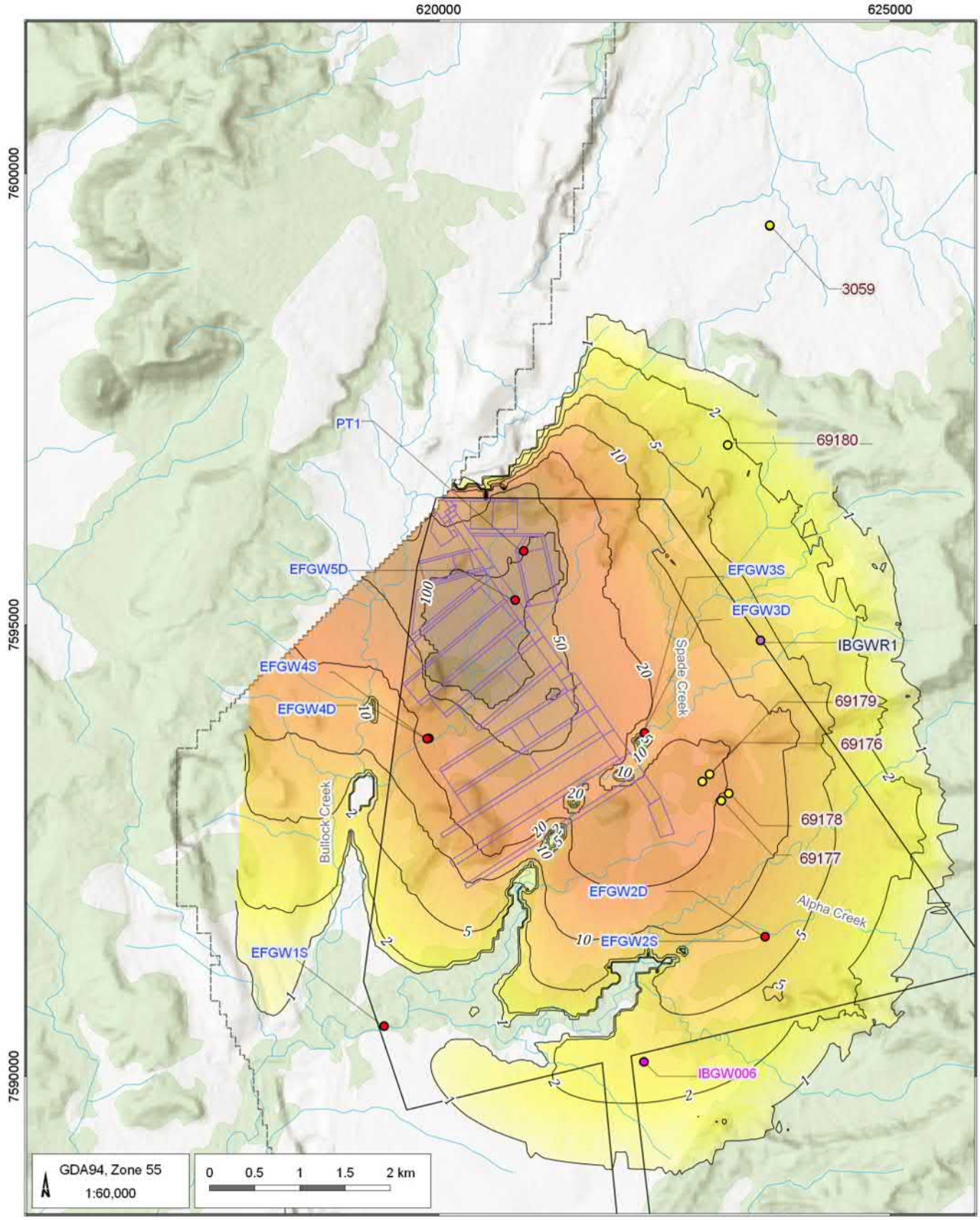
Predicted drawdown in water table at the end of UWIR Year 3 (IAA) (End of 2028)

AGE

DATE 01/10/2025

FIGURE No: **A 17**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 15_IRB5005_Predicted drawdown in water table at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0
- 1
- 2
- 5
- 10
- 20
- 50
- 100
- 200
- 500

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

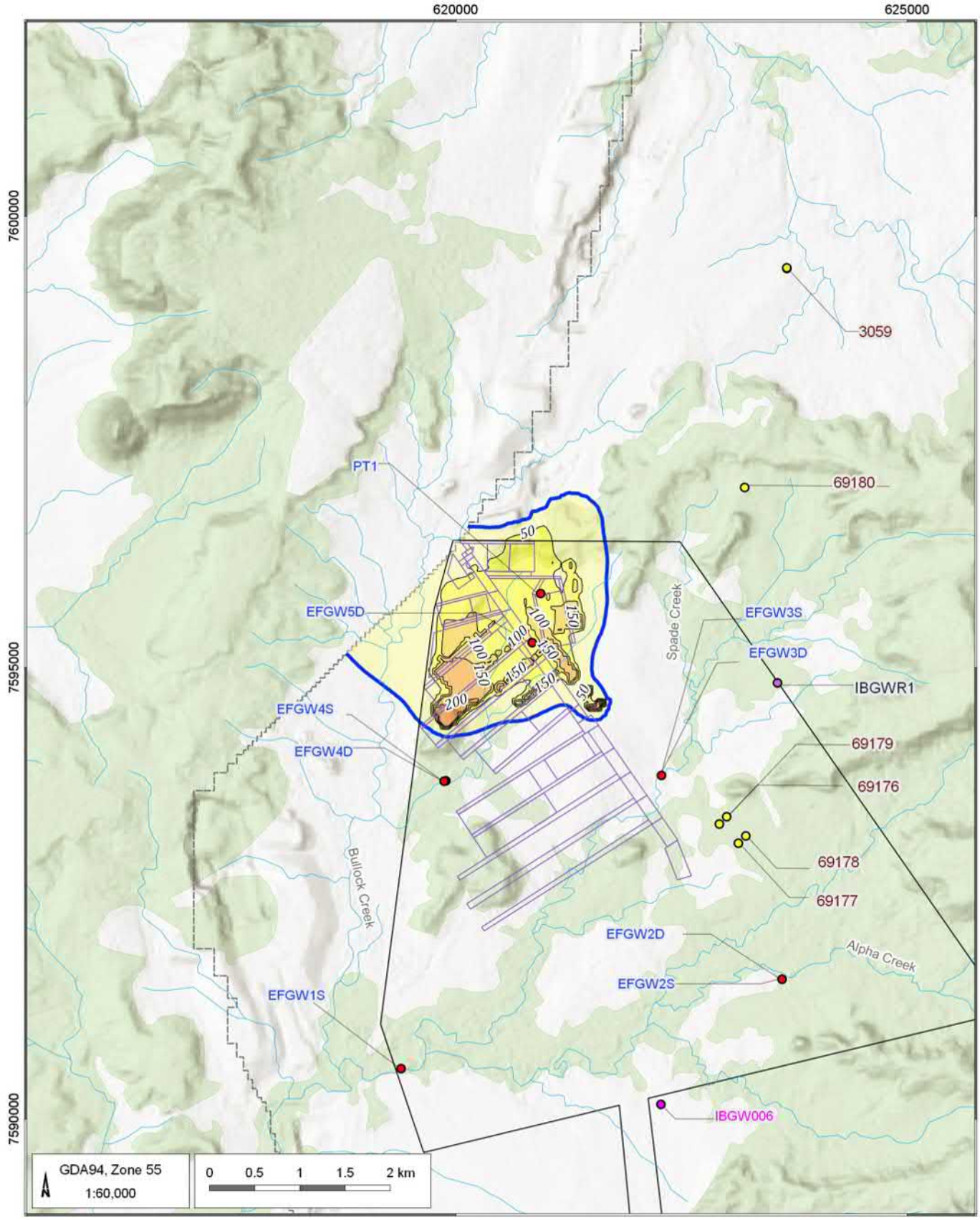
Predicted drawdown in water table at the end of mining (LTAA)

AGE

DATE 01/10/2025

FIGURE No: **A 18**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 15_IRB5005_Predicted drawdown in water table at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Immediate Affected Area (IAF)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0 - 5
- 5 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 350

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

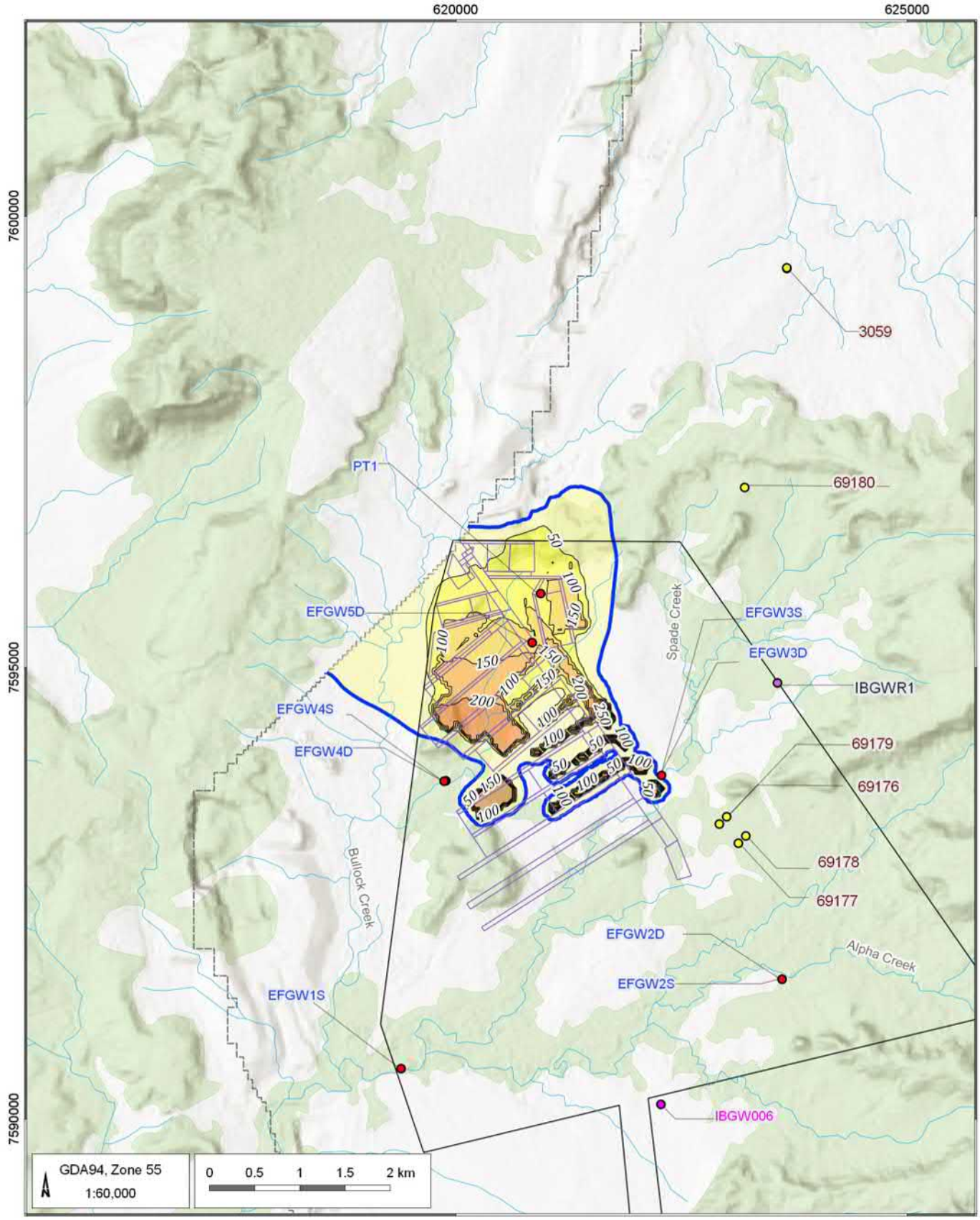
Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 1 (End of 2026)

AGE

DATE 01/10/2025

FIGURE No: **A 19**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 19_IRB5005_Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Immediate Affected Area (IAF)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0 - 5
- 5 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 350

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

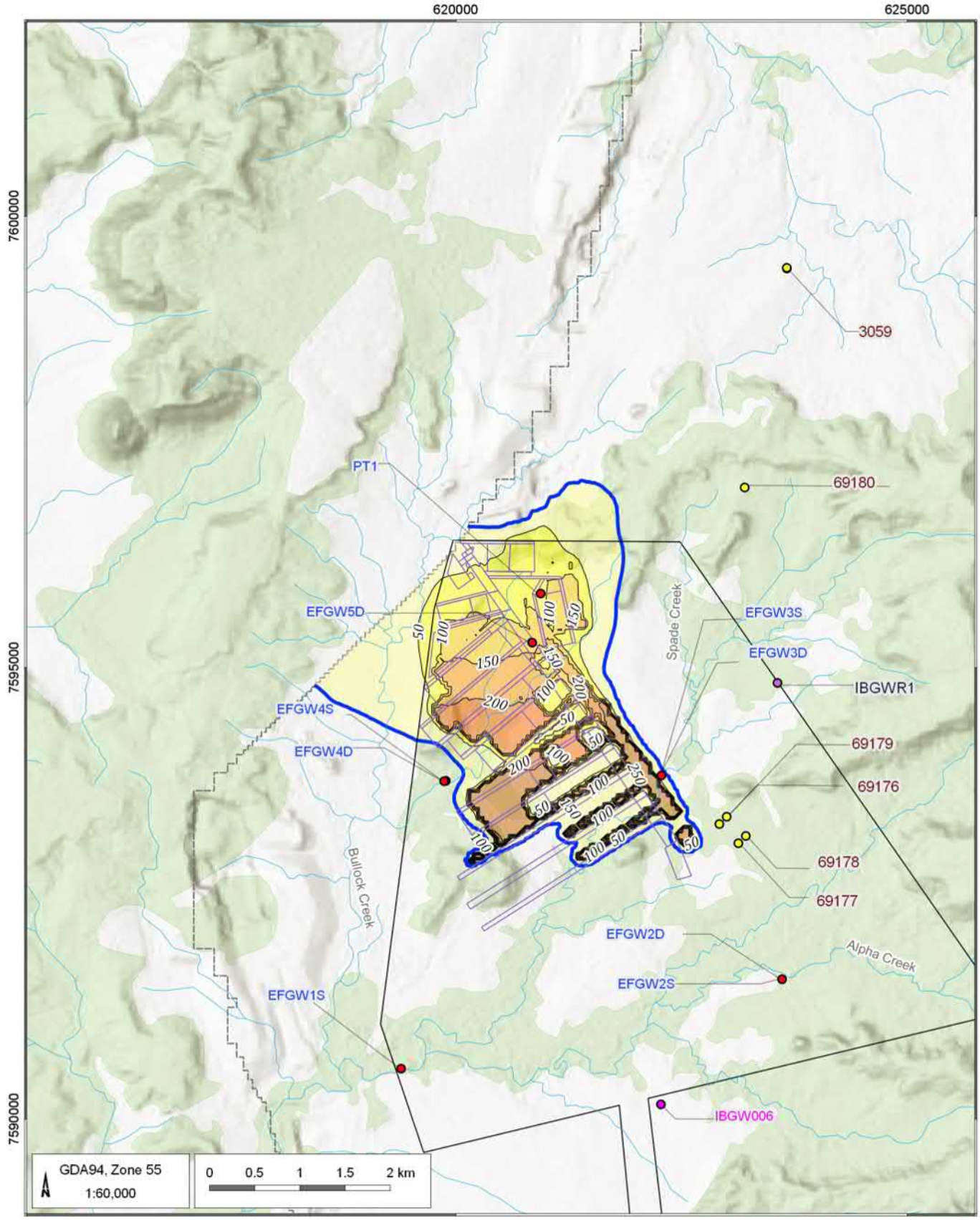
Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 2 (End of 2027)

AGE

DATE 01/10/2025

FIGURE No: **A 20**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 19_IRB5005_Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Immediate Affected Area (IAF)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0 - 5
- 5 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 350

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

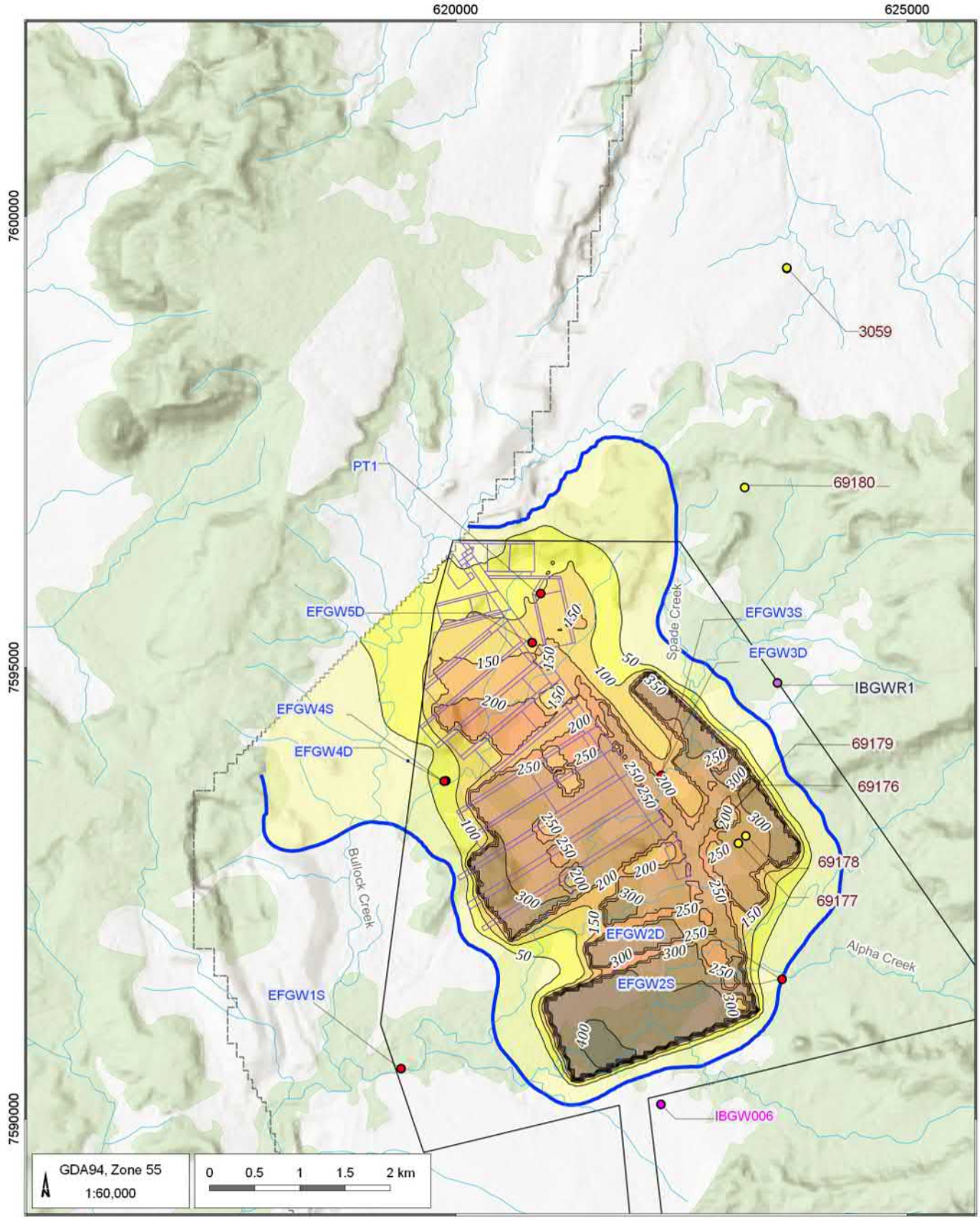
Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 3 (IAA) (End of 2027)

AGE

DATE 01/10/2025

FIGURE No: **A 21**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 19_IRB5005_Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 1.qgz



LEGEND

- Creeks
- Drawdown contour (m)
- Immediate Affected Area (IAF)
- Project Mining Lease Boundary
- Mine plan
- Vegetation
- Mine groundwater monitoring bore
- Reference bore
- Proposed compliance bore
- CSG appraisal well

Drawdown (m)

- 0 - 5
- 5 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 350
- 350 - 400
- 400 - 500

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Predicted Depressurisation in the Leichhardt Seam at the end of mining (LTAA)

AGE

DATE 01/10/2025

FIGURE No: **A 22**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\A 19_IRB5005_Predicted Depressurisation in the Leichhardt Seam at the end of UWIR Year 1.qgz

Appendix B

Numerical modelling

Numerical modelling

The potential impacts of groundwater abstraction associated with mine development were previously evaluated through the development and simulation of a numerical groundwater model (Hansen Bailey, 2018). This assessment focuses on identifying areas where predicted drawdown exceeds the trigger levels specified in the IAA and LTAA.

Model code

Simulation of groundwater flow at the Project site was undertaken using the MODFLOW-USG code (Panday et al., 2015), hereafter referred to as USG. Model input files were prepared with Fortran scripts and the USG edition of the Groundwater Data Utilities developed by Watermark Numerical Computing, enabling use of the advanced capabilities of USG. The numerical mesh was generated with Algomesh (HydroAlgorithmics, 2014).

Model domain

The model domain was defined to encompass the extent of potential future drawdown associated with the Project. Model boundaries were positioned at sufficient distances from the Project area to minimise boundary-related effects on model predictions. Where appropriate, natural hydrogeological features such as geological contacts and regional catchment divides were adopted as boundary conditions.

The model domain is approximately 27 km wide (west to east direction) and 35 km long (north to south direction) as shown in Figure B 1. Grid spacing across the model domain is variable, with refinement around the mine site and locations of groundwater level observations. The model cell size becomes larger away from these key areas. The model domain was discretised into 23 layers comprising 40,596 cells (31,259 active cells, 9,337 inactive cells) for the whole model. Cell sizes range from approximately 50 m by 50 m within the mining area around, up to 500 m by 500 m outside the project site (Figure B 1).

The vertical discretisation of the model was defined by the geological layering. Geological surfaces were extrapolated across the numerical model from the Leichhardt Seam structure, as interpreted from exploration drilling data. To the east of the Project area, the seam dips toward the axis of the Nebo Syncline, where it becomes progressively deeper. The actual depth of the coal seam aquifer in this area remains uncertain due to the absence of coal and gas exploration east of the Project boundary. For modelling purposes, a constant dip consistent with that observed within the Project area was assumed and extended from the mapped subcrop and outcrop positions toward the syncline axis. An average seam thickness of 4.5 m was applied in the model.

The hydraulic properties applied in the model were initially defined using parameters derived from the data presented in Section 4 of the main report. These parameters were subsequently adjusted through calibration to improve agreement with observed data. Regional parameter values were also used as a reference to guide and constrain the calibration within reasonable bounds.

Model boundary conditions

The model domain is bounded by no-flow conditions, defined by the outcrop and subcrop of the Rangal Coal Measures and by the thrust fault zone east of the Carborough Range. The base of Layer 23 was also specified as a no-flow boundary, preventing any exchange of groundwater between the model domain and underlying formations.

Recharge and evapotranspiration

Recharge was applied uniformly to the uppermost model layer, which represents the ground surface, using the MODFLOW-USG Recharge (RCH) package. The recharge rate, derived through model calibration, was 5.6 mm/year/m², equivalent to approximately 1% of average annual rainfall. Evapotranspiration was simulated with the Evapotranspiration (EVT) package, also applied to the uppermost layer, at a constant rate of 2,366.6 mm/year/m² (6.48 mm/day/m²). An extinction depth of 8 m was specified, below which evapotranspiration was assumed not to occur.

Rivers

Creeks were represented in the model using the MODFLOW-USG River (RIV) package. The riverbeds were defined as incised into the land surface, with river stage set equal to the riverbed elevation. Under these assumptions, the rivers remain dry under normal conditions and act as drains, removing groundwater from the system only when groundwater heads rise above the riverbed elevation.

Mining progression

Mining progression was represented in the model using the MODFLOW-USG Drain (DRN) package. Drain cells were applied at the base of the mined layer, with a cell conductance value of 100 m²/day. The model was updated to reflect the revised mining progression schedule through stress-period specific activation of drain cells.

Model calibration

The groundwater model was originally calibrated in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al., 2012), using groundwater level records from 36 bores intersecting a range of aquifers and aquitards. Hydraulic properties were constrained by site-specific testing, including packer and pumping tests within the coal seam, and supported by operational observations of groundwater inflows at the neighbouring Carborough Downs Coal Mine. This process achieved a steady-state calibration with a scaled RMS error of 8.1%, demonstrating that the model provides an acceptable fit to measured groundwater levels and flow patterns.

For this UWIR, the calibration was revisited to take advantage of recently available groundwater level data from the Leichhardt Seam. Monitoring at bore PT1 provided new constraints on seam behaviour, particularly with respect to the observed depressurisation. To improve the model fit, hydraulic properties of the seam layer were adjusted within realistic limits, resulting in a closer alignment between simulated and observed groundwater responses. These refinements enhance confidence that the model reliably represents current conditions and provides a sound basis for predicting groundwater take, depressurisation, and potential impacts during the UWIR period.

Horizontal (Kh) and vertical (Kv) hydraulic conductivities for the interburden (Layers 2–21 and Layer 23) and the Leichhardt coal seams (Layer 22) were defined as depth-dependent (Figure B 2). For this model, the hydraulic conductivity of Layer 22 was updated to improve model fit to the declining groundwater levels in the Leichhardt seam. Storage parameters, including specific yield (Sy) and specific storage (Ss), were assigned as constant values for each hydrostratigraphic unit. A summary of the calibrated hydraulic parameters adopted in the model is provided in Table B 1.

Table B 1 Model hydraulic parameters

Layer	Parameter	Value
Layer 1 Weathered Material (Regolith)	Horizontal Hydraulic Conductivity (Kh)	0.5 m/day
	Vertical Hydraulic Conductivity (Kv)	10% of Kh
	Specific Yield (Sy)	5 %
	Specific Storage (Ss)	5×10^{-5} m^{-1}
Layers 2 to 21 Rewan Group	Horizontal Hydraulic Conductivity (Kh)	Variable with depth (exponential dependence): $Kh = K_0 \times e^{(slope \times depth)}$; where: $K_0 = 1.94 \times 10^{-2}$ $slope = -2.70 \times 10^{-2}$ $upper\ limit = 2.50 \times 10^{-3}$ $lower\ limit = 1.00 \times 10^{-6}$
	Vertical Hydraulic Conductivity (Kv)	Variable with depth (exponential dependence): 0.01×Kh
	Specific Yield (Sy)	0.01 %
	Specific Storage (Ss)	1×10^{-6} m^{-1}
Layer 22 Rangal Coal Seams	Horizontal Hydraulic Conductivity (Kh)	Variable with depth (exponential dependence): $Kh = K_0 \times e^{(slope \times depth)}$; where: $K_0 = 3.81 \times 10^{-3}$ $slope = -2.70 \times 10^{-2}$ $upper\ limit = 5.00 \times 10^{-2}$ $lower\ limit = 1.00 \times 10^{-6}$
	Vertical Hydraulic Conductivity (Kv)	Variable with depth (exponential dependence): 0.1×Kh
	Specific Yield (Sy)	1.0 %
	Specific Storage (Ss)	5×10^{-6} m^{-1}
Layer 23 Fort Cooper Coal Measures (Model Base)	Horizontal Hydraulic Conductivity (Kh)	variable with depth (exponential dependence): $Kh = K_0 \times e^{(slope \times depth)}$; where: $K_0 = 1.94 \times 10^{-2}$ $slope = -2.70 \times 10^{-2}$ $upper\ limit = 2.50 \times 10^{-3}$ $lower\ limit = 1.00 \times 10^{-6}$
	Vertical Hydraulic Conductivity (Kv)	1% of Kh
	Specific Yield (Sy)	0.01 %
	Specific Storage (Ss)	1×10^{-6} m^{-1}

Model Setup for Impact Assessment

The predictive simulation was undertaken by converting the steady-state model to transient flow conditions to evaluate the extent of depressurisation associated with coal seam dewatering. The transient simulation period spans January 2018 to April 2025, with initial conditions defined by the steady-state analysis. Depressurisation was simulated using the MODFLOW-USG Drain (DRN) package to represent underground mining progression, while dewatering of the Burton Pit was also included during this period. The model simulation was then extended to predict to the end of mining (LTAA). The model simulation was extended to predict through to the end of mining (LTAA). In the Leichhardt Coal Seam (Layer 22), drain cells were progressively introduced at the seam base as mining advanced and subsequently removed once each panel was completed, representing the temporal sequence of excavation. Drain elevations were set at the base of the seam, with time-varying conductance applied to capture increased inflows associated with progressive fracturing and exposure during mining.

Modelling results

Results from the predictive model were evaluated at the end of the current UWIR period (31 December 2028). Groundwater heads were extracted from Layer 1 (weathered surface zone) and Layer 22 (Leichhardt coal seam), along with model flow budgets, to assess mining impacts. Drawdown extents were derived by comparing the mining scenario against a null scenario (no mining).

Water budgets

The difference between total inflows and outflows at the end of the predictive simulation was 0.01%, expressed as percent discrepancy, confirming numerical accuracy and overall model stability. Table B 2 presents the steady-state water budget, while Table B 3 summarises total flows through the various boundary conditions over the full three-year assessment period.

Table B 2 Groundwater budget – steady state model

Parameter	In (ML/day)	Out (ML/day)
Recharge (RCH)	0.095	0
Evapotranspiration (EVT)	0	0.095
Storage	0	0
Mining (DRN)	0	0
River leakage (RIV)	0	0
Total	**0.095**	**0.095**

Table B 3 Groundwater budget – transient model (ML over current UWIR period)

Parameter	In (ML)	Out (ML)
Rainfall recharge (RCH)	104	0
Evapotranspiration (EVT)	0	104
Storage change	351	1
Mining (DRN)	0	349
River leakage (RIV)	0	0
Total	**455**	**455**

Sensitivity

The predicted drawdown extents are dependent on the hydraulic properties of the geological layers adopted in the model. These properties are determined during model calibration, and represent the parameter set of minimum error variance, however, due to parameter non-uniqueness other combinations of similarly well calibrated model parameters are possible. For the sensitivity analysis, key model parameters were increased or decreased by one order of magnitude and the impact to model predictions was reported. As hydraulic conductivity is depth-dependent, the parameter K_0 (the initial hydraulic conductivity at a depth of 0 m) was varied. It should be noted that adjustments to these parameters influence model calibration and fit to the observed water levels, and therefore changes that cause substantial deviations from the baseline prediction are considered unlikely in the absence of further information.

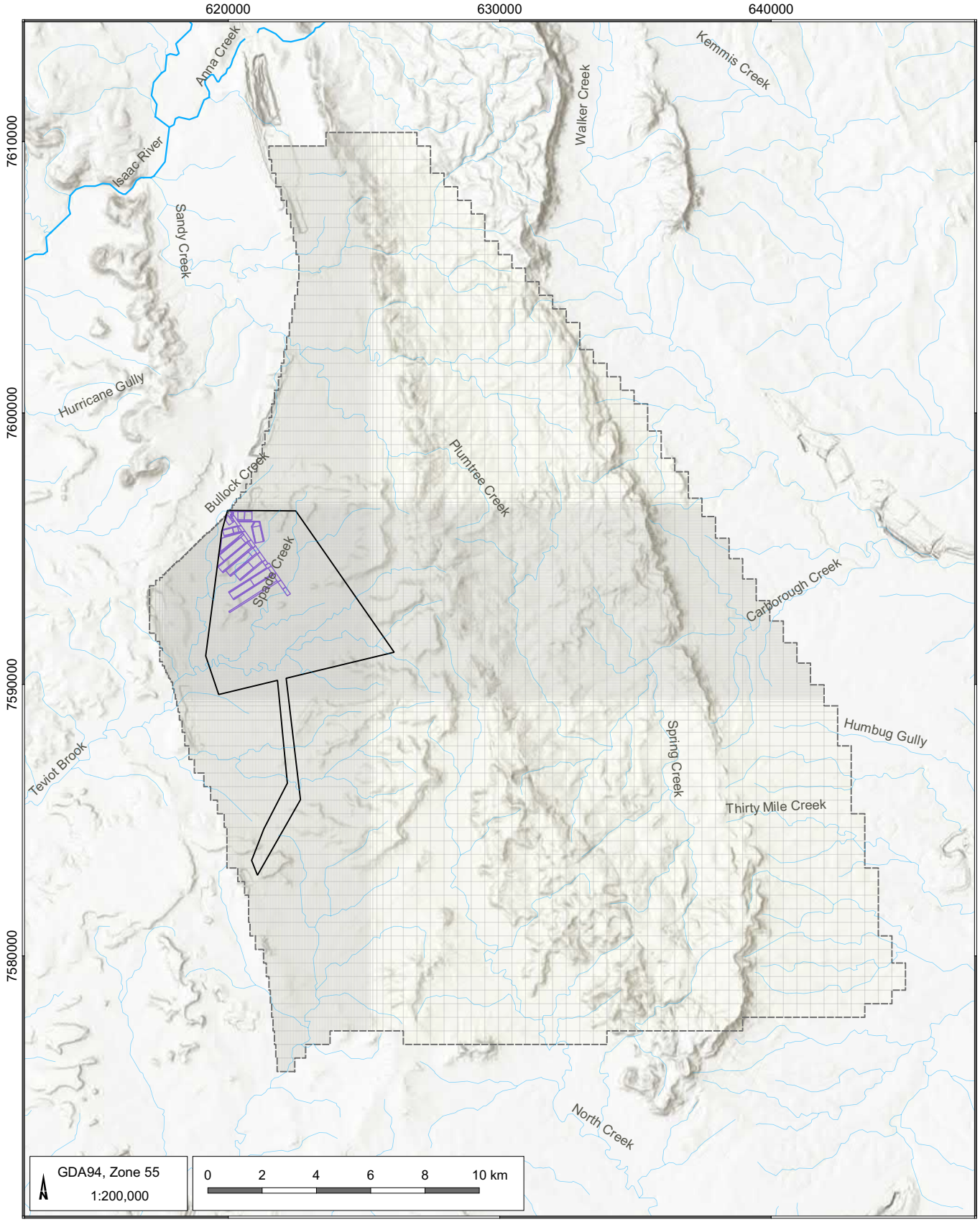
Figure B 3 shows predicted mine inflows over the current UWIR period, while Figure B 4 shows the rates of groundwater inflow over time for the multiple sensitivity scenarios. The model is most sensitive to changes to specific yield, with predicted inflows over the current UWIR period ranging from 284 ML (Sy = 0.5%) to 869 ML (Sy = 5%), compared with 349 ML in the base case. In contrast, the model shows limited sensitivity to changes in specific storage, with inflows ranging from 347 to 360 ML. Sensitivity to hydraulic conductivity is moderate, with predicted inflows ranging between 251 ML ($K_x \div 10$) and 515 ML ($K_x \times 10$).

Table B 4 summarises the predicted inflows for each sensitivity scenario. Figure B 5 to Figure B 8 present the corresponding drawdown extents, with Figure B 5 to Figure B 7 illustrating predicted conditions at the end of each UWIR year, and Figure B 8 showing the final extent of drawdown at the conclusion of mining

Modelled vs observed water level hydrographs are presented for the groundwater monitoring network in Figure B 9. Only PT1, which is screened in the Leichhardt Coal Seam, shows a clear drawdown response to mine inflows, while the other bores indicate relatively stable water levels under the sensitivity scenarios.

Table B 4 Cumulative mine inflow volumes over the current UWIR period for sensitivity scenarios

Scenario	Parameter Variation	Predicted Inflow (ML)
K ÷10	Hydraulic conductivity reduced tenfold (K_0 = 3.81E-04)	251
K ×10	Hydraulic conductivity increased tenfold (K_0 = 3.81E-02)	515
Base model	Calibrated parameters (K_0 = 3.81E-03, Sy = 1.00E-02, Ss = 5.00E-06)	349
Sy =0.5%	Specific yield reduced (5.00E-03)	284
Sy =5%	Specific yield increased (5.00E-02)	869
Ss ÷10	Specific storage reduced tenfold (5.00E-07)	347
Ss ×10	Specific storage increased tenfold (5.00E-05)	360



LEGEND

- Creeks
- Limit of Leichardt seam subcrop
- Model Mesh
- Mine Plan

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Numerical model domain

AGE

DATE 25/09/2025

FIGURE No: **B 1**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\B-01_IRB5005_Numerical model domain.qgs.qgz

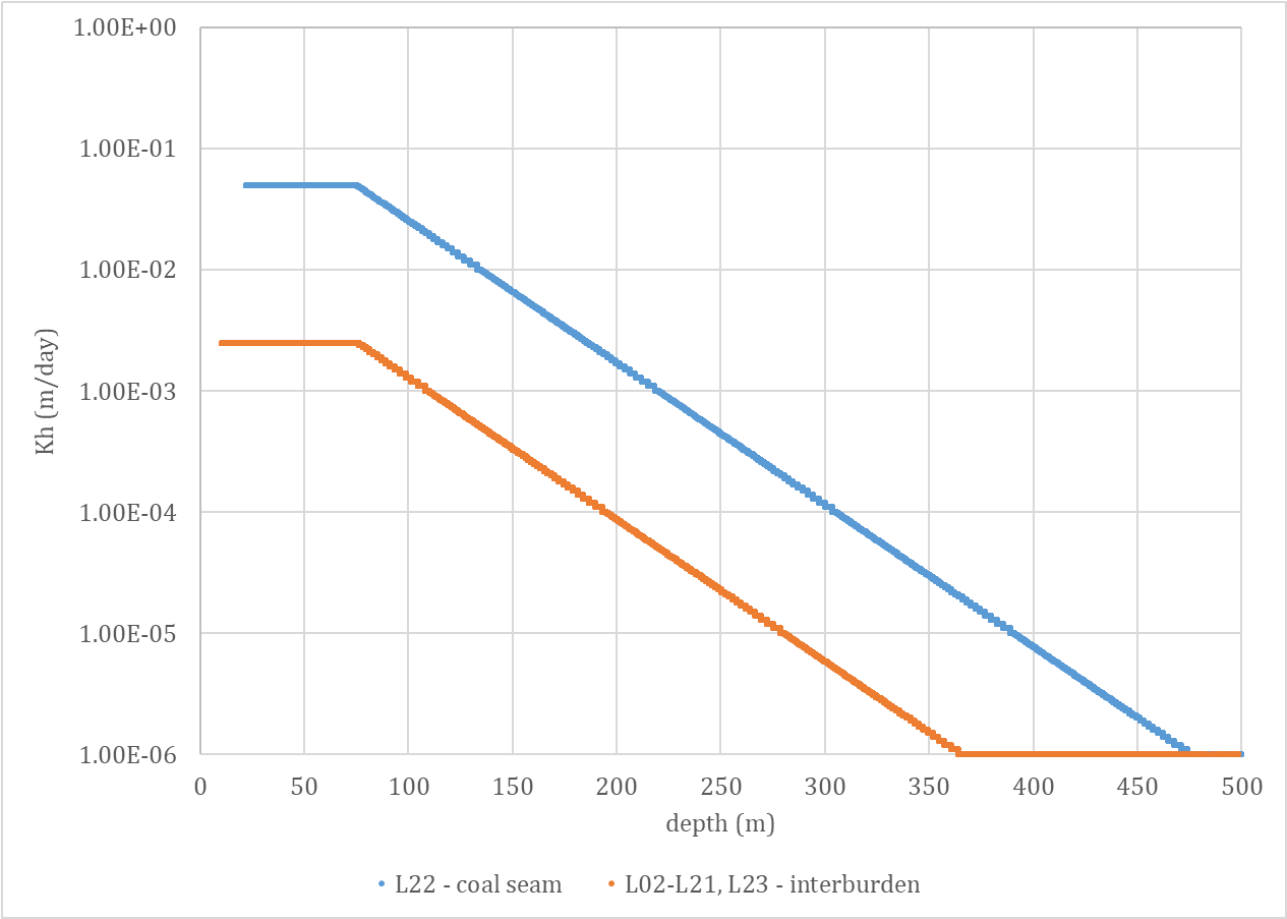


Figure B 2 Depth dependence of horizontal hydraulic conductivity – Interburden (layers 2-21 and 23) and coal seams (layer 22)

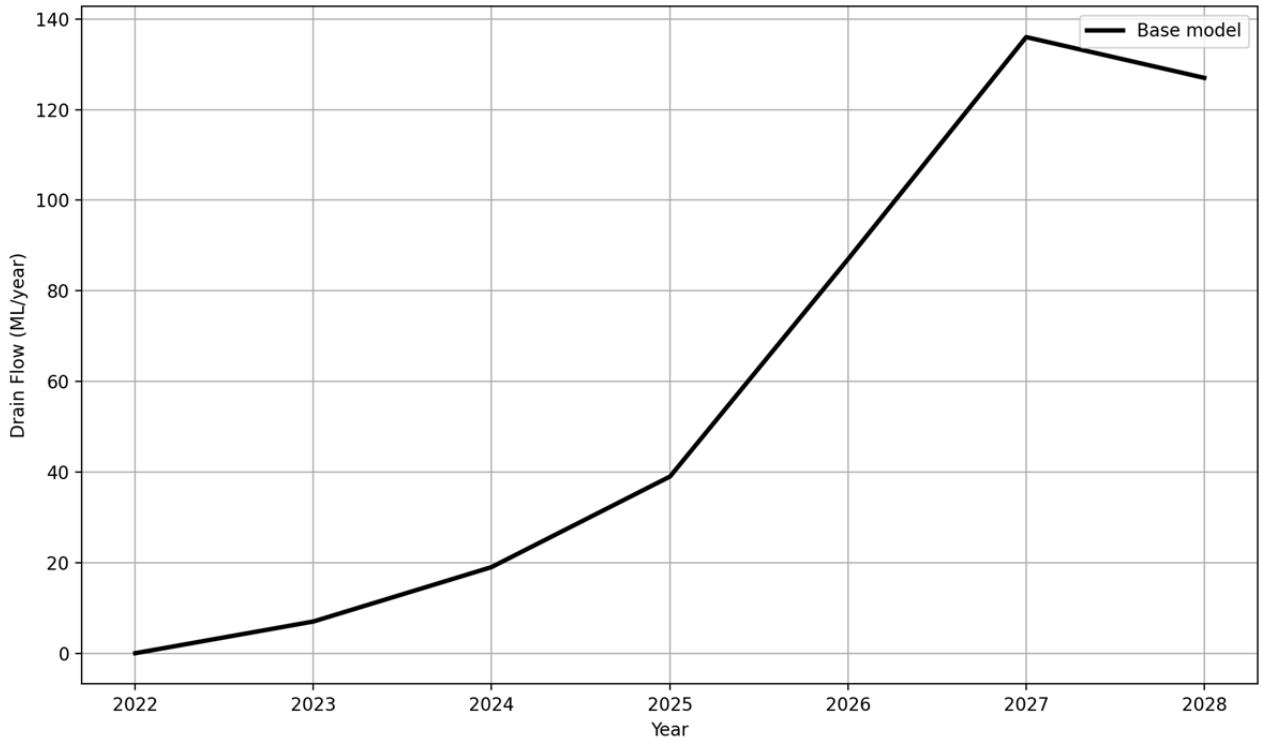


Figure B 3 Predicted UWIR Mine Inflows: Base Model

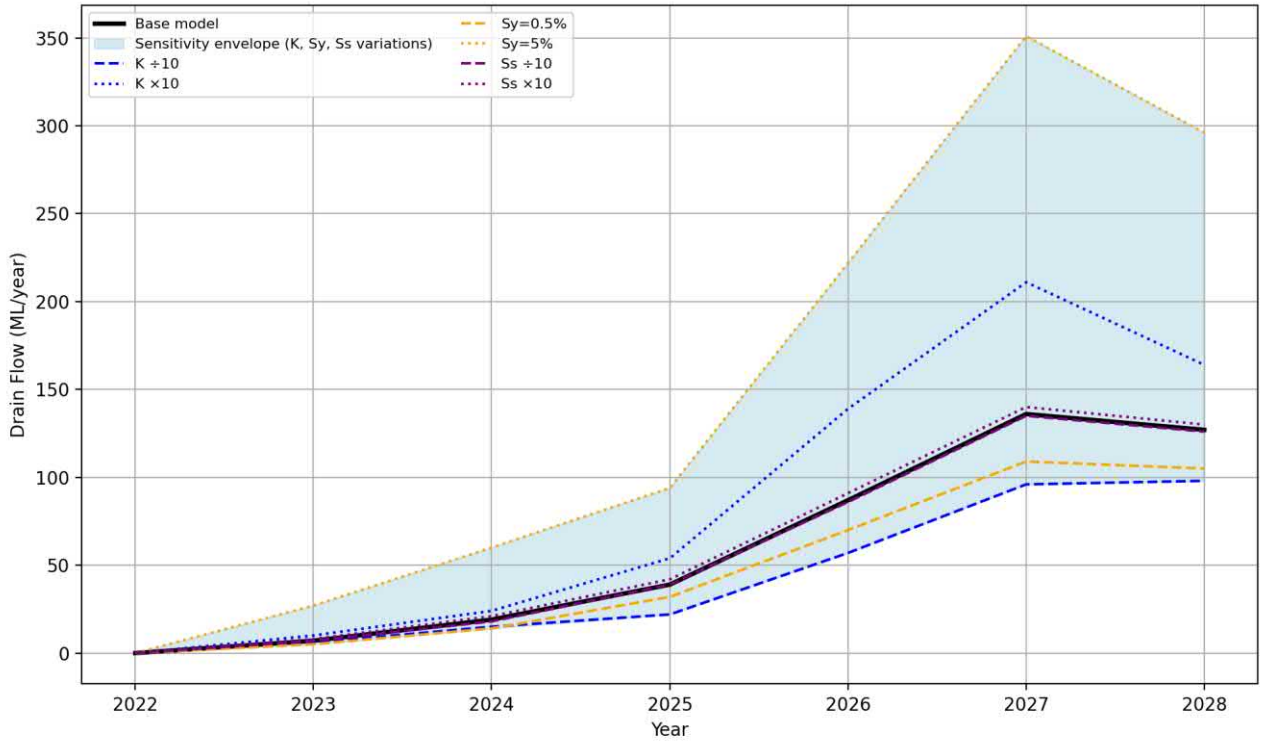
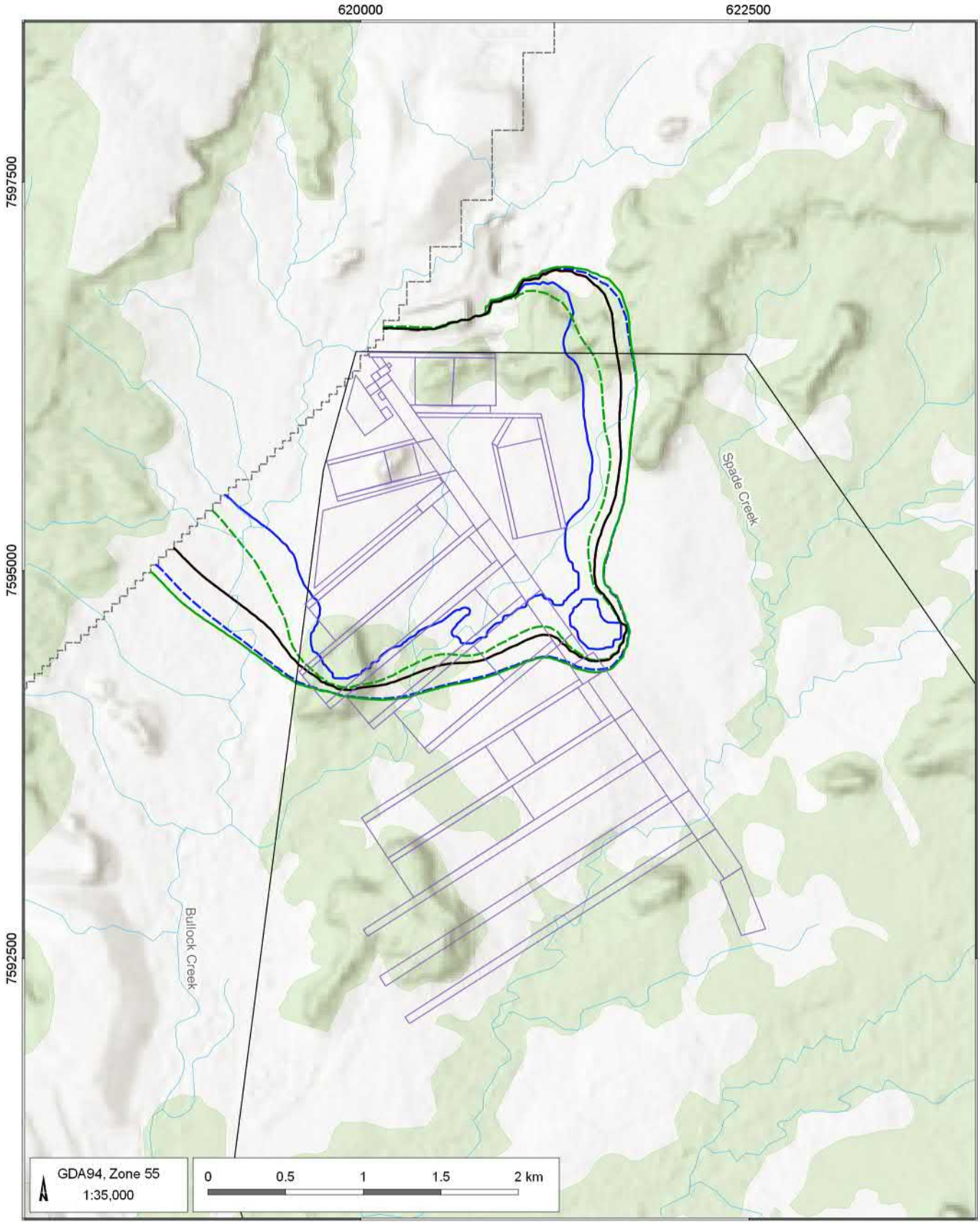


Figure B 4 Predicted UWIR Mine Inflows: Base Model vs K, Sy, Ss Sensitivity Envelope



LEGEND

- Creeks
- Project Mining Lease Boundary
- Limit of Leichardt seam subcrop
- Mine Plan
- Vegetation

- Base model 5m drawdown contour
- K ÷ 10
- K x 10
- Sy=0.5%
- Sy=5%
- Ss ÷ 10
- Ss x 10

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Predicted 5m drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at the end of UWIR Year 1

AGE

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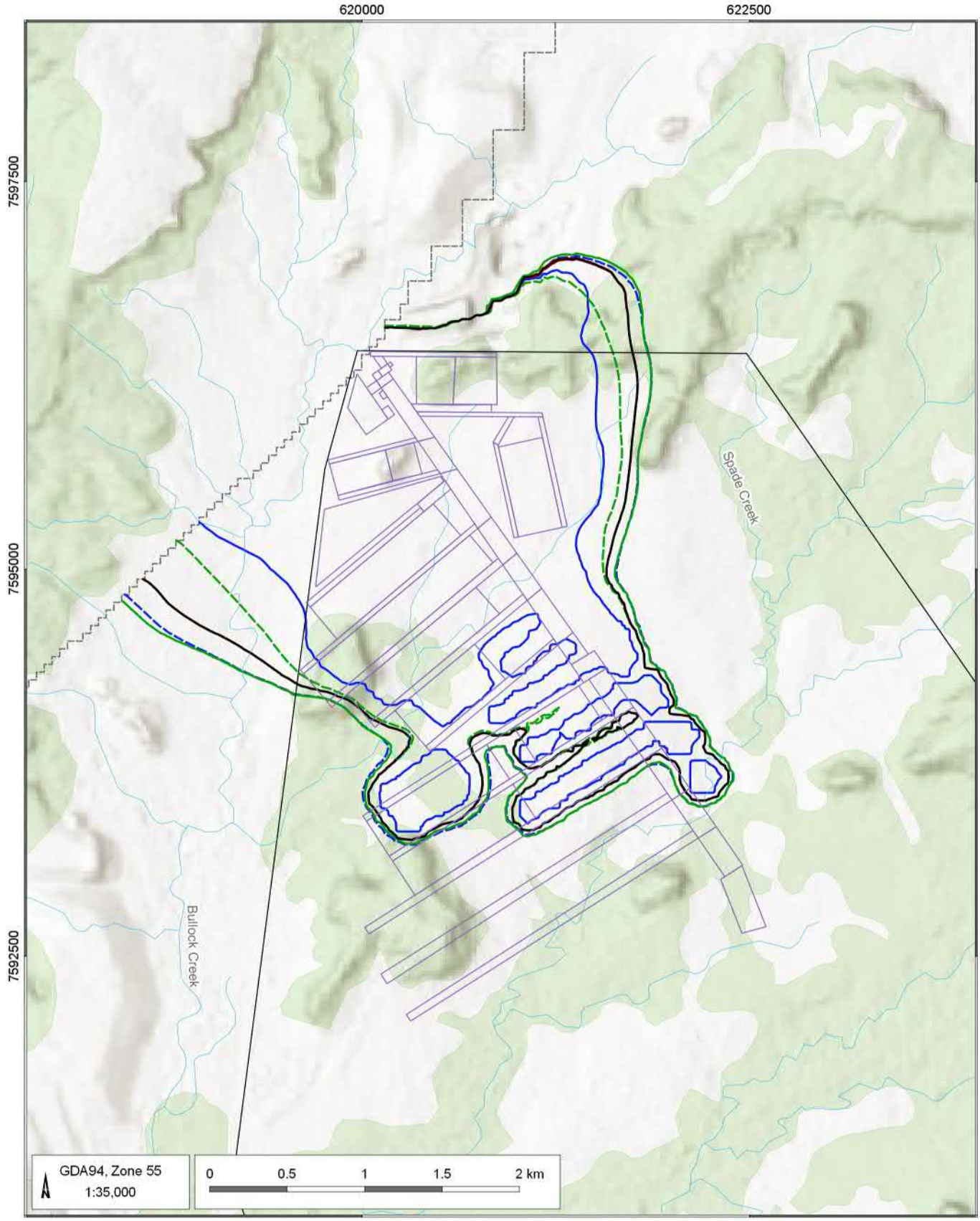
FIGURE No. **B 5**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\B 05_IRB5005_Predicted drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at X Time.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Limit of Leichardt seam subcrop
- Mine Plan
- Vegetation

- Base model 5m drawdown contour
- K ÷ 10
- K x 10
- Sy=0.5%
- Sy=5%
- Ss ÷ 10
- Ss x 10

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

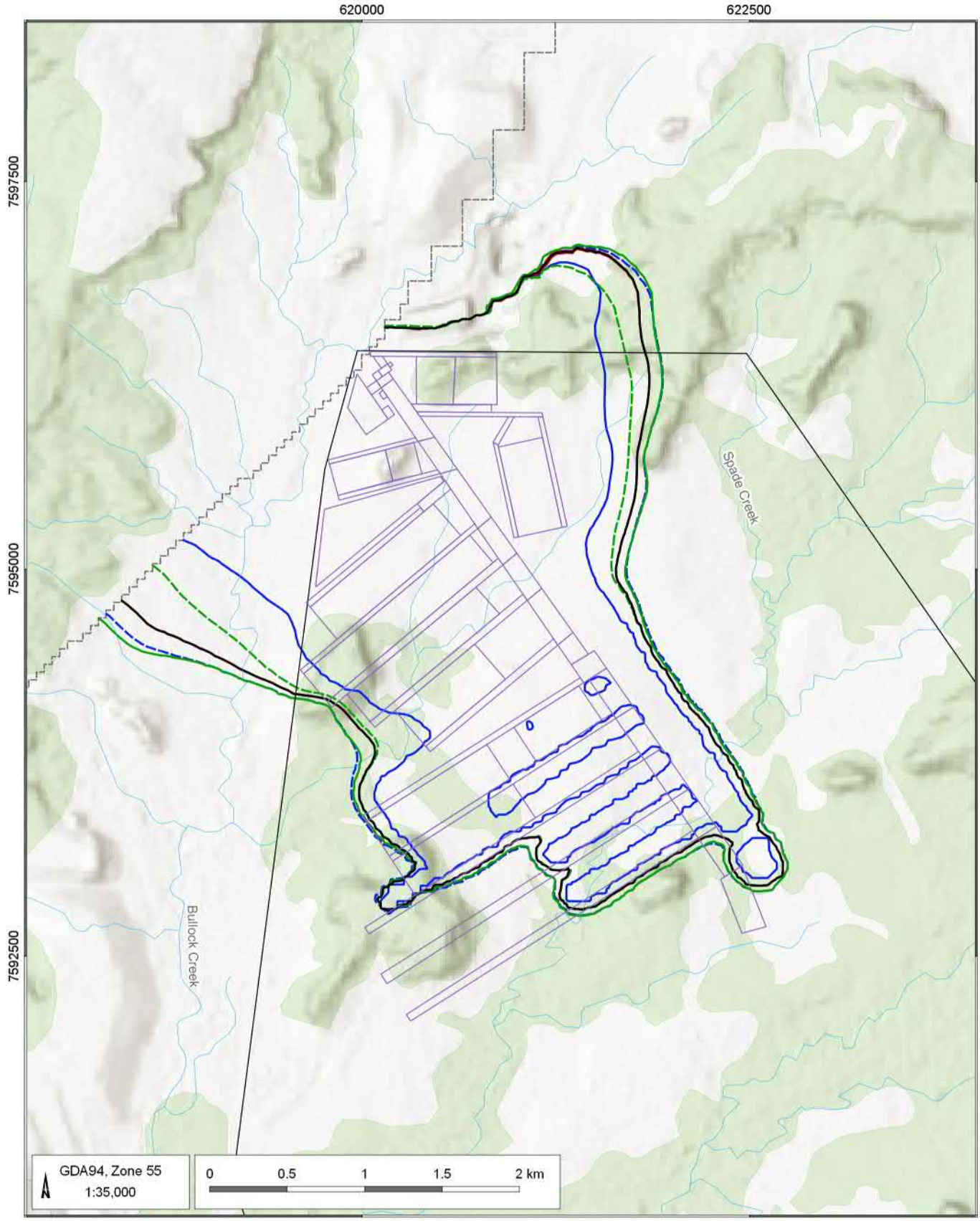
Predicted 5m drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at the end of UWIR Year 2

AGE

DATE 28/10/2025

FIGURE No. **B 6**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\B 05_IRB5005_Predicted drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at X Time.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Limit of Leichardt seam subcrop
- Mine Plan
- Vegetation

- Base model 5m drawdown contour
- K ÷ 10
- K x 10
- Sy=0.5%
- Sy=5%
- Ss ÷ 10
- Ss x 10

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

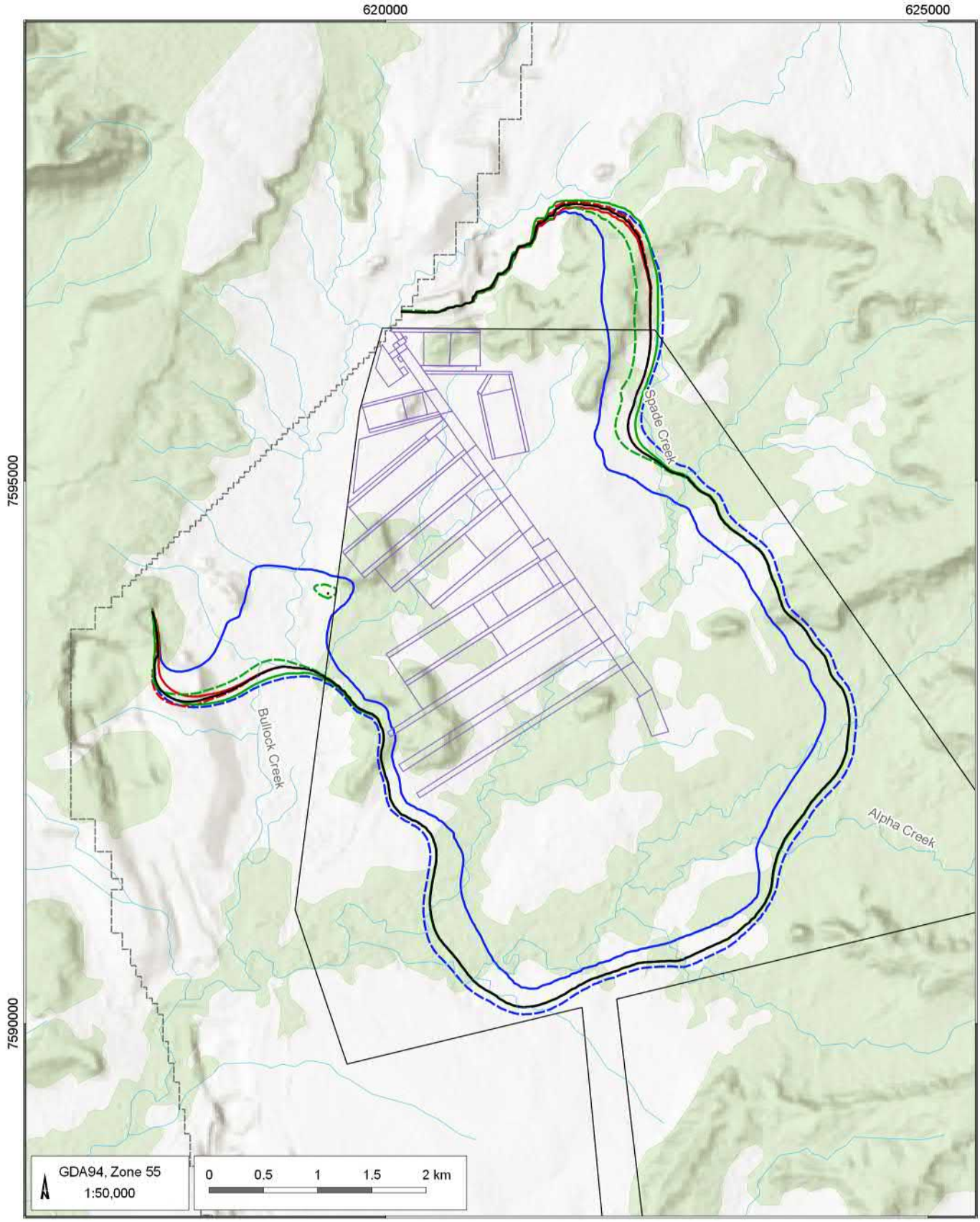
Predicted 5m drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at the end of UWIR Year 3

AGE

DATE 28/10/2025

FIGURE No. **B 7**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\B 05_IRB5005_Predicted drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at X Time.qgz



LEGEND

- Creeks
- Project Mining Lease Boundary
- Limit of Leichardt seam subcrop
- Mine Plan
- Vegetation

- Base model 5m drawdown contour
- K ÷ 10
- K x 10
- Sy=0.5%
- Sy=5%
- Ss ÷ 10
- Ss x 10

Underground Water Impact Report 3-Year Review.
Ironbark No. 1 Mine (IRB5005.001)

Predicted 5m drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at the end of mining (LTAA)

AGE

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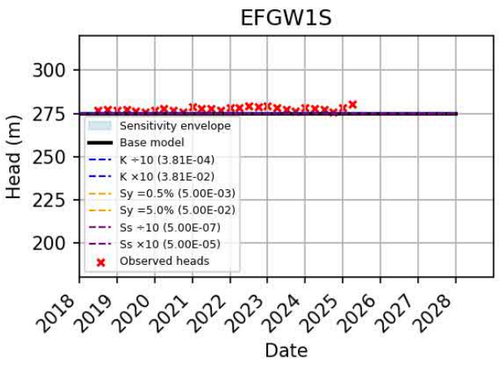
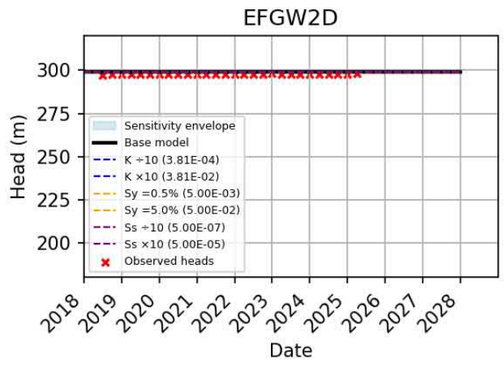
FIGURE No. **B 8**

Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\IRB5005.001 Ironbark 3-Y UWIR Review\3_GIS\Workspaces\001_Deliverable1\B 05_IRB5005_Predicted drawdown – sensitivity analysis Leichhardt seam (Layer 22) drawdown contours at X Time.qgz

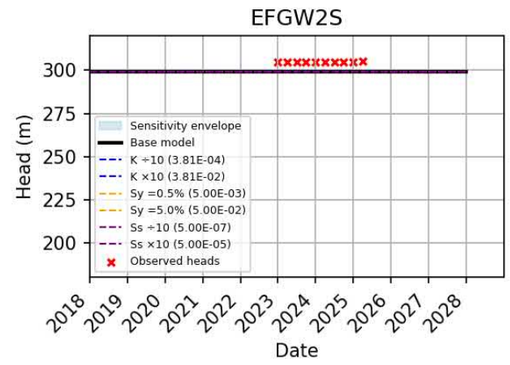
EFGW1S



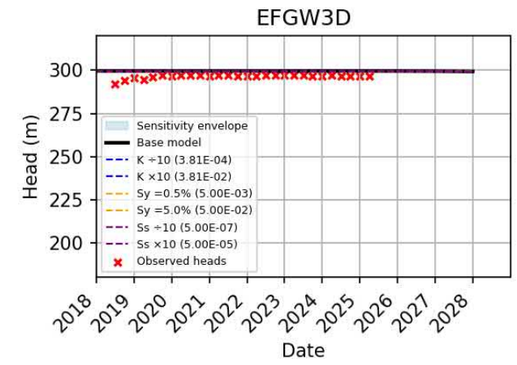
EFGW2D



EFGW2S



EFGW3D



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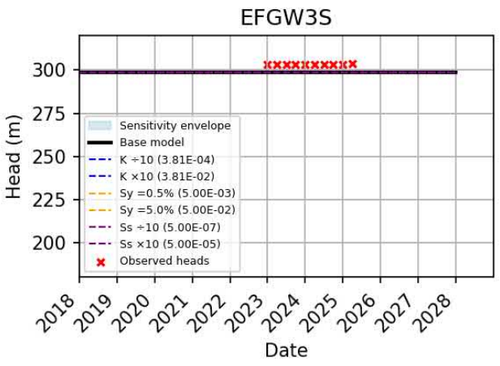
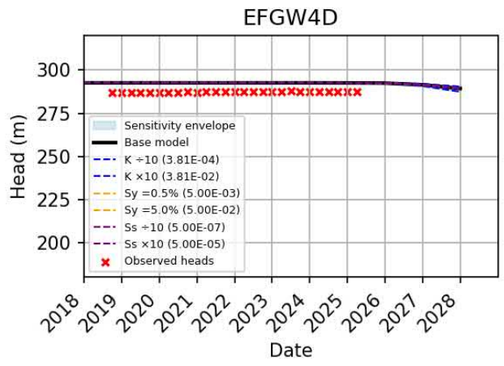
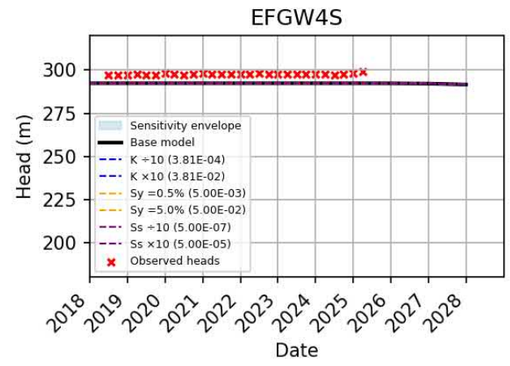


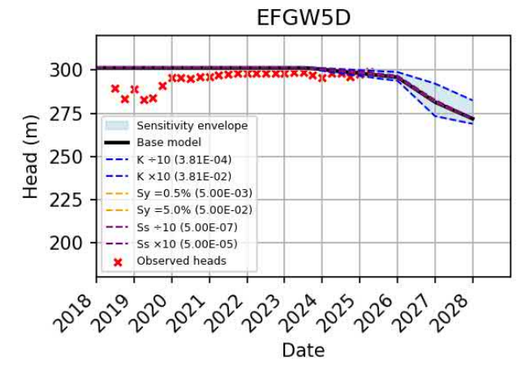
EFGW4D



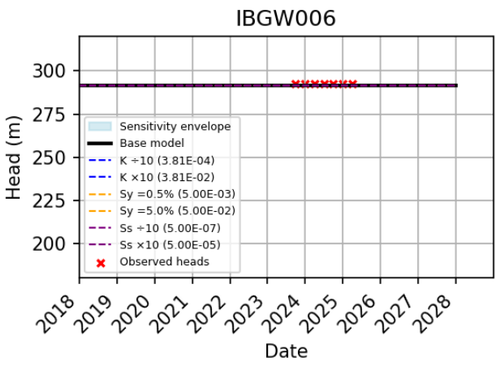
EFGW4S



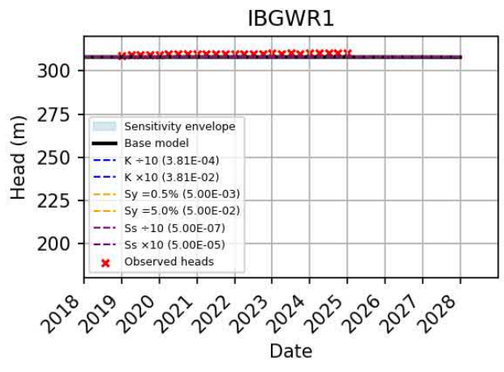
EFGW5D



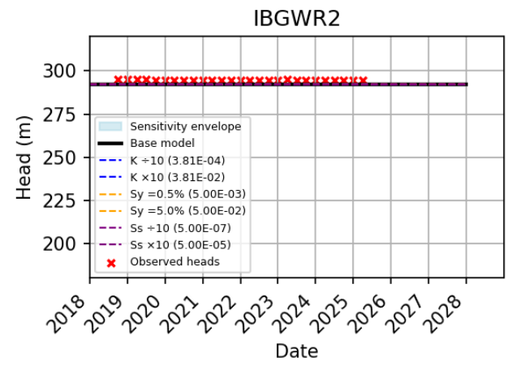
IBGW006



IBGWR1



IBGWR2



PT1

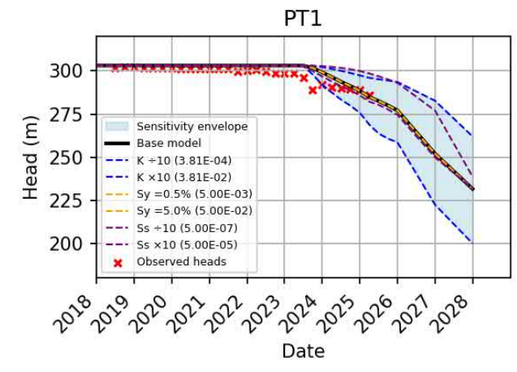


Figure B 9 Predicted and observed hydrographs under sensitivity analysis

Appendix C

Water Quality Laboratory Results

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			9/07/2008	17/01/2018	25/07/2018	30/08/2018	27/09/2018
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.27	7.84	7.59	7.53	7.71
Electrical Conductivity	µS/cm	1	3,550	6,360	5,500	5,700	4,050
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	466	596	777	785	728
Dissolved Major Ions							
Calcium	mg/L	1	37	102	76	83	42
Magnesium	mg/L	1	42	119	105	104	49
Sodium	mg/L	1	576	1,090	1,010	1,060	710
Potassium	mg/L	1	5	7	5	6	4
Chloride	mg/L	1	740	1,720	1,330	1,450	823
Sulfate	mg/L	1	78	66	68	80	44
Dissolved Metals							
Aluminium	mg/L	0.01	-	<0.01	-	-	-
Arsenic	mg/L	0.001	0.001	0.002	<0.001	0.001	<0.001
Cadmium	mg/L	0.0001	0.0001	<0.0001	-	-	-
Cobalt	mg/L	0.001	-	0.005	-	-	-
Copper	mg/L	0.001	<0.001	<0.001	-	-	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.685	1.73	2.78	1.27	0.256
Nickel	mg/L	0.001	0.004	0.007	-	-	-
Zinc	mg/L	0.005	0.011	0.073	0.024	0.026	0.027
Iron	mg/L	0.05	0.75	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	-	-			
Arsenic	mg/L	0.001	-	0.004	0.001	0.002	<0.001
Lead	mg/L	0.001	-	0.011	<0.001	0.004	0.001
Manganese	mg/L	0.001	-	2.7	2.84	1.44	0.256
Zinc	mg/L	0.005	-	0.364	0.041	0.072	0.036
Iron	mg/L	0.05	-	12.1	0.43	2.27	0.9
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	-	-	<20	<20	<20
C10 - C14 Fraction	µg/L	50	-	-	<50	<50	<50
C15 - C28 Fraction	µg/L	100	-	-	<100	<100	<100
C29 - C36 Fraction	µg/L	50	-	-	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	-	-	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20			<20	<20	<20
>C10 - C16 Fraction	µg/L	100			<100	<100	<100
>C16 - C34 Fraction	µg/L	100			<100	<100	<100
>C34 - C40 Fraction	µg/L	100			<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100			<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100			<100	<100	<100
BTEXN							
Benzene	µg/L	1			<1	<1	<1
Toluene	µg/L	2			<2	<2	<2
Ethylbenzene	µg/L	2			<2	<2	<2
meta- & para-Xylene	µg/L	2			<2	<2	<2
ortho-Xylene	µg/L	2			<2	<2	<2
Total Xylenes	µg/L	2			<2	<2	<2
Sum of BTEX	µg/L	1			<1	<1	<1
Naphthalene	µg/L	5			<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			24/10/2018	16/11/2018	26/02/2019	26/03/2019	30/04/2019
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.92	7.63	6.39	5.85	5.81
Electrical Conductivity	µS/cm	1	2,320	4,560	276	277	277
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	632	649	606	593	677
Dissolved Major Ions							
Calcium	mg/L	1	17	56	50	58	62
Magnesium	mg/L	1	20	66	63	77	80
Sodium	mg/L	1	425	882	785	939	958
Potassium	mg/L	1	2	5	6	5	5
Chloride	mg/L	1	415	1,080	1,100	1,380	1,460
Sulfate	mg/L	1	23	55	52	60	67
Dissolved Metals							
Aluminium	mg/L	0.01	-	-			
Arsenic	mg/L	0.001	<0.001	0.003	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0001	-	-			
Cobalt	mg/L	0.001	-	-			
Copper	mg/L	0.001	-	-			
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.364	0.24	0.423	0.114	0.178
Nickel	mg/L	0.001	-	-			
Zinc	mg/L	0.005	0.031	0.034	0.012	0.032	0.011
Iron	mg/L	0.05	<0.05	0.14	<0.05	<0.05	0.05
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	<0.001	0.003	<0.001	0.001	0.002
Lead	mg/L	0.001	<0.001	<0.001	0.001	0.004	0.005
Manganese	mg/L	0.001	0.412	0.252	0.434	0.258	0.325
Zinc	mg/L	0.005	0.046	0.04	0.03	0.086	0.069
Iron	mg/L	0.05	0.71	0.51	0.65	3.32	4.04
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			22/05/2019	21/06/2019	16/07/2019	27/08/2019	6/11/2019
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	5.77	6.03	6.3	6.61	7.29
Electrical Conductivity	µS/cm	1	277	277	276	276	275
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	727	636	709	642	591
Dissolved Major Ions							
Calcium	mg/L	1	33	98	66	47	35
Magnesium	mg/L	1	44	107	77	61	46
Sodium	mg/L	1	701	1,190	1,070	831	634
Potassium	mg/L	1	4	7	6	5	4
Chloride	mg/L	1	837	1,780	1,880	1,180	949
Sulfate	mg/L	1	38	66	66	49	41
Dissolved Metals							
Aluminium	mg/L	0.01					<0.01
Arsenic	mg/L	0.001	<0.001	0.002	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.048	0.53	0.163	0.057	0.011
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.01	0.008	0.008	0.006	0.012
Iron	mg/L	0.05	<0.05	1.01	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01					0.03
Arsenic	mg/L	0.001	0.001	0.001	0.002	<0.001	<0.001
Lead	mg/L	0.001	0.003	0.002	0.006	0.002	<0.001
Manganese	mg/L	0.001	0.152	0.257	0.4	0.145	0.038
Zinc	mg/L	0.005	0.048	0.029	0.061	0.026	0.015
Iron	mg/L	0.05	2.61	1.3	5.28	1.43	0.08
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			26/02/2020	26/05/2020	27/08/2020	24/11/2020	04/02/2021
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	5.15	5.42	6.89	8.72	4.22
Electrical Conductivity	µS/cm	1	278	277	276	274	279
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	642	731	878	851	750
Dissolved Major Ions							
Calcium	mg/L	1	95	39	45	42	44
Magnesium	mg/L	1	112	47	50	52	55
Sodium	mg/L	1	1,070	668	695	668	695
Potassium	mg/L	1	6	4	4	4	4
Chloride	mg/L	1	1,590	899	933	813	795
Sulfate	mg/L	1	77	54	44	37	70
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.001	<0.001	<0.001	0.001	<0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.93	1.42	1.17	0.055	1.8
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.016	0.039	0.116	0.413	0.058
Iron	mg/L	0.05	0.15	0.08	0.34	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.13	0.71	0.18	0.19	0.15
Arsenic	mg/L	0.001	0.001	0.002	<0.001	0.001	0.001
Lead	mg/L	0.001	<0.001	0.004	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	2.3	1.53	1.17	0.101	1.93
Zinc	mg/L	0.005	0.022	0.096	0.199	0.411	0.075
Iron	mg/L	0.05	0.4	0.96	0.63	0.42	0.51
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			24/08/2021	8/12/2021	10/02/2022	19/05/2022	9/08/2022
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	5.18	5.06	4.26	4.07	3.98
Electrical Conductivity	µS/cm	1	278	278	279	279	279
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	754	950	759	710	684
Dissolved Major Ions							
Calcium	mg/L	1	19	57	34	21	25
Magnesium	mg/L	1	26	70	44	27	31
Sodium	mg/L	1	438	806	601	473	522
Potassium	mg/L	1	6	5	4	3	3
Chloride	mg/L	1	335	890	633	446	463
Sulfate	mg/L	1	16	2	3	4	8
Dissolved Metals							
Aluminium	mg/L	0.01	0.02	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.001	0.002	0.002	<0.001	0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001		<0.001	<0.001
Manganese	mg/L	0.001	1.62	4.34	3.59	0.002	2.98
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.011	<0.005		<0.005	0.007
Iron	mg/L	0.05	0.18	5.54	1.86	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	4.01	0.29	0.08	0.22	0.06
Arsenic	mg/L	0.001	0.004	0.003	0.003	0.001	0.002
Lead	mg/L	0.001	0.003	<0.001		<0.001	<0.001
Manganese	mg/L	0.001	1.7	4.29	3.77	3.08	3.31
Zinc	mg/L	0.005	0.162	0.051		0.032	0.041
Iron	mg/L	0.05	3.34	6.92	3.78	2.02	1.35
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	30	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	910	290	<100	<100
C29 - C36 Fraction	µg/L	50	160	1130	240	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	160	2040	530	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	200	2010	520	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	200	2010	520	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			10/11/2022	24/02/2023	10/05/2023	9/08/2023	21/11/2023
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.59	7.59	7.06	7.51	7.25
Electrical Conductivity	µS/cm	1	3,230	3,670	5,850	4,860	4,440
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	648	689	796	650	700
Dissolved Major Ions							
Calcium	mg/L	1	29	32	68	51	59
Magnesium	mg/L	1	39	43	91	70	73
Sodium	mg/L	1	661	724	1,070	927	825
Potassium	mg/L	1	4	4	6	6	5
Chloride	mg/L	1	675	811	1,380	1,090	1,140
Sulfate	mg/L	1	17	19	23	39	44
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	0.04	<0.01
Arsenic	mg/L	0.001	0.002	0.003	0.003	0.004	0.003
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	2.02	1.39	1.27	1.17	2.12
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.005	0.006	0.016	0.04	0.013
Iron	mg/L	0.05	0.87	2.57	2.07	1.8	2.42
Total Metals							
Aluminium	mg/L	0.01	0.09	0.06	0.44	0.51	0.78
Arsenic	mg/L	0.001	0.005	0.004	0.007	0.006	0.005
Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.001	0.001
Manganese	mg/L	0.001	1.89	1.58	1.38	1.47	2.02
Zinc	mg/L	0.005	0.015	0.017	0.187	0.11	0.095
Iron	mg/L	0.05	4.42	3.19	3.84	3.1	4.06
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	90	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	130	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	220	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	130	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	230	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW1S	EFGW1S	EFGW1S
Sample Date			16/01/2024	9/04/2024	6/07/2024	29/10/2024	27/01/2025
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.63	7.4	7.48	7.73	7.48
Electrical Conductivity	µS/cm	1	6,340	2,730	2,960	3,380	3,220
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	766	630	698	739	576
Dissolved Major Ions							
Calcium	mg/L	1	86	21	25	32	43
Magnesium	mg/L	1	102	30	34	42	47
Sodium	mg/L	1	1,140	545	568	617	663
Potassium	mg/L	1	7	3	4	4	4
Chloride	mg/L	1	1,610	574	631	733	631
Sulfate	mg/L	1	43	21	22	23	26
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.004	0.003	0.003	0.002	0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	3.77	1.24	1.54	1.19	2.94
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.033	0.012	0.019	0.035	0.013
Iron	mg/L	0.05	1.28	1.4	0.84	0.62	0.55
Total Metals							
Aluminium	mg/L	0.01	1.86	0.59	1.06	0.14	0.39
Arsenic	mg/L	0.001	0.005	0.003	0.004	0.003	0.002
Lead	mg/L	0.001	0.002	<0.001	0.002	<0.001	<0.001
Manganese	mg/L	0.001	5.11	1.27	1.59	1.36	3.34
Zinc	mg/L	0.005	0.174	0.034	0.087	0.05	0.023
Iron	mg/L	0.05	4.5	2.21	2.8	1.57	1.51
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW1S	EFGW1S	EFGW2S	EFGW2S	EFGW2D
Sample Date			17/04/2025	16/07/2025	9/07/2008	17/04/2025	9/07/2008
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.11	7.23	7.19	7.21	7.46
Electrical Conductivity	µS/cm	1	1,530	1,170	1,040	904	12,400
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	586	516	225	183	263
Dissolved Major Ions							
Calcium	mg/L	1	13	8	20	9	276
Magnesium	mg/L	1	16	11	18	10	81
Sodium	mg/L	1	350	262	150	177	2,070
Potassium	mg/L	1	2	2	1	1	18
Chloride	mg/L	1	190	71	148	180	4,000
Sulfate	mg/L	1	8	2	22	21	110
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	-	0.01	-
Arsenic	mg/L	0.001	<0.001	0.001	<0.001	<0.001	0.012
Cadmium	mg/L	0.0001			<0.0001		<0.0001
Cobalt	mg/L	0.001			-		-
Copper	mg/L	0.001			<0.001		0.002
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.92	0.695	0.01	0.002	1.34
Nickel	mg/L	0.001			<0.001		0.002
Zinc	mg/L	0.005	0.02	0.016	0.011	<0.005	0.01
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	0.22
Total Metals							
Aluminium	mg/L	0.01	0.16	0.42	-	0.38	-
Arsenic	mg/L	0.001	<0.001	0.002	-	<0.001	-
Lead	mg/L	0.001	<0.001	<0.001	-	<0.001	-
Manganese	mg/L	0.001	2.11	1.29	-	0.012	-
Zinc	mg/L	0.005	0.047	0.038	-	<0.005	-
Iron	mg/L	0.05	0.4	0.56	-	0.22	-
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	-	<20	-
C10 - C14 Fraction	µg/L	50	<50	<50	-	<50	-
C15 - C28 Fraction	µg/L	100	<100	<100	-	<100	-
C29 - C36 Fraction	µg/L	50	<50	<50	-	<50	-
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	-	<50	-
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20		<20	
>C10 - C16 Fraction	µg/L	100	<100	<100		<100	
>C16 - C34 Fraction	µg/L	100	<100	<100		<100	
>C34 - C40 Fraction	µg/L	100	<100	<100		<100	
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100		<100	
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100		<100	
BTEXN							
Benzene	µg/L	1	<1	<1		<1	
Toluene	µg/L	2	<2	<2		<2	
Ethylbenzene	µg/L	2	<2	<2		<2	
meta- & para-Xylene	µg/L	2	<2	<2		<2	
ortho-Xylene	µg/L	2	<2	<2		<2	
Total Xylenes	µg/L	2	<2	<2		<2	
Sum of BTEX	µg/L	1	<1	<1		<1	
Naphthalene	µg/L	5	<5	<5		<5	

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			16/01/2018	24/07/2018	30/08/2018	27/09/2018	23/10/2018
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	8.18	8.15	7.75	7.76	7.91
Electrical Conductivity	µS/cm	1	5,870	5,610	9,430	9,230	8,790
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	293	385	168	177	177
Dissolved Major Ions							
Calcium	mg/L	1	78	88	238	198	223
Magnesium	mg/L	1	18	20	56	44	48
Sodium	mg/L	1	1,130	1,100	1,830	1,660	1,650
Potassium	mg/L	1	6	7	11	10	10
Chloride	mg/L	1	1,660	1,590	3,340	3,080	2,590
Sulfate	mg/L	1	6	12	3	3	2
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	-	-	-	-
Arsenic	mg/L	0.001	0.01	0.013	0.009	0.01	0.009
Cadmium	mg/L	0.0001	<0.0001	-	-	-	-
Cobalt	mg/L	0.001	<0.001	-	-	-	-
Copper	mg/L	0.001	<0.001	-	-	-	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.389	0.241	1.13	1.4	1
Nickel	mg/L	0.001	<0.001	-	-	-	-
Zinc	mg/L	0.005	<0.005	<0.005	0.006	0.008	0.023
Iron	mg/L	0.05	<0.05	<0.05	0.06	<0.05	0.08
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.01	0.032	0.01	0.014	0.013
Lead	mg/L	0.001	0.001	0.102	0.001	0.007	0.017
Manganese	mg/L	0.001	0.445	5.55	1.18	1.4	1.49
Zinc	mg/L	0.005	0.026	0.533	0.006	0.059	0.123
Iron	mg/L	0.05	1.39	151	0.8	12	12.4
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	-	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	-	<50	<50	<50	60
C15 - C28 Fraction	µg/L	100	-	1180	<100	140	260
C29 - C36 Fraction	µg/L	50	-	1280	<50	100	150
C10 - C36 Fraction (sum)	µg/L	50	-	2460	<50	240	470
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20		<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100		<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100		2020	<100	200	350
>C34 - C40 Fraction	µg/L	100		1210	<100	<100	130
>C10 - C40 Fraction (sum)	µg/L	100		3230	<100	200	480
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100		<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1		<1	<1	<1	<1
Toluene	µg/L	2		<2	<2	<2	6
Ethylbenzene	µg/L	2		<2	<2	<2	<2
meta- & para-Xylene	µg/L	2		<2	<2	<2	<2
ortho-Xylene	µg/L	2		<2	<2	<2	<2
Total Xylenes	µg/L	2		<2	<2	<2	<2
Sum of BTEX	µg/L	1		<1	<1	<1	6
Naphthalene	µg/L	5		<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			16/11/2018	26/02/2019	26/03/2019	30/04/2019	22/05/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	8	8	7.57	7.56	7.98
Electrical Conductivity	µS/cm	1	8,150	7,120	7,600	8,900	8,630
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	196	263	230	202	217
Dissolved Major Ions							
Calcium	mg/L	1	151	122	189	187	192
Magnesium	mg/L	1	37	34	52	51	50
Sodium	mg/L	1	1,490	1,310	1,720	1,620	1,680
Potassium	mg/L	1	9	11	11	10	10
Chloride	mg/L	1	2,500	1,960	2,440	2,810	2,980
Sulfate	mg/L	1	3	6	6	8	7
Dissolved Metals							
Aluminium	mg/L	0.01	-				
Arsenic	mg/L	0.001	0.008	0.012	0.008	0.007	0.007
Cadmium	mg/L	0.0001	-				
Cobalt	mg/L	0.001	-				
Copper	mg/L	0.001	-				
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.578	0.584	0.89	0.933	0.929
Nickel	mg/L	0.001	-				
Zinc	mg/L	0.005	0.012	0.03	0.034	0.037	0.032
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.01	0.013	0.011	0.009	0.009
Lead	mg/L	0.001	0.003	0.002	0.004	0.002	0.002
Manganese	mg/L	0.001	0.635	0.614	1.02	1.04	0.902
Zinc	mg/L	0.005	0.035	0.048	0.099	0.058	0.056
Iron	mg/L	0.05	1.9	0.41	3.39	2.32	0.56
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	140	160	370	150	210
C29 - C36 Fraction	µg/L	50	<50	<50	50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	140	160	420	150	210
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	150	160	400	140	240
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	150	160	400	140	240
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			21/06/2019	16/07/2019	27/08/2019	6/11/2019	26/02/2020
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.45	7.52	7.66	7.5	7.87
Electrical Conductivity	µS/cm	1	9,130	8,960	8,960	8,210	8,220
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	178	222	200	235	247
Dissolved Major Ions							
Calcium	mg/L	1	235	211	202	156	152
Magnesium	mg/L	1	49	54	48	43	40
Sodium	mg/L	1	1,660	1,770	1,670	1,460	1,540
Potassium	mg/L	1	11	11	10	10	9
Chloride	mg/L	1	2,910	2,750	2,710	2,580	2,380
Sulfate	mg/L	1	2	7	1	8	7
Dissolved Metals							
Aluminium	mg/L	0.01				<0.01	<0.01
Arsenic	mg/L	0.001	0.008	0.007	0.007	0.007	0.01
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.955	0.948	1.05	0.837	0.747
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.042	0.04	0.036	0.059	0.049
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01				0.08	0.52
Arsenic	mg/L	0.001	0.01	0.009	0.01	0.008	0.012
Lead	mg/L	0.001	0.002	0.003	0.003	0.001	0.004
Manganese	mg/L	0.001	1.02	0.989	1.01	0.865	0.837
Zinc	mg/L	0.005	0.05	0.07	0.071	0.062	0.087
Iron	mg/L	0.05	0.56	0.88	0.76	0.16	0.97
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	60	<50
C15 - C28 Fraction	µg/L	100	170	160	250	420	500
C29 - C36 Fraction	µg/L	50	<50	<50	<50	80	50
C10 - C36 Fraction (sum)	µg/L	50	170	160	250	560	550
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	180	160	260	440	510
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	180	160	260	440	510
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			26/05/2020	26/08/2020	19/11/2020	04/02/2021	12/05/2021
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.86	7.81	7.96	7.92	7.32
Electrical Conductivity	µS/cm	1	7,910	8,380	7,010	5,920	13,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	228	228	266	292	101
Dissolved Major Ions							
Calcium	mg/L	1	156	190	112	78	425
Magnesium	mg/L	1	39	42	30	23	106
Sodium	mg/L	1	1,540	1,580	1,260	1,180	2,560
Potassium	mg/L	1	10	10	8	7	15
Chloride	mg/L	1	2,400	2,580	2,220	1,760	5,180
Sulfate	mg/L	1	2	4	2	3	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.011	0.009	0.01	0.014	0.006
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	0.002	<0.001	<0.001
Manganese	mg/L	0.001	0.722	0.836	0.66	0.416	2.27
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.034	0.046	0.091	0.072	0.128
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	0.33
Total Metals							
Aluminium	mg/L	0.01	0.1	<0.01	0.01	0.06	3.43
Arsenic	mg/L	0.001	0.012	0.01	0.011	0.014	0.008
Lead	mg/L	0.001	0.001	0.001	0.005	0.004	0.008
Manganese	mg/L	0.001	0.763	0.839	0.589	0.442	2.53
Zinc	mg/L	0.005	0.044	0.052	0.099	0.078	0.164
Iron	mg/L	0.05	0.24	0.07	0.08	0.16	5.27
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	240	<100	320	300	110
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	240	<50	320	300	110
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	260	<100	310	280	110
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	260	<100	310	280	110
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			24/08/2021	8/12/2021	2/02/2022	19/05/2022	9/08/2022
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	8.11	8.04	7.89	8.04	8.04
Electrical Conductivity	µS/cm	1	5,130	5,330	5,210	5,790	5,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	330	333	346	366	332
Dissolved Major Ions							
Calcium	mg/L	1	57	69	57	60	70
Magnesium	mg/L	1	17	20	17	17	18
Sodium	mg/L	1	1,050	1,080	1,010	1,050	1,130
Potassium	mg/L	1	6	7	6	6	7
Chloride	mg/L	1	1,560	1,520	1,630	1,630	1,590
Sulfate	mg/L	1	2	<1	1	<1	4
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.013	0.012	0.012	<0.001	0.011
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.308	0.377	0.358	<0.001	0.358
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.054	0.022	0.01	<0.005	<0.005
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	0.05
Total Metals							
Aluminium	mg/L	0.01	0.09	0.03	0.04	0.02	0.06
Arsenic	mg/L	0.001	0.015	0.012	0.014	0.01	0.012
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.314	0.393	0.381	0.474	0.366
Zinc	mg/L	0.005	0.062	0.027	0.012	0.012	0.016
Iron	mg/L	0.05	0.2	0.12	0.1	0.05	0.16
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	110	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	110	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			10/11/2022	24/02/2023	9/05/2023	9/08/2023	21/11/2023
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.89	7.93	7.64	7.78	7.73
Electrical Conductivity	µS/cm	1	5,540	5,660	5,780	5,680	5,190
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	313	326	335	324	330
Dissolved Major Ions							
Calcium	mg/L	1	64	63	68	63	69
Magnesium	mg/L	1	18	18	19	19	18
Sodium	mg/L	1	1,110	1,100	1,100	1,140	986
Potassium	mg/L	1	7	7	7	7	7
Chloride	mg/L	1	1,630	1,580	1,570	1,520	1,560
Sulfate	mg/L	1	<1	<1	<1	1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	0.02	<0.01	<0.01	0.01	<0.01
Arsenic	mg/L	0.001	0.01	0.009	0.01	0.012	0.012
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.364	0.365	0.374	0.305	0.389
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	0.05	<0.05	<0.05	<0.05	0.08	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.16	0.06	0.11	0.08	0.02
Arsenic	mg/L	0.001	0.011	0.01	0.011	0.013	0.013
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.396	0.399	0.397	0.324	0.424
Zinc	mg/L	0.005	0.01	<0.005	0.007	0.008	<0.005
Iron	mg/L	0.05	0.29	0.14	0.22	0.2	<0.05
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	250	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	250	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	250	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	250	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW2D	EFGW2D	EFGW2D
Sample Date			16/01/2024	9/04/2024	6/07/2024	29/10/2024	27/01/2025
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	8.04	7.73	7.76	7.99	7.86
Electrical Conductivity	µS/cm	1	5,370	6,400	5,160	5,360	5,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	354	315	333	353	300
Dissolved Major Ions							
Calcium	mg/L	1	56	88	58	54	71
Magnesium	mg/L	1	17	24	16	14	16
Sodium	mg/L	1	1,080	1,230	1,050	880	1,060
Potassium	mg/L	1	8	8	7	6	6
Chloride	mg/L	1	1,480	1,810	1,530	1,530	1,460
Sulfate	mg/L	1	<1	2	1	5	1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.013	0.011	0.014	0.014	0.011
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.324	0.48	0.34	0.308	0.309
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.005	0.009	<0.005	<0.005	0.014
Iron	mg/L	0.05	<0.05	<0.05	0.14	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.01	0.02	0.05	<0.01	0.01
Arsenic	mg/L	0.001	0.013	0.011	0.014	0.016	0.012
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.001
Manganese	mg/L	0.001	0.336	0.458	0.347	0.34	0.318
Zinc	mg/L	0.005	0.014	0.012	0.011	<0.005	0.016
Iron	mg/L	0.05	0.1	0.12	0.24	0.07	0.07
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	60	<50	<50
C15 - C28 Fraction	µg/L	100	<100	140	170	<100	120
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	140	230	<50	120
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	130	160	<100	110
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	130	160	<100	110
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	5	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	5	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW2D	EFGW2D	EFGW3D	EFGW3D	EFGW3D
Sample Date			17/04/2025	16/07/2025	9/07/2008	18/01/2018	25/07/2018
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.2	7.8	7.24	7.96	7.71
Electrical Conductivity	µS/cm	1	16,800	5,580	20,700	17,900	17,400
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	91	330	424	626	340
Dissolved Major Ions							
Calcium	mg/L	1	573	61	510	486	504
Magnesium	mg/L	1	128	17	325	222	214
Sodium	mg/L	1	2,770	1,000	3,380	3,290	3,280
Potassium	mg/L	1	17	6	48	31	32
Chloride	mg/L	1	6,050	1,660	6,750	6,410	6,100
Sulfate	mg/L	1	<1	<1	800	45	161
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	-	0.05	-
Arsenic	mg/L	0.001	0.007	0.013	0.01	<0.001	0.001
Cadmium	mg/L	0.0001			0.0003	<0.0001	-
Cobalt	mg/L	0.001			-	<0.001	-
Copper	mg/L	0.001			0.001	<0.001	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	3.84	0.332	1.9	0.96	0.964
Nickel	mg/L	0.001			0.003	0.008	-
Zinc	mg/L	0.005	0.023	<0.005	0.012	<0.005	<0.005
Iron	mg/L	0.05	0.73	0.11	1.43	0.13	<0.05
Total Metals							
Aluminium	mg/L	0.01	3.08	0.08	-		
Arsenic	mg/L	0.001	0.009	0.015	-	0.003	<0.001
Lead	mg/L	0.001	0.004	<0.001	-	0.008	0.002
Manganese	mg/L	0.001	3.52	0.367	-	1.27	1.02
Zinc	mg/L	0.005	0.051	0.018	-	0.166	0.106
Iron	mg/L	0.05	5.2	0.25	-	16	0.84
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	-	-	480
C10 - C14 Fraction	µg/L	50	<50	50	-	-	60
C15 - C28 Fraction	µg/L	100	<100	130	-	-	<100
C29 - C36 Fraction	µg/L	50	<50	<50	-	-	60
C10 - C36 Fraction (sum)	µg/L	50	<50	180	-	-	120
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20			470
>C10 - C16 Fraction	µg/L	100	<100	<100			<100
>C16 - C34 Fraction	µg/L	100	<100	120			130
>C34 - C40 Fraction	µg/L	100	<100	<100			<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	120			130
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100			<100
BTEXN							
Benzene	µg/L	1	4	<1			<1
Toluene	µg/L	2	<2	<2			<2
Ethylbenzene	µg/L	2	<2	<2			<2
meta- & para-Xylene	µg/L	2	<2	<2			<2
ortho-Xylene	µg/L	2	<2	<2			<2
Total Xylenes	µg/L	2	<2	<2			<2
Sum of BTEX	µg/L	1	4	<1			<1
Naphthalene	µg/L	5	<5	<5			<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			30/08/2018	26/09/2018	23/10/2018	15/11/2018	26/02/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.51	7.43	7.55	7.24	7.63
Electrical Conductivity	µS/cm	1	17,800	17,700	18,100	18,200	18,100
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	254	129	84	69	72
Dissolved Major Ions							
Calcium	mg/L	1	536	657	698	766	625
Magnesium	mg/L	1	228	163	160	168	187
Sodium	mg/L	1	3,570	3,400	3,380	3,620	3,320
Potassium	mg/L	1	33	34	35	37	44
Chloride	mg/L	1	6,570	6,410	6,540	6,420	6,170
Sulfate	mg/L	1	138	149	168	200	190
Dissolved Metals							
Aluminium	mg/L	0.01	-	-	-	-	
Arsenic	mg/L	0.001	<0.001	<0.001	0.006	0.003	0.004
Cadmium	mg/L	0.0001	-	-	-	-	
Cobalt	mg/L	0.001	-	-	-	-	
Copper	mg/L	0.001	-	-	-	-	
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.955	0.751	0.585	0.542	0.742
Nickel	mg/L	0.001	-	-	-	-	
Zinc	mg/L	0.005	<0.005	<0.005	0.059	0.062	0.077
Iron	mg/L	0.05	0.49	0.3	0.19	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.001	0.001	0.007	0.004	0.004
Lead	mg/L	0.001	0.002	0.001	0.002	0.001	0.002
Manganese	mg/L	0.001	0.979	0.751	0.651	0.549	0.767
Zinc	mg/L	0.005	0.114	0.028	0.111	0.059	0.086
Iron	mg/L	0.05	1.8	0.87	0.9	0.39	0.16
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	610	300	140	<20	100
C10 - C14 Fraction	µg/L	50	120	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	110	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	60	<50	50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	290	<50	50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	600	340	140	<20	90
>C10 - C16 Fraction	µg/L	100	120	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	150	<100	120	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	270	<100	120	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	120	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	4	4	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	4	4	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			26/03/2019	30/04/2019	22/05/2019	20/06/2019	16/07/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.08	7.04	7.41	6.87	7.05
Electrical Conductivity	µS/cm	1	18,100	19,100	19,200	19,600	19,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	53	52	53	57	61
Dissolved Major Ions							
Calcium	mg/L	1	705	685	713	760	741
Magnesium	mg/L	1	158	160	171	165	173
Sodium	mg/L	1	3,380	3,310	3,620	3,380	3,470
Potassium	mg/L	1	35	34	36	35	36
Chloride	mg/L	1	6,990	6,830	7,030	7,180	6,720
Sulfate	mg/L	1	186	187	192	192	178
Dissolved Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.001	0.002	<0.005	0.002	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.684	0.64	0.699	0.598	0.519
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.093	0.032	0.069	0.059	0.055
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.002	0.002	<0.005	0.002	0.003
Lead	mg/L	0.001	0.001	<0.001	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.701	0.661	0.778	0.625	0.552
Zinc	mg/L	0.005	0.1	0.034	0.095	0.052	0.086
Iron	mg/L	0.05	0.74	0.13	0.24	0.13	0.17
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	120	110	110
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	120	110	110
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	140	100	110
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	140	100	110
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			27/08/2019	6/11/2019	26/02/2020	26/05/2020	26/08/2020
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.23	7.07	7.49	7.27	7.46
Electrical Conductivity	µS/cm	1	19,200	19,300	20,100	19,000	19,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	67	82	79	71	86
Dissolved Major Ions							
Calcium	mg/L	1	656	607	615	640	710
Magnesium	mg/L	1	168	164	177	182	173
Sodium	mg/L	1	3,290	3,100	3,520	3,590	3,470
Potassium	mg/L	1	34	33	34	35	34
Chloride	mg/L	1	6,510	6,790	6,720	7,890	6,980
Sulfate	mg/L	1	194	175	192	186	180
Dissolved Metals							
Aluminium	mg/L	0.01		<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.002	0.003	0.002	0.002	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.631	0.7	0.713	0.748	0.691
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.048	0.101	0.057	0.127	0.009
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01		0.09	0.04	0.08	0.26
Arsenic	mg/L	0.001	0.004	0.003	0.003	0.003	0.002
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.603	0.72	0.85	0.77	0.694
Zinc	mg/L	0.005	0.065	0.096	0.054	0.149	0.023
Iron	mg/L	0.05	0.08	0.22	0.12	0.27	0.43
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	30	20	20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	110	250	<100	400	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	60	<50
C10 - C36 Fraction (sum)	µg/L	50	110	250	<50	460	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	30	20	20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	110	270	<100	430	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	110	270	<100	430	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			24/11/2020	04/02/2021	12/05/2021	24/08/2021	25/11/2021
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.35	7.27	7.17	7.55	7.49
Electrical Conductivity	µS/cm	1	19,300	18,900	17,800	18,000	18,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	96	88	92	97	99
Dissolved Major Ions							
Calcium	mg/L	1	616	576	584	509	554
Magnesium	mg/L	1	188	190	199	198	203
Sodium	mg/L	1	3,470	3,560	3,550	3,420	3,590
Potassium	mg/L	1	35	36	36	33	34
Chloride	mg/L	1	7,390	6,880	7,020	7,020	6,590
Sulfate	mg/L	1	184	163	154	153	167
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.002	0.002	0.001	0.002	0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.732	0.726	0.855	0.921	0.959
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.081	0.016	0.013	0.009	0.006
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.08	0.06	0.07	0.1	0.07
Arsenic	mg/L	0.001	0.002	0.002	0.001	0.002	0.001
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.811	0.774	0.895	0.956	0.966
Zinc	mg/L	0.005	0.079	0.019	0.012	0.013	0.009
Iron	mg/L	0.05	0.2	0.16	0.25	0.23	0.28
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	40	40	50	40	70
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	40	30	50	40	60
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			02/02/2022	19/05/2022	9/08/2022	10/11/2022	24/02/2023
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.5	7.69	7.59	7.41	7.5
Electrical Conductivity	µS/cm	1	16,600	20,400	15,700	19,400	20,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	103	111	102	98	105
Dissolved Major Ions							
Calcium	mg/L	1	516	559	527	593	463
Magnesium	mg/L	1	196	227	206	208	199
Sodium	mg/L	1	3,290	3,820	3,580	3,500	3,480
Potassium	mg/L	1	31	39	34	32	32
Chloride	mg/L	1	6,970	7,310	7,260	7,310	6,830
Sulfate	mg/L	1	136	140	129	128	119
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	0.02	<0.01	<0.01
Arsenic	mg/L	0.001	<0.001	0.001	0.001	<0.001	0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.992	1.04	0.99	1.1	1.03
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.01	0.009	0.011	0.011	0.014
Iron	mg/L	0.05	<0.05	<0.05	0.33	0.16	0.28
Total Metals							
Aluminium	mg/L	0.01	0.1	0.06	0.01	0.07	0.05
Arsenic	mg/L	0.001	0.001	0.001	0.001	0.002	0.001
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.01	1.02	1.03	1.09	1.18
Zinc	mg/L	0.005	0.012	0.012	0.019	0.012	0.016
Iron	mg/L	0.05	0.47	0.28	0.15	0.47	0.62
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	50	40	60	70	60
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	50	40	60	80	60
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			9/05/2023	9/08/2023	21/11/2023	16/01/2024	9/04/2024
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.24	7.49	7.24	7.58	7.36
Electrical Conductivity	µS/cm	1	20,300	20,800	20,300	20,300	22,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	110	99	111	102	86
Dissolved Major Ions							
Calcium	mg/L	1	496	558	561	530	568
Magnesium	mg/L	1	202	226	218	210	198
Sodium	mg/L	1	3,340	3,660	3,130	3,720	3,570
Potassium	mg/L	1	32	33	34	37	34
Chloride	mg/L	1	6,860	6,880	7,010	7,060	7,160
Sulfate	mg/L	1	113	113	104	113	120
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.001	0.001	0.001	<0.001	<0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.09	1.09	1.2	0.876	0.803
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.012	0.072	0.028	0.012	0.021
Iron	mg/L	0.05	0.19	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.04	0.63	0.16	1.49	0.22
Arsenic	mg/L	0.001	0.001	0.001	0.001	0.001	<0.001
Lead	mg/L	0.001	<0.001	0.002	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.1	1.07	1.23	0.891	0.804
Zinc	mg/L	0.005	0.015	0.09	0.034	0.019	0.034
Iron	mg/L	0.05	0.73	1.81	1.31	2.02	0.45
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	70	60	80	40	20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	70	60	70	40	20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW3D	EFGW3D	EFGW3D	EFGW3D	EFGW3D
Sample Date			7/07/2024	29/10/2024	27/01/2025	17/04/2025	16/07/2025
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.37	7.53	7.3	7.3	7.25
Electrical Conductivity	µS/cm	1	19,800	19,800	19,900	20,000	19,700
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	88	100	82	86	84
Dissolved Major Ions							
Calcium	mg/L	1	535	508	640	620	596
Magnesium	mg/L	1	194	176	190	191	186
Sodium	mg/L	1	3,390	3,050	3,530	3,360	3,280
Potassium	mg/L	1	34	31	34	35	30
Chloride	mg/L	1	7,220	7,200	6,470	7,280	7,490
Sulfate	mg/L	1	110	103	118	110	111
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.04	1.08	0.953	1.06	0.905
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.015	<0.005	<0.005	<0.005	0.018
Iron	mg/L	0.05	<0.05	0.22	0.14	0.21	0.21
Total Metals							
Aluminium	mg/L	0.01	0.15	0.05	2.11	0.05	0.31
Arsenic	mg/L	0.001	<0.001	<0.001	0.001	<0.001	0.002
Lead	mg/L	0.001	<0.001	<0.001	0.003	<0.001	<0.001
Manganese	mg/L	0.001	0.983	1.06	1.03	0.883	0.993
Zinc	mg/L	0.005	0.017	0.008	0.02	0.013	0.032
Iron	mg/L	0.05	0.35	0.37	4.57	0.29	0.9
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	30	20	30	<20	20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	30	20	30	<20	20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			9/07/2008	17/01/2018	24/07/2018	31/08/2018	27/09/2018
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	6.87	7.52	7.93	7.11	7.1
Electrical Conductivity	µS/cm	1	34,400	25,300	24,600	22,700	28,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	418	376	439	445	463
Dissolved Major Ions							
Calcium	mg/L	1	557	610	602	605	632
Magnesium	mg/L	1	638	535	583	607	593
Sodium	mg/L	1	4,260	4,330	4,470	4,640	4,600
Potassium	mg/L	1	118	77	81	84	84
Chloride	mg/L	1	9,400	8,890	8,570	8,790	8,330
Sulfate	mg/L	1	692	618	636	734	631
Dissolved Metals							
Aluminium	mg/L	0.01	-	<0.01	-	-	-
Arsenic	mg/L	0.001	<0.001	0.002	0.003	0.003	0.002
Cadmium	mg/L	0.0001	0.0001	<0.0001	-	-	-
Cobalt	mg/L	0.001	-	0.001	-	-	-
Copper	mg/L	0.001	0.002	<0.001	-	-	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.898	0.797	0.964	0.768	0.728
Nickel	mg/L	0.001	0.004	0.002	-	-	-
Zinc	mg/L	0.005	0.015	<0.005	<0.005	<0.005	0.02
Iron	mg/L	0.05	4.63	4.22	4.47	4.06	4.11
Total Metals							
Aluminium	mg/L	0.01	-				
Arsenic	mg/L	0.001	-	0.002	0.003	0.003	0.002
Lead	mg/L	0.001	-	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	-	0.797	0.756	0.768	0.755
Zinc	mg/L	0.005	-	<0.005	<0.005	<0.005	0.02
Iron	mg/L	0.05	-	4.22	4.47	4.06	4.11
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	-	-	<20	<20	<20
C10 - C14 Fraction	µg/L	50	-	-	<50	<50	<50
C15 - C28 Fraction	µg/L	100	-	-	220	<100	<100
C29 - C36 Fraction	µg/L	50	-	-	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	-	-	220	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20			<20	<20	<20
>C10 - C16 Fraction	µg/L	100			<100	<100	<100
>C16 - C34 Fraction	µg/L	100			220	<100	<100
>C34 - C40 Fraction	µg/L	100			<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100			220	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100			<100	<100	<100
BTEXN							
Benzene	µg/L	1			<1	<1	<1
Toluene	µg/L	2			<2	<2	<2
Ethylbenzene	µg/L	2			<2	<2	<2
meta- & para-Xylene	µg/L	2			<2	<2	<2
ortho-Xylene	µg/L	2			<2	<2	<2
Total Xylenes	µg/L	2			<2	<2	<2
Sum of BTEX	µg/L	1			<1	<1	<1
Naphthalene	µg/L	5			<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			24/10/2018	15/11/2018	26/02/2019	26/03/2019	30/04/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.48	6.9	7.77	7	6.86
Electrical Conductivity	µS/cm	1	16,100	28,800	25,600	25,900	26,800
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	442	416	420	445	451
Dissolved Major Ions							
Calcium	mg/L	1	628	656	586	606	591
Magnesium	mg/L	1	591	651	649	595	611
Sodium	mg/L	1	4,510	4,870	4,520	4,470	4,480
Potassium	mg/L	1	81	87	106	83	80
Chloride	mg/L	1	8,640	8,780	8,520	9,300	9,290
Sulfate	mg/L	1	590	698	691	683	668
Dissolved Metals							
Aluminium	mg/L	0.01	-	-			
Arsenic	mg/L	0.001	0.002	0.002	0.002	0.002	0.002
Cadmium	mg/L	0.0001	-	-			
Cobalt	mg/L	0.001	-	-			
Copper	mg/L	0.001	-	-			
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.72	0.74	0.694	0.751	0.714
Nickel	mg/L	0.001	-	-			
Zinc	mg/L	0.005	0.031	0.015	0.014	0.015	0.012
Iron	mg/L	0.05	4.1	3.8	3.15	3.59	4.04
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.002	0.002	0.002	0.002	0.002
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.72	0.74	0.694	0.751	0.714
Zinc	mg/L	0.005	0.031	0.015	0.014	0.015	0.012
Iron	mg/L	0.05	4.1	3.8	3.15	3.59	4.04
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			22/05/2019	21/06/2019	16/07/2019	27/08/2019	6/11/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.47	6.84	6.78	6.99	6.81
Electrical Conductivity	µS/cm	1	25,800	27,400	27,400	28,400	29,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	452	414	448	463	452
Dissolved Major Ions							
Calcium	mg/L	1	610	642	664	584	528
Magnesium	mg/L	1	628	696	625	592	561
Sodium	mg/L	1	4,800	4,900	4,640	4,550	4,170
Potassium	mg/L	1	83	90	85	83	77
Chloride	mg/L	1	9,120	9,260	8,600	8,520	9,330
Sulfate	mg/L	1	704	670	677	633	614
Dissolved Metals							
Aluminium	mg/L	0.01					<0.01
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	0.002	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.741	0.783	0.723	0.749	0.696
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.025	<0.025	<0.025	0.009	0.011
Iron	mg/L	0.05	1.95	4.1	4.04	4.28	3.64
Total Metals							
Aluminium	mg/L	0.01					<0.01
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	0.002	0.002
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.741	0.783	0.723	0.749	0.696
Zinc	mg/L	0.005	<0.025	<0.025	<0.025	0.009	0.011
Iron	mg/L	0.05	1.95	4.1	4.04	4.28	3.64
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			26/02/2020	26/05/2020	26/08/2020	24/11/2020	04/02/2021
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.37	7.25	7.43	7.25	7.38
Electrical Conductivity	µS/cm	1	26,700	26,300	25,800	26,100	21,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	438	414	428	431	390
Dissolved Major Ions							
Calcium	mg/L	1	572	584	639	587	564
Magnesium	mg/L	1	592	601	570	602	588
Sodium	mg/L	1	4,770	4,740	4,610	4,600	4,680
Potassium	mg/L	1	85	84	82	88	89
Chloride	mg/L	1	9,060	8,740	9,080	9,630	8,900
Sulfate	mg/L	1	707	627	665	616	692
Dissolved Metals							
Aluminium	mg/L	0.01	0.02	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.005	0.002	0.003	0.002	0.003
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.002	0.002
Manganese	mg/L	0.001	0.276	0.725	0.828	0.808	0.796
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.005	0.008	0.129	0.295	0.265
Iron	mg/L	0.05	5.34	3.57	3.63	3.68	4.07
Total Metals							
Aluminium	mg/L	0.01	0.02	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.005	0.002	0.003	0.002	0.003
Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.002	0.002
Manganese	mg/L	0.001	0.276	0.725	0.828	0.808	0.796
Zinc	mg/L	0.005	<0.005	0.008	0.129	0.295	0.265
Iron	mg/L	0.05	5.34	3.57	3.63	3.68	4.07
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	60	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	570	<100	<100	360	150
C29 - C36 Fraction	µg/L	50	110	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	740	<50	<50	360	150
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	630	<100	<100	320	130
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	630	<100	<100	320	130
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			12/05/2021	24/08/2021	25/11/2021	02/02/2022	10/11/2022
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	6.88	7.09	7.4	7.25	7.2
Electrical Conductivity	µS/cm	1	27,100	25,500	21,100	22,600	26,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	409	391	372	432	380
Dissolved Major Ions							
Calcium	mg/L	1	582	586	614	521	619
Magnesium	mg/L	1	638	615	618	563	571
Sodium	mg/L	1	4,890	4,810	4,740	4,360	4,530
Potassium	mg/L	1	87	89	89	79	80
Chloride	mg/L	1	9,130	9,140	8,810	9,320	9,510
Sulfate	mg/L	1	694	726	706	726	741
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.01	<0.01
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	0.002	0.003
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.994	1.04	1.06	1.01	1.1
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.244	0.141	0.033	0.043	0.026
Iron	mg/L	0.05	4.4	4.72	4.92	5.06	4.99
Total Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.01	0.71
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	0.002	0.003
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.994	1.04	1.06	1.01	1.12
Zinc	mg/L	0.005	0.244	0.141	0.033	0.043	0.035
Iron	mg/L	0.05	4.4	4.72	4.92	5.06	6.08
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	20	20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	120	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	120	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	20	<20	20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	110	<100	<100	100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	110	<100	<100	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			24/02/2023	9/05/2023	9/08/2023	21/11/2023	16/01/2024
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.25	6.92	6.95	6.96	7.41
Electrical Conductivity	µS/cm	1	26,000	27,000	27,600	26,800	26,400
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	370	414	429	419	453
Dissolved Major Ions							
Calcium	mg/L	1	496	541	583	615	470
Magnesium	mg/L	1	551	582	629	609	594
Sodium	mg/L	1	4,610	4,460	4,840	4,230	4,570
Potassium	mg/L	1	84	84	88	88	84
Chloride	mg/L	1	8,800	9,010	9,100	9,180	9,280
Sulfate	mg/L	1	744	728	723	712	732
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	0.05	<0.05	<0.01	<0.01
Arsenic	mg/L	0.001	0.003	<0.005	<0.005	0.002	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	1.05	0.872	0.789	0.856	0.849
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.005	<0.025	<0.025	0.021	0.034
Iron	mg/L	0.05	5.2	4.16	4.29	4.02	3.87
Total Metals							
Aluminium	mg/L	0.01	0.54	<0.05	0.15	0.55	2.67
Arsenic	mg/L	0.001	0.003	<0.005	<0.005	0.002	0.004
Lead	mg/L	0.001	<0.001	<0.005	<0.005	<0.001	0.003
Manganese	mg/L	0.001	1.17	0.872	0.806	0.839	0.947
Zinc	mg/L	0.005	0.009	<0.026	<0.026	0.023	0.05
Iron	mg/L	0.05	6.3	4.05	3.99	4.6	6.69
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4D	EFGW4D	EFGW4D	EFGW4D	EFGW4D
Sample Date			9/04/2024	7/07/2024	29/10/2024	17/04/2025	16/07/2025
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	6.94	7.06	7.28	7.04	7.43
Electrical Conductivity	µS/cm	1	27,600	26,900	26,400	25,900	26,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	415	418	446	425	406
Dissolved Major Ions							
Calcium	mg/L	1	565	565	512	599	594
Magnesium	mg/L	1	552	602	506	572	615
Sodium	mg/L	1	4,360	4,580	4,060	4,460	5,030
Potassium	mg/L	1	85	86	78	84	85
Chloride	mg/L	1	9,160	9,120	9,300	9,100	11,000
Sulfate	mg/L	1	748	735	726	627	624
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.05	<0.01	<0.01	<0.05
Arsenic	mg/L	0.001	<0.001	<0.005	0.002	0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.001	<0.005
Manganese	mg/L	0.001	0.822	0.849	0.861	1.09	0.932
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.038	<0.025	0.044	0.039	<0.025
Iron	mg/L	0.05	<0.05	4.23	3.96	5.13	4.01
Total Metals							
Aluminium	mg/L	0.01	<0.01	<0.05	0.04	0.66	0.08
Arsenic	mg/L	0.001	0.002	<0.005	0.003	0.005	<0.005
Lead	mg/L	0.001	<0.001	<0.005	<0.001	0.001	<0.005
Manganese	mg/L	0.001	0.826	0.832	0.888	0.898	0.96
Zinc	mg/L	0.005	0.026	<0.026	0.052	0.064	0.033
Iron	mg/L	0.05	4.06	4.26	4.14	5.13	4.31
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	160	<20	<20	100	60
C10 - C14 Fraction	µg/L	50	<50	<50	<50	150	60
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	150	60
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	30	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	89	47
Toluene	µg/L	2	113	<2	<2	6	2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	113	<1	<1	95	49
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW4S	EFGW4S	EFGW4S	EFGW5D	EFGW5D
Sample Date			16/01/2024	17/04/2025	16/07/2025	9/07/2008	16/01/2018
Aquifer			Alluvium	Alluvium	Alluvium	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	6.95	6.96	6.74	8.16	8.15
Electrical Conductivity	µS/cm	1	414	426	402	1,970	10,400
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	81	167	125	172	429
Dissolved Major Ions							
Calcium	mg/L	1	7	40	7	19	120
Magnesium	mg/L	1	5	6	3	18	140
Sodium	mg/L	1	76	52	78	304	1,870
Potassium	mg/L	1	<1	1	<1	14	41
Chloride	mg/L	1	75	35	44	378	3,460
Sulfate	mg/L	1	22	8	3	92	44
Dissolved Metals							
Aluminium	mg/L	0.01	0.55	0.05	0.25	-	0.02
Arsenic	mg/L	0.001	0.01	0.002	0.002	0.003	<0.001
Cadmium	mg/L	0.0001				0.0002	<0.0001
Cobalt	mg/L	0.001				-	<0.001
Copper	mg/L	0.001				0.002	<0.001
Lead	mg/L	0.001	0.007	<0.001	<0.001	0.002	<0.001
Manganese	mg/L	0.001	0.057	0.252	0.081	0.063	0.23
Nickel	mg/L	0.001				0.013	<0.001
Zinc	mg/L	0.005	0.014	0.062	<0.005	0.036	<0.005
Iron	mg/L	0.05	5.66	1.1	5.94	0.06	<0.05
Total Metals							
Aluminium	mg/L	0.01	44.5	8.17	3.29	-	
Arsenic	mg/L	0.001	0.011	0.003	0.003	-	0.002
Lead	mg/L	0.001	0.031	0.005	0.003	-	0.003
Manganese	mg/L	0.001	0.258	0.286	0.105	-	0.251
Zinc	mg/L	0.005	0.155	0.063	0.032	-	0.051
Iron	mg/L	0.05	50.4	13.5	9.6	-	0.3
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	-	-
C10 - C14 Fraction	µg/L	50	<50	<50	<50	-	-
C15 - C28 Fraction	µg/L	100	<100	<100	<100	-	-
C29 - C36 Fraction	µg/L	50	<50	<50	<50	-	-
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	-	-
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20		
>C10 - C16 Fraction	µg/L	100	<100	<100	<100		
>C16 - C34 Fraction	µg/L	100	<100	<100	<100		
>C34 - C40 Fraction	µg/L	100	<100	<100	<100		
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100		
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100		
BTEXN							
Benzene	µg/L	1	<1	<1	<1		
Toluene	µg/L	2	<2	<2	<2		
Ethylbenzene	µg/L	2	<2	<2	<2		
meta- & para-Xylene	µg/L	2	<2	<2	<2		
ortho-Xylene	µg/L	2	<2	<2	<2		
Total Xylenes	µg/L	2	<2	<2	<2		
Sum of BTEX	µg/L	1	<1	<1	<1		
Naphthalene	µg/L	5	<5	<5	<5		

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			25/07/2018	31/08/2018	27/09/2018	24/10/2018	16/11/2018
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	8.02	7.42	7.41	7.67	7.22
Electrical Conductivity	µS/cm	1	20,600	21,600	20,400	20,700	20,900
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	552	567	536	493	451
Dissolved Major Ions							
Calcium	mg/L	1	295	306	336	334	357
Magnesium	mg/L	1	444	456	451	461	520
Sodium	mg/L	1	3,860	4,020	4,030	3,950	4,440
Potassium	mg/L	1	76	78	80	78	85
Chloride	mg/L	1	7,520	7,620	7,360	7,670	7,870
Sulfate	mg/L	1	<1	2	<1	16	3
Dissolved Metals							
Aluminium	mg/L	0.01	-	-	-	-	-
Arsenic	mg/L	0.001	0.005	0.003	0.004	0.004	0.004
Cadmium	mg/L	0.0001	-	-	-	-	-
Cobalt	mg/L	0.001	-	-	-	-	-
Copper	mg/L	0.001	-	-	-	-	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.25	0.332	0.307	0.256	0.261
Nickel	mg/L	0.001	-	-	-	-	-
Zinc	mg/L	0.005	0.007	0.115	0.016	0.016	0.021
Iron	mg/L	0.05	7.37	4.34	9.44	11.1	10
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.01	0.007	0.004	0.005	0.004
Lead	mg/L	0.001	0.02	0.025	0.003	0.001	0.001
Manganese	mg/L	0.001	0.651	0.464	0.307	0.312	0.273
Zinc	mg/L	0.005	0.176	0.383	0.041	0.037	0.033
Iron	mg/L	0.05	69	15.8	16.1	16.1	13.4
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	130	130	30	60	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	490	140	140	140	<100
C29 - C36 Fraction	µg/L	50	280	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	770	140	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	130	120	40	60	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	680	150	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	230	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	910	150	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	2	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			18/12/2018	26/02/2019	26/03/2019	30/04/2019	22/05/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.4	7.59	7.11	7.22	7.64
Electrical Conductivity	µS/cm	1	23,900	21,200	22,600	22,500	22,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	473	458	468	463	466
Dissolved Major Ions							
Calcium	mg/L	1	263	284	326	294	330
Magnesium	mg/L	1	438	488	476	481	506
Sodium	mg/L	1	3,920	3,920	4,130	4,060	4,390
Potassium	mg/L	1	80	100	81	80	84
Chloride	mg/L	1	7,500	7,660	8,360	8,140	8,150
Sulfate	mg/L	1	<1	<1	<1	3	3
Dissolved Metals							
Aluminium	mg/L	0.01	-				
Arsenic	mg/L	0.001	0.004	0.002	0.004	0.003	<0.005
Cadmium	mg/L	0.0001	-				
Cobalt	mg/L	0.001	-				
Copper	mg/L	0.001	-				
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Manganese	mg/L	0.001	0.238	0.245	0.255	0.234	0.215
Nickel	mg/L	0.001	-				
Zinc	mg/L	0.005	0.016	0.014	0.015	0.01	<0.025
Iron	mg/L	0.05	9.73	3.07	10.1	9.7	8.52
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.005	0.004	0.005	0.004	<0.005
Lead	mg/L	0.001	0.002	0.001	<0.001	<0.001	<0.005
Manganese	mg/L	0.001	0.258	0.25	0.272	0.224	0.261
Zinc	mg/L	0.005	0.046	0.04	0.036	0.033	0.035
Iron	mg/L	0.05	12.7	8.96	13.5	10.6	11.1
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	30	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	60
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	60
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	30	30	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			21/06/2019	16/07/2019	27/08/2019	6/11/2019	26/02/2020
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.01	7.1	7.26	7.12	7.68
Electrical Conductivity	µS/cm	1	23,400	23,000	22,800	22,600	24,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	433	463	470	487	457
Dissolved Major Ions							
Calcium	mg/L	1	383	350	322	280	298
Magnesium	mg/L	1	471	507	474	419	459
Sodium	mg/L	1	4,100	4,310	4,100	3,540	4,180
Potassium	mg/L	1	83	86	83	77	82
Chloride	mg/L	1	8,340	7,940	7,670	7,900	8,130
Sulfate	mg/L	1	<1	2	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01				<0.01	<0.01
Arsenic	mg/L	0.001	0.004	<0.005	0.004	0.003	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.229	0.232	0.233	0.238	0.744
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.024	<0.025	0.024	0.023	0.202
Iron	mg/L	0.05	9.19	9.13	9.73	7.82	3.43
Total Metals							
Aluminium	mg/L	0.01				0.07	0.17
Arsenic	mg/L	0.001	0.004	<0.005	0.006	0.004	0.003
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.001	0.002
Manganese	mg/L	0.001	0.241	0.247	0.243	0.237	0.885
Zinc	mg/L	0.005	0.034	0.042	0.107	0.042	0.207
Iron	mg/L	0.05	10.6	9.95	9.96	9.45	4.77
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	110	110
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	110	110
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	120	120
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	120	120
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			26/05/2020	26/08/2020	24/11/2020	04/02/2021	12/05/2021
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.48	7.49	7.55	7.67	7.21
Electrical Conductivity	µS/cm	1	21,700	23,900	23,300	21,100	21,800
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	457	462	464	420	440
Dissolved Major Ions							
Calcium	mg/L	1	312	338	298	289	298
Magnesium	mg/L	1	477	454	480	476	499
Sodium	mg/L	1	4,340	4,150	4,200	4,280	4,430
Potassium	mg/L	1	84	79	84	88	90
Chloride	mg/L	1	8,060	8,150	8,650	8,010	8,500
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.003	0.003	0.003	0.003	0.003
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.262	0.251	0.266	0.27	0.289
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.02	0.019	0.012	<0.005	0.01
Iron	mg/L	0.05	10.1	9.24	9.38	9.46	9.78
Total Metals							
Aluminium	mg/L	0.01	0.12	2.53	1.42	10.3	0.9
Arsenic	mg/L	0.001	0.004	0.007	0.006	0.006	0.008
Lead	mg/L	0.001	0.002	0.007	0.002	0.005	0.002
Manganese	mg/L	0.001	0.261	0.314	0.304	0.327	0.322
Zinc	mg/L	0.005	0.082	0.326	0.281	0.235	0.233
Iron	mg/L	0.05	9.29	17.5	14	34.1	13.4
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	30	<20	30
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	350	290	<100	240	<100
C29 - C36 Fraction	µg/L	50	<50	70	<50	140	<50
C10 - C36 Fraction (sum)	µg/L	50	350	360	<50	380	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	30	<20	40
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	360	340	<100	340	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	360	340	<100	340	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			24/08/2021	25/11/2021	02/02/2022	19/05/2022	9/08/2022
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.74	7.57	7.54	7.75	7.7
Electrical Conductivity	µS/cm	1	21,000	20,900	19,900	24,100	18,300
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	469	453	482	514	458
Dissolved Major Ions							
Calcium	mg/L	1	253	301	270	244	293
Magnesium	mg/L	1	481	498	470	557	496
Sodium	mg/L	1	4,150	4,470	4,060	4,710	4,410
Potassium	mg/L	1	79	89	78	96	84
Chloride	mg/L	1	8,260	7,900	8,620	8,380	8,340
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.05	<0.01
Arsenic	mg/L	0.001	0.004	0.004	0.003	<0.005	0.004
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.005	<0.001
Manganese	mg/L	0.001	0.289	0.287	0.289	0.026	0.318
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.008	0.01	0.009	<0.025	0.074
Iron	mg/L	0.05	10.6	10.6	10.8	<0.05	10.7
Total Metals							
Aluminium	mg/L	0.01	2.06	0.53	0.74	0.89	0.74
Arsenic	mg/L	0.001	0.008	0.007	0.006	0.006	0.006
Lead	mg/L	0.001	0.002	0.001	0.001	0.001	0.001
Manganese	mg/L	0.001	0.3	0.3	0.321	0.323	0.299
Zinc	mg/L	0.005	0.213	0.15	0.125	0.117	0.096
Iron	mg/L	0.05	13.6	12.3	12.5	13.6	12.5
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	40	40	30	30
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	110	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	110	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	30	30	30	30
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	120	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	120	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			10/11/2022	24/02/2023	9/05/2023	9/08/2023	21/11/2023
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.64	7.59	7.23	7.46	7.31
Electrical Conductivity	µS/cm	1	23,100	22,700	24,000	24,300	23,500
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	430	468	481	445	471
Dissolved Major Ions							
Calcium	mg/L	1	334	252	252	307	313
Magnesium	mg/L	1	477	466	444	518	481
Sodium	mg/L	1	4,160	4,240	3,940	4,370	3,760
Potassium	mg/L	1	78	80	80	82	83
Chloride	mg/L	1	8,660	8,020	7,980	8,200	8,280
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	0.17	<0.01
Arsenic	mg/L	0.001	0.003	0.003	0.004	0.004	0.003
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.324	0.288	0.296	0.291	0.293
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.008	0.008	0.008	0.048	0.035
Iron	mg/L	0.05	10.3	10	10.3	10.6	9.42
Total Metals							
Aluminium	mg/L	0.01	2.36	1.26	1.76	<0.01	0.1
Arsenic	mg/L	0.001	0.006	0.006	0.005	0.003	0.004
Lead	mg/L	0.001	0.002	0.002	0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.321	0.335	0.336	0.309	0.311
Zinc	mg/L	0.005	0.083	0.083	0.066	0.009	0.052
Iron	mg/L	0.05	15.4	13.9	13.5	10	10.6
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<50	30	40	30	50
C10 - C14 Fraction	µg/L	50	60	<50	<50	70	80
C15 - C28 Fraction	µg/L	100	<100	<100	410	290	370
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	60	<50	410	360	450
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<50	40	40	40	50
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	110
>C16 - C34 Fraction	µg/L	100	<100	<100	400	280	350
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	400	280	460
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	110
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	EFGW5D	EFGW5D	EFGW5D
Sample Date			16/01/2024	9/04/2024	7/07/2024	29/10/2024	27/01/2025
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.68	7.31	7.37	7.61	7.32
Electrical Conductivity	µS/cm	1	23,400	23,800	22,900	23,300	23,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	512	468	469	499	438
Dissolved Major Ions							
Calcium	mg/L	1	229	299	286	262	280
Magnesium	mg/L	1	475	503	474	421	432
Sodium	mg/L	1	4,030	4,330	4,130	3,690	3,670
Potassium	mg/L	1	81	84	81	74	73
Chloride	mg/L	1	8,160	8,360	8,270	8,240	6,280
Sulfate	mg/L	1	<1	<1	<1	<1	2
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.003	0.003	0.003	0.003	0.003
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.005
Manganese	mg/L	0.001	0.285	0.284	0.329	0.303	0.264
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.007	<0.005	0.008	0.009	0.007
Iron	mg/L	0.05	9.56	10.6	9.76	9.93	9.61
Total Metals							
Aluminium	mg/L	0.01	1.08	3.1	1.14	0.43	0.11
Arsenic	mg/L	0.001	0.004	0.005	0.003	0.003	0.004
Lead	mg/L	0.001	0.001	0.003	0.001	0.001	<0.001
Manganese	mg/L	0.001	0.316	0.314	0.315	0.304	0.294
Zinc	mg/L	0.005	0.07	0.098	0.047	0.042	0.067
Iron	mg/L	0.05	13	16.8	11.9	11.7	11.7
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	40	30	20	20	30
C10 - C14 Fraction	µg/L	50	70	<50	70	100	80
C15 - C28 Fraction	µg/L	100	120	<100	310	250	300
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	190	<50	380	350	380
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	40	30	30	20	30
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	120	110
>C16 - C34 Fraction	µg/L	100	100	100	290	220	270
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	100	100	290	340	380
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	120	110
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			EFGW5D	EFGW5D	IBGW006	IBGW006	IBGW006
Sample Date			17/04/2025	16/07/2025	22/11/2023	17/01/2024	30/10/2024
Aquifer			Rewan	Rewan	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.34	7.31	7.4	7.6	7.64
Electrical Conductivity	µS/cm	1	23,600	23,200	11,500	11,800	11,700
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	472	454	81	82	96
Dissolved Major Ions							
Calcium	mg/L	1	313	301	222	159	185
Magnesium	mg/L	1	453	503	14	15	15
Sodium	mg/L	1	3,960	4,620	2,000	2,140	2,100
Potassium	mg/L	1	78	83	10	10	11
Chloride	mg/L	1	8,290	9,640	3,970	3,930	4,130
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.05	0.02	0.02	<0.01
Arsenic	mg/L	0.001	0.003	<0.005	0.002	0.002	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.275	0.285	0.733	0.773	0.733
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.008	<0.025	0.006	0.006	0.012
Iron	mg/L	0.05	10.1	10.8	1.17	1.74	0.98
Total Metals							
Aluminium	mg/L	0.01	0.82	0.94	0.19	0.08	0.8
Arsenic	mg/L	0.001	0.004	<0.005	0.002	0.002	0.003
Lead	mg/L	0.001	0.001	<0.005	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.277	0.309	0.763	0.826	0.859
Zinc	mg/L	0.005	0.066	0.068	0.02	0.014	0.069
Iron	mg/L	0.05	11.9	13.6	1.63	2.09	2.67
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	20	20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	80	60	80	<50
C15 - C28 Fraction	µg/L	100	140	260	230	450	120
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	140	340	290	530	120
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	30	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	110	<100
>C16 - C34 Fraction	µg/L	100	130	240	240	440	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	130	240	240	550	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	110	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGW006	IBGW006	IBGW006	PT1	PT1
Sample Date			28/01/2025	17/04/2025	16/07/2025	18/01/2018	25/07/2018
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.35	7.76	7.6	8.03	8.09
Electrical Conductivity	µS/cm	1	11,600	12,600	12,600	11,600	11,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	90	446	428	236	233
Dissolved Major Ions							
Calcium	mg/L	1	194	74	95	178	146
Magnesium	mg/L	1	14	16	15	50	50
Sodium	mg/L	1	1,910	2,590	2,430	2,250	2,190
Potassium	mg/L	1	10	10	9	10	10
Chloride	mg/L	1	3,600	4,310	4,490	4,050	3,800
Sulfate	mg/L	1	<1	<1	<1	1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	-
Arsenic	mg/L	0.001	0.001	0.011	0.012	0.014	0.013
Cadmium	mg/L	0.0001				<0.0001	-
Cobalt	mg/L	0.001				<0.001	-
Copper	mg/L	0.001				<0.001	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.748	0.492	0.485	0.032	0.028
Nickel	mg/L	0.001				<0.001	-
Zinc	mg/L	0.005	0.011	0.007	0.007	0.008	<0.005
Iron	mg/L	0.05	0.33	2.83	3.16	0.28	0.65
Total Metals							
Aluminium	mg/L	0.01	0.04	1.49	4.49		
Arsenic	mg/L	0.001	0.002	0.012	0.014	0.015	0.015
Lead	mg/L	0.001	<0.001	0.001	0.005	<0.001	<0.001
Manganese	mg/L	0.001	0.79	0.539	0.62	0.049	0.029
Zinc	mg/L	0.005	0.016	0.043	0.142	0.013	0.012
Iron	mg/L	0.05	1.71	5.87	12	0.75	0.77
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	-	<20
C10 - C14 Fraction	µg/L	50	60	<50	<50	-	<50
C15 - C28 Fraction	µg/L	100	160	330	160	-	140
C29 - C36 Fraction	µg/L	50	<50	70	<50	-	<50
C10 - C36 Fraction (sum)	µg/L	50	220	400	160	-	140
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20		<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100		<100
>C16 - C34 Fraction	µg/L	100	130	350	180		160
>C34 - C40 Fraction	µg/L	100	<100	<100	<100		<100
>C10 - C40 Fraction (sum)	µg/L	100	130	350	180		160
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100		<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1		<1
Toluene	µg/L	2	<2	<2	<2		<2
Ethylbenzene	µg/L	2	<2	<2	<2		<2
meta- & para-Xylene	µg/L	2	<2	<2	<2		<2
ortho-Xylene	µg/L	2	<2	<2	<2		<2
Total Xylenes	µg/L	2	<2	<2	<2		<2
Sum of BTEX	µg/L	1	<1	<1	<1		<1
Naphthalene	µg/L	5	<5	<5	<5		<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			30/08/2018	27/09/2018	24/10/2018	15/11/2018	18/12/2018
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.71	7.8	7.91	7.61	7.83
Electrical Conductivity	µS/cm	1	11,000	11,100	10,900	10,800	11,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	231	224	235	213	206
Dissolved Major Ions							
Calcium	mg/L	1	168	179	181	189	141
Magnesium	mg/L	1	51	49	51	56	51
Sodium	mg/L	1	2,260	2,230	2,230	2,420	2,160
Potassium	mg/L	1	10	10	10	10	10
Chloride	mg/L	1	3,880	3,810	3,290	3,560	3,390
Sulfate	mg/L	1	<1	<1	<1	18	2
Dissolved Metals							
Aluminium	mg/L	0.01	-	-	-	-	-
Arsenic	mg/L	0.001	0.01	0.012	0.013	0.012	0.01
Cadmium	mg/L	0.0001	-	-	-	-	-
Cobalt	mg/L	0.001	-	-	-	-	-
Copper	mg/L	0.001	-	-	-	-	-
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.028	0.029	0.028	0.028	0.033
Nickel	mg/L	0.001	-	-	-	-	-
Zinc	mg/L	0.005	0.01	0.011	0.01	0.005	0.007
Iron	mg/L	0.05	0.15	0.6	0.76	0.7	0.44
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.012	0.014	0.012	0.013	0.012
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.029	0.03	0.03	0.027	0.034
Zinc	mg/L	0.005	0.009	<0.005	0.012	0.009	0.012
Iron	mg/L	0.05	0.71	0.81	0.74	0.79	0.83
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	30
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			26/02/2019	26/03/2019	30/04/2019	22/05/2019	21/06/2019
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	8.09	7.52	7.65	7.97	7.45
Electrical Conductivity	µS/cm	1	10,900	10,800	11,200	11,200	11,500
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	213	218	223	222	209
Dissolved Major Ions							
Calcium	mg/L	1	138	180	148	174	209
Magnesium	mg/L	1	50	50	51	53	50
Sodium	mg/L	1	2,100	2,220	2,170	2,360	2,250
Potassium	mg/L	1	12	10	9	10	10
Chloride	mg/L	1	3,460	3,620	3,730	3,650	3,600
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.003	0.004	0.009	0.008	0.01
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.024	0.012	0.026	0.025	0.026
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.008	<0.005	0.008	0.012	0.01
Iron	mg/L	0.05	<0.05	0.2	0.49	0.44	0.62
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	0.01	0.011	0.011	0.012	0.01
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.025	0.028	0.026	0.028	0.026
Zinc	mg/L	0.005	0.007	0.008	0.012	0.018	0.009
Iron	mg/L	0.05	0.51	0.76	0.75	0.68	0.72
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			16/07/2019	27/08/2019	6/11/2019	26/02/2020	26/05/2020
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.54	7.67	7.56	8	7.85
Electrical Conductivity	µS/cm	1	11,400	11,200	11,200	11,300	11,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	222	228	223	204	202
Dissolved Major Ions							
Calcium	mg/L	1	182	168	138	154	152
Magnesium	mg/L	1	54	50	44	47	49
Sodium	mg/L	1	2,380	2,230	1,890	2,280	2,300
Potassium	mg/L	1	10	10	9	10	10
Chloride	mg/L	1	3,620	3,360	3,540	3,390	3,550
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01			<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.009	0.008	0.008	0.003	0.009
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.024	0.027	0.024	0.248	0.024
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.01	0.014	0.01	0.031	0.012
Iron	mg/L	0.05	0.49	0.43	0.41	8.66	0.5
Total Metals							
Aluminium	mg/L	0.01			<0.01	0.03	<0.01
Arsenic	mg/L	0.001	0.012	0.012	0.009	0.004	0.011
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.028	0.031	0.024	0.278	0.026
Zinc	mg/L	0.005	0.017	0.023	0.009	0.068	0.01
Iron	mg/L	0.05	0.78	0.67	0.66	11	0.67
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			26/08/2020	19/11/2020	04/02/2021	13/05/2021	25/08/2021
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.79	7.92	8.01	7.59	7.95
Electrical Conductivity	µS/cm	1	11,400	11,400	11,000	10,800	11,000
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	222	188	212	204	216
Dissolved Major Ions							
Calcium	mg/L	1	167	194	135	143	116
Magnesium	mg/L	1	47	47	48	50	48
Sodium	mg/L	1	2,290	2,120	2,340	2,370	2,220
Potassium	mg/L	1	10	9	10	11	10
Chloride	mg/L	1	3,600	3,790	3,950	3,950	4,030
Sulfate	mg/L	1	<1	6	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	0.03
Arsenic	mg/L	0.001	0.01	0.003	0.007	0.01	0.009
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.029	0.135	0.073	0.03	0.031
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.036	0.049	0.056	0.008	0.017
Iron	mg/L	0.05	0.55	<0.05	<0.05	0.61	0.98
Total Metals							
Aluminium	mg/L	0.01	<0.01	0.07	0.03	0.06	0.04
Arsenic	mg/L	0.001	0.01	0.004	0.007	0.014	0.01
Lead	mg/L	0.001	<0.001	0.002	0.002	<0.001	<0.001
Manganese	mg/L	0.001	0.03	0.137	0.083	0.033	0.031
Zinc	mg/L	0.005	0.047	0.075	0.067	0.012	0.014
Iron	mg/L	0.05	0.65	0.34	0.24	1.33	0.56
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	190	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	190	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	190	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	190	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			25/11/2021	02/02/2022	19/05/2022	9/08/2022	10/11/2022
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.84	7.83	7.97	7.91	7.79
Electrical Conductivity	µS/cm	1	10,900	10,500	12,100	10,000	11,800
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	216	223	241	229	232
Dissolved Major Ions							
Calcium	mg/L	1	143	128	127	141	134
Magnesium	mg/L	1	50	47	45	50	48
Sodium	mg/L	1	2,390	2,190	2,260	2,410	2,310
Potassium	mg/L	1	11	10	10	10	11
Chloride	mg/L	1	3,650	3,970	4,200	4,100	4,190
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.008	0.007	<0.001	0.007	0.006
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.029	0.028	<0.001	0.03	0.027
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.007	0.01	<0.005	0.032	0.02
Iron	mg/L	0.05	0.48	0.4	<0.05	0.58	0.55
Total Metals							
Aluminium	mg/L	0.01	0.01	0.01	<0.01	0.02	0.03
Arsenic	mg/L	0.001	0.009	0.008	0.006	0.008	0.006
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.029	0.031	0.024	0.028	0.026
Zinc	mg/L	0.005	0.011	0.013	0.02	0.017	0.008
Iron	mg/L	0.05	0.69	0.7	0.36	0.72	0.71
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			24/02/2023	9/05/2023	9/08/2023	21/11/2023	16/01/2024
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.84	7.56	7.79	7.79	7.94
Electrical Conductivity	µS/cm	1	11,600	12,200	12,400	11,900	12,300
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	231	244	235	224	246
Dissolved Major Ions							
Calcium	mg/L	1	112	109	141	146	107
Magnesium	mg/L	1	46	44	48	44	41
Sodium	mg/L	1	2,410	2,190	2,400	2,200	2,300
Potassium	mg/L	1	10	10	10	12	12
Chloride	mg/L	1	4,070	3,970	4,080	3,980	4,040
Sulfate	mg/L	1	<1	<1	<1	16	10
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.005	0.006	0.004	0.003	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.025	0.024	0.02	0.022	0.015
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.008	0.008	0.007	0.009	0.005
Iron	mg/L	0.05	0.67	0.55	0.65	0.3	0.44
Total Metals							
Aluminium	mg/L	0.01	0.01	0.05	0.02	0.02	0.02
Arsenic	mg/L	0.001	0.006	0.007	0.004	0.004	0.003
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.026	0.027	0.022	0.022	0.015
Zinc	mg/L	0.005	0.009	0.017	0.01	0.013	0.009
Iron	mg/L	0.05	0.74	0.91	0.66	0.41	0.49
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	880	250	550	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	880	250	550	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	900	260	540	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	900	260	540	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	PT1	PT1	PT1	PT1
Sample Date			9/04/2024	6/07/2024	29/10/2024	27/01/2025	17/04/2025
Aquifer			Coal seam	Coal seam	Coal seam	Coal seam	Coal seam
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.75	7.71	7.85	7.68	7.75
Electrical Conductivity	µS/cm	1	12,000	11,800	12,400	12,400	12,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	191	192	272	236	264
Dissolved Major Ions							
Calcium	mg/L	1	136	133	120	149	149
Magnesium	mg/L	1	38	35	40	39	41
Sodium	mg/L	1	2,380	2,360	2,300	2,430	2,420
Potassium	mg/L	1	15	16	11	11	11
Chloride	mg/L	1	4,120	4,230	4,280	3,860	4,270
Sulfate	mg/L	1	26	19	1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.003	0.003	0.004	0.002	0.002
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.01	0.011	0.07	0.033	0.028
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.005	<0.005	0.022	0.014	0.017
Iron	mg/L	0.05	0.37	0.4	0.2	0.18	0.5
Total Metals							
Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	0.003	0.002	0.004	0.002	0.002
Lead	mg/L	0.001	<0.001	<0.001	0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.01	0.011	0.072	0.033	0.026
Zinc	mg/L	0.005	0.007	0.006	0.026	0.018	0.015
Iron	mg/L	0.05	0.38	0.41	0.26	0.21	0.52
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	110	150	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	110	150	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	100	140	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	100	140	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			PT1	IBGWR1	IBGWR1	IBGWR1	IBGWR1
Sample Date			16/07/2025	15/11/2018	26/02/2019	26/03/2019	30/04/2019
Aquifer			Coal seam	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.7	7.28	7.52	7.17	7.19
Electrical Conductivity	µS/cm	1	12,000	28,100	24,900	28,900	27,300
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	256	72	78	83	77
Dissolved Major Ions							
Calcium	mg/L	1	154	1280	1130	1190	1160
Magnesium	mg/L	1	39	394	359	344	354
Sodium	mg/L	1	2,360	5,080	4,510	4,550	4,630
Potassium	mg/L	1	10	49	58	46	45
Chloride	mg/L	1	4,480	9,650	9,620	10,400	10,600
Sulfate	mg/L	1	<1	6	18	18	4
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01				
Arsenic	mg/L	0.001	0.002	0.008	0.006	0.009	0.007
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.022	5.44	5.59	6.25	5.59
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.016	0.034	0.048	0.05	0.042
Iron	mg/L	0.05	0.52	0.53	0.37	0.87	0.91
Total Metals							
Aluminium	mg/L	0.01	0.01				
Arsenic	mg/L	0.001	0.002	0.007	0.007	0.01	0.009
Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.001	<0.001
Manganese	mg/L	0.001	0.023	5.44	5.59	6.35	5.75
Zinc	mg/L	0.005	0.025	0.039	0.05	0.059	0.05
Iron	mg/L	0.05	0.55	1.4	0.57	1.66	1.43
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	160	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	120	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	120	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	40	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	120	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	120	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	124	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	124	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR1	IBGWR1	IBGWR1	IBGWR1	IBGWR1
Sample Date			22/05/2019	20/06/2019	16/07/2019	27/08/2019	6/11/2019
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.5	7.01	7.27	7.24	6.97
Electrical Conductivity	µS/cm	1	27,600	28,700	29,600	31,900	32,500
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	80	76	76	78	79
Dissolved Major Ions							
Calcium	mg/L	1	1200	1270	1370	1170	1040
Magnesium	mg/L	1	365	395	377	348	317
Sodium	mg/L	1	4,960	4,930	4,920	4,640	4,230
Potassium	mg/L	1	47	50	49	46	44
Chloride	mg/L	1	10,000	9,890	10,200	9,920	10,400
Sulfate	mg/L	1	3	3	<1	2	2
Dissolved Metals							
Aluminium	mg/L	0.01					<0.01
Arsenic	mg/L	0.001	0.008	0.007	0.005	0.006	0.006
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	5.6	5.8	6.24	5.63	5.16
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.038	0.029	0.084	0.076	0.154
Iron	mg/L	0.05	1.01	0.97	0.05	0.75	0.57
Total Metals							
Aluminium	mg/L	0.01					0.02
Arsenic	mg/L	0.001	0.01	0.007	0.007	0.009	0.007
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	6.48	5.6	5.83	5.25	5.34
Zinc	mg/L	0.005	0.085	0.045	0.098	0.109	0.143
Iron	mg/L	0.05	2.1	2.9	1.23	0.97	0.75
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	100	110	100	290
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	50
C10 - C36 Fraction (sum)	µg/L	50	<50	100	110	100	340
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	120	120	100	300
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	120	120	100	300
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR1	IBGWR1	IBGWR1	IBGWR1	IBGWR1
Sample Date			26/02/2020	26/05/2020	26/08/2020	19/11/2020	04/02/2021
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.46	7.33	7.38	7.36	7.16
Electrical Conductivity	µS/cm	1	28,500	28,600	28,700	28,400	27,100
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	76	73	72	82	71
Dissolved Major Ions							
Calcium	mg/L	1	1120	1180	1210	1130	1150
Magnesium	mg/L	1	327	381	331	371	356
Sodium	mg/L	1	4,700	5,420	4,800	4,670	4,800
Potassium	mg/L	1	47	48	44	48	47
Chloride	mg/L	1	10,300	10,300	10,000	10,200	10,200
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.05	<0.01	<0.05	<0.05
Arsenic	mg/L	0.001	0.01	0.008	0.007	<0.005	0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.005	<0.005
Manganese	mg/L	0.001	0.024	6.46	4.9	6.55	6.21
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.012	0.084	0.159	0.422	0.247
Iron	mg/L	0.05	0.51	1.42	1.49	0.46	1.48
Total Metals							
Aluminium	mg/L	0.01	<0.01	<0.05	0.04	0.21	<0.05
Arsenic	mg/L	0.001	0.01	0.008	0.008	0.006	0.006
Lead	mg/L	0.001	<0.001	<0.005	0.002	0.013	<0.005
Manganese	mg/L	0.001	0.027	6.22	5.81	5.52	6.32
Zinc	mg/L	0.005	0.012	0.083	0.158	0.473	0.242
Iron	mg/L	0.05	0.76	1.65	1.81	1.71	1.92
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	160	160	<100	610	400
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	160	160	<50	610	400
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	160	160	<100	600	370
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	160	160	<100	600	370
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR1	IBGWR1	IBGWR1	IBGWR1	IBGWR1
Sample Date			12/05/2021	24/08/2021	25/11/2021	02/02/2022	19/05/2022
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.03	7.52	7.34	7.37	7.52
Electrical Conductivity	µS/cm	1	28,800	28,300	27,800	26,700	29,400
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	72	78	83	87	91
Dissolved Major Ions							
Calcium	mg/L	1	1120	1130	1220	1040	1150
Magnesium	mg/L	1	370	375	384	335	398
Sodium	mg/L	1	4,930	5,100	5,110	4,450	5,160
Potassium	mg/L	1	46	51	50	44	54
Chloride	mg/L	1	10,300	10,400	10,100	10,800	9,920
Sulfate	mg/L	1	<1	<1	3	1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.01	<0.05
Arsenic	mg/L	0.001	0.007	<0.005	<0.005	0.003	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.001	<0.005
Manganese	mg/L	0.001	6.12	6.2	6.55	6.18	6.31
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.222	0.17	0.027	0.038	0.036
Iron	mg/L	0.05	1.4	1.65	1.99	1.6	<0.05
Total Metals							
Aluminium	mg/L	0.01	1.32	0.08	<0.05	0.06	<0.05
Arsenic	mg/L	0.001	0.009	<0.005	<0.005	0.004	<0.005
Lead	mg/L	0.001	0.007	<0.005	<0.005	<0.001	<0.005
Manganese	mg/L	0.001	6.52	5.88	5.85	5.76	6.09
Zinc	mg/L	0.005	0.244	0.158	<0.026	0.046	0.048
Iron	mg/L	0.05	3.26	1.85	2.16	1.82	1.51
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	110	<100	<100	<100	120
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	110	<50	<50	<50	120
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	110	<100	<100	<100	110
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	110	<100	<100	<100	110
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR1	IBGWR1	IBGWR1	IBGWR1	IBGWR1
Sample Date			9/08/2022	10/11/2022	24/02/2023	9/05/2023	9/08/2023
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.47	7.32	7.63	7.12	7.29
Electrical Conductivity	µS/cm	1	21,200	28,000	29,900	29,500	29,700
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	86	84	87	93	97
Dissolved Major Ions							
Calcium	mg/L	1	1180	1380	1120	1030	1130
Magnesium	mg/L	1	373	402	394	348	371
Sodium	mg/L	1	5,180	5,530	5,320	4,610	4,920
Potassium	mg/L	1	50	53	50	46	49
Chloride	mg/L	1	10,600	10,900	10,200	10,200	10,200
Sulfate	mg/L	1	<1	<1	<1	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic	mg/L	0.001	<0.005	0.008	<0.005	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	0.006	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	6.33	5.55	6.38	6.23	6.2
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.031	0.05	0.03	0.035	0.033
Iron	mg/L	0.05	2.3	2.14	1.84	2.08	2.46
Total Metals							
Aluminium	mg/L	0.01	0.1	0.21	0.13	0.09	<0.05
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	6.85	5.53	6.49	6.29	5.77
Zinc	mg/L	0.005	0.038	<0.026	0.056	0.034	0.033
Iron	mg/L	0.05	2.52	2.11	2.08	2.18	2.63
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	70	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	370	<100	<100	120
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	440	<50	<50	120
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	140	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	310	<100	<100	110
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	450	<100	<100	110
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	140	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR1	IBGWR1	IBGWR1	IBGWR1	IBGWR1
Sample Date			21/11/2023	16/01/2024	9/04/2024	7/07/2024	29/10/2024
Aquifer			Rewan	Rewan	Rewan	Rewan	Rewan
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.1	7.42	7.16	7.2	7.39
Electrical Conductivity	µS/cm	1	29,100	29,000	31,000	28,800	28,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	98	93	95	103	117
Dissolved Major Ions							
Calcium	mg/L	1	1250	1100	1160	1020	983
Magnesium	mg/L	1	398	354	357	354	299
Sodium	mg/L	1	4,830	4,510	4,900	4,650	4,070
Potassium	mg/L	1	47	51	52	46	42
Chloride	mg/L	1	10,300	10,300	10,300	10,200	10,400
Sulfate	mg/L	1	<1	<1	2	<1	<1
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.01
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.001
Manganese	mg/L	0.001	6.57	6.07	6.22	5.87	6.5
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.029	<0.025	0.036	<0.025	0.027
Iron	mg/L	0.05	2.09	2.28	2.4	2.96	2.94
Total Metals							
Aluminium	mg/L	0.01	<0.05	0.26	0.09	0.13	0.45
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	6.9	5.89	7	6.25	6.68
Zinc	mg/L	0.005	<0.026	0.032	0.043	<0.026	0.046
Iron	mg/L	0.05	2.14	2.8	2.88	3.28	3.74
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	100	<100	110
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	100	<50	110
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR1	IBGWR1	IBGWR2	IBGWR2	IBGWR2
Sample Date			27/01/2025	16/07/2025	16/11/2018	17/12/2018	26/02/2019
Aquifer			Rewan	Rewan	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.18	7.12	6.91	7.15	7.75
Electrical Conductivity	µS/cm	1	28,200	28,100	28,500	34,100	27,100
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	92	95	807	795	801
Dissolved Major Ions							
Calcium	mg/L	1	1210	1170	410	320	388
Magnesium	mg/L	1	341	372	835	723	814
Sodium	mg/L	1	4,760	5,280	6,020	5,460	5,610
Potassium	mg/L	1	45	48	60	57	73
Chloride	mg/L	1	8,880	12,500	9,790	9,850	9,810
Sulfate	mg/L	1	<1	<1	977	966	971
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.05			
Arsenic	mg/L	0.001	0.001	<0.005	<0.005	<0.001	<0.001
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.005	<0.001	<0.001
Manganese	mg/L	0.001	6.05	6.36	1.4	1.36	1.21
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.027	0.031	<0.025	0.01	0.016
Iron	mg/L	0.05	2.37	2.57	0.11	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.2	<0.05			
Arsenic	mg/L	0.001	0.001	<0.005	<0.001	<0.005	<0.001
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.005	0.001
Manganese	mg/L	0.001	6.71	6.55	1.62	1.5	1.26
Zinc	mg/L	0.005	0.037	0.053	0.014	<0.026	0.017
Iron	mg/L	0.05	2.73	2.68	1.91	0.85	0.31
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	30	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	3	<1	<1	<1
Toluene	µg/L	2	<2	<2	19	8	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	3	19	8	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR2	IBGWR2	IBGWR2	IBGWR2	IBGWR2
Sample Date			26/03/2019	30/04/2019	22/05/2019	20/06/2019	16/07/2019
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	6.86	6.74	7.46	6.81	6.9
Electrical Conductivity	µS/cm	1	30,500	29,600	30,200	31,600	31,600
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	813	829	848	791	844
Dissolved Major Ions							
Calcium	mg/L	1	472	376	396	414	406
Magnesium	mg/L	1	825	844	813	873	782
Sodium	mg/L	1	6,190	6,510	5,960	6,080	5,720
Potassium	mg/L	1	62	59	59	61	58
Chloride	mg/L	1	10,600	10,600	10,300	10,400	10,600
Sulfate	mg/L	1	980	1000	1030	969	977
Dissolved Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.36	1.34	1.24	1.3	1.21
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.025	<0.025	<0.025	<0.025	0.033
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01					
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.29	1.24	1.51	1.38	1.31
Zinc	mg/L	0.005	<0.026	<0.026	<0.026	<0.026	0.037
Iron	mg/L	0.05	2.06	1.68	2.25	0.63	0.22
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR2	IBGWR2	IBGWR2	IBGWR2	IBGWR2
Sample Date			27/08/2019	6/11/2019	26/02/2020	26/05/2020	26/08/2020
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.06	6.88	7.47	7.36	7.47
Electrical Conductivity	µS/cm	1	35,400	34,600	33,200	31,100	33,200
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	857	841	767	775	780
Dissolved Major Ions							
Calcium	mg/L	1	382	396	448	381	407
Magnesium	mg/L	1	760	795	884	797	866
Sodium	mg/L	1	5,670	5,700	6,480	6,340	6,410
Potassium	mg/L	1	58	57	64	59	62
Chloride	mg/L	1	10,200	10,600	11,200	10,800	11,100
Sulfate	mg/L	1	938	968	1000	946	1000
Dissolved Metals							
Aluminium	mg/L	0.01		<0.05	<0.01	<0.05	<0.05
Arsenic	mg/L	0.001	<0.001	<0.005	0.007	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.001	<0.005	<0.005
Manganese	mg/L	0.001	1.26	1.2	4.76	1.37	1.38
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.013	<0.025	0.112	<0.025	0.22
Iron	mg/L	0.05	<0.05	<0.05	0.69	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01		<0.05	0.19	0.11	0.24
Arsenic	mg/L	0.001	0.001	<0.005	0.008	<0.005	0.001
Lead	mg/L	0.001	<0.001	<0.005	0.001	<0.005	0.004
Manganese	mg/L	0.001	1.22	1.33	6.24	1.34	1.34
Zinc	mg/L	0.005	0.021	<0.026	0.108	<0.026	0.211
Iron	mg/L	0.05	0.41	0.07	1.46	0.13	0.42
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR2	IBGWR2	IBGWR2	IBGWR2	IBGWR2
Sample Date			19/11/2020	04/02/2021	12/05/2021	24/08/2021	8/12/2021
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.31	7.66	6.83	7.61	7.41
Electrical Conductivity	µS/cm	1	32,600	23,700	32,700	31,300	31,900
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	722	692	778	769	762
Dissolved Major Ions							
Calcium	mg/L	1	466	439	408	418	382
Magnesium	mg/L	1	892	844	861	865	822
Sodium	mg/L	1	6,200	6,310	6,430	6,550	6,220
Potassium	mg/L	1	68	64	62	65	60
Chloride	mg/L	1	11,400	11,000	11,000	11,000	10,900
Sulfate	mg/L	1	1020	970	986	964	964
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	0.009	<0.005	0.007	<0.005	<0.005
Manganese	mg/L	0.001	1.6	1.69	1.6	1.57	1.45
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.18	0.193	0.223	0.202	0.041
Iron	mg/L	0.05	0.15	<0.05	<0.05	<0.05	0.55
Total Metals							
Aluminium	mg/L	0.01	0.13	0.32	0.07	0.12	<0.05
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	0.01	<0.005	0.008	<0.005	<0.005
Manganese	mg/L	0.001	1.46	1.75	1.58	1.52	1.58
Zinc	mg/L	0.005	0.199	0.211	0.209	0.23	0.045
Iron	mg/L	0.05	0.3	0.37	0.13	0.23	0.65
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	700	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	430	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	1130	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	1040	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	260	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	1300	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR2	IBGWR2	IBGWR2	IBGWR2	IBGWR2
Sample Date			3/02/2022	19/05/2022	9/08/2022	10/11/2022	24/02/2023
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.26	7.66	7.43	7.21	7.67
Electrical Conductivity	µS/cm	1	30,100	32,900	22,500	31,100	31,100
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	842	848	795	777	802
Dissolved Major Ions							
Calcium	mg/L	1	340	188	385	378	421
Magnesium	mg/L	1	775	896	862	916	873
Sodium	mg/L	1	5,760	6,660	6,530	6,630	6,640
Potassium	mg/L	1	57	69	68	71	65
Chloride	mg/L	1	11,300	11,600	11,300	11,300	10,500
Sulfate	mg/L	1	1010	1000	970	988	966
Dissolved Metals							
Aluminium	mg/L	0.01	<0.01	<0.05	<0.05	<0.05	<0.05
Arsenic	mg/L	0.001	0.002	<0.005	<0.005	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.001	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.36	1.2	1.56	1.45	1.56
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.035	<0.025	<0.025	0.031	<0.025
Iron	mg/L	0.05	<0.05	<0.05	<0.05	0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.18	0.07	<0.05	0.59	1.02
Arsenic	mg/L	0.001	<0.001	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	<0.001	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.6	1.43	1.92	1.55	1.67
Zinc	mg/L	0.005	0.036	<0.026	<0.026	<0.026	0.039
Iron	mg/L	0.05	0.39	0.11	<0.05	0.95	1.51
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR2	IBGWR2	IBGWR2	IBGWR2	IBGWR2
Sample Date			9/05/2023	9/08/2023	21/11/2023	16/01/2024	9/04/2024
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	6.84	7.19	6.95	7.47	7.03
Electrical Conductivity	µS/cm	1	32,700	32,600	32,300	31,700	33,800
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	817	778	782	848	792
Dissolved Major Ions							
Calcium	mg/L	1	411	401	420	403	428
Magnesium	mg/L	1	844	822	872	788	802
Sodium	mg/L	1	5,980	6,220	6,030	5,630	6,140
Potassium	mg/L	1	62	63	61	68	62
Chloride	mg/L	1	10,600	10,600	11,000	10,900	11,000
Sulfate	mg/L	1	981	912	956	954	953
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.6	1.53	1.5	1.55	1.58
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	0.027	<0.025	<0.025	0.029	<0.025
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	1.64	0.16	0.58	0.89	0.7
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.58	1.51	1.62	1.62	1.56
Zinc	mg/L	0.005	0.041	<0.026	<0.026	0.037	0.029
Iron	mg/L	0.05	2.33	0.28	0.89	1.22	1.19
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	<50	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	3	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	3	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix C – Water Quality – Laboratory Analyses (Project No. IRB5005.001)

Sample ID			IBGWR2	IBGWR2	IBGWR2	IBGWR2	IBGWR2
Sample Date			6/07/2024	29/10/2024	27/01/2025	17/04/2025	16/07/2025
Aquifer			Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Analyte	Units	LOR*					
Water Quality Indicators							
pH Value	pH Unit	0.01	7.08	7.38	7.09	7.07	7.1
Electrical Conductivity	µS/cm	1	31,800	31,700	31,400	31,400	31,100
Alkalinity							
Carbonate Alkalinity	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg/L	1	797	858	768	822	790
Dissolved Major Ions							
Calcium	mg/L	1	378	412	398	405	403
Magnesium	mg/L	1	809	823	818	822	820
Sodium	mg/L	1	5,730	6,440	6,010	6,000	6,510
Potassium	mg/L	1	56	65	61	62	61
Chloride	mg/L	1	10,800	11,000	9,280	10,900	13,000
Sulfate	mg/L	1	935	983	999	974	821
Dissolved Metals							
Aluminium	mg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	mg/L	0.0001					
Cobalt	mg/L	0.001					
Copper	mg/L	0.001					
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.45	1.7	1.54	1.8	1.63
Nickel	mg/L	0.001					
Zinc	mg/L	0.005	<0.025	<0.025	0.044	0.036	<0.025
Iron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Metals							
Aluminium	mg/L	0.01	0.1	0.15	2.53	0.1	<0.05
Arsenic	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	mg/L	0.001	1.56	1.67	1.74	1.67	1.66
Zinc	mg/L	0.005	<0.026	<0.026	0.048	0.035	<0.026
Iron	mg/L	0.05	0.19	0.25	2.49	0.21	<0.05
Total Petroleum Hydrocarbons							
C6 - C9 Fraction	µg/L	20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	<100	<100	160	<100	<100
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	50	<50	<50	160	<50	<50
TotalRecoverable Hydrocarbons							
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	100	<100	<100	150	<100	<100
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	100	<100	<100	150	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	<100	<100	<100	<100	<100
BTEXN							
Benzene	µg/L	1	<1	<1	<1	1	<1
Toluene	µg/L	2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
Sum of BTEX	µg/L	1	<1	<1	<1	1	<1
Naphthalene	µg/L	5	<5	<5	<5	<5	<5

*Laboratory limit of reporting

Appendix D

Water Quality Summary Statistics

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW1S - All data							
Aquifer			Alluvium							
Statistic			# Obs	Min	Median	p80	p95	Max	# Obs	Min
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	37	3.98	7.23	7.59	7.856	8.72	11	7.06
Electrical Conductivity	µS/cm	1	37	274	1,170	4,362	5,948	6,360	11	1,170
Alkalinity										
Carbonate Alkalinity	mg/L	1	37	0.5	0.5	0.5	0.5	0.5	11	0.5
Bicarbonate Alkalinity	mg/L	1	37	466	689	758	856.4	950	11	516
Dissolved Major Ions										
Calcium	mg/L	1	37	8	43	65	96	102	11	8
Magnesium	mg/L	1	37	11	50	79	108	119	11	11
Sodium	mg/L	1	37	262	701	1,000	1,100	1,190	11	262
Potassium	mg/L	1	37	2	4	6	7	7	11	2
Chloride	mg/L	1	37	71	890	1,380	1,732	1,880	11	71
Sulfate	mg/L	1	37	2	41	66	77	80	11	2
Dissolved Metals										
Aluminium	mg/L	0.01	24	0.005	0.005	0.005	0.01775	0.04	11	0.005
Arsenic	mg/L	0.001	37	0	0	0.0005	0.0005	0.0005	11	0
Cadmium	mg/L	0.0001	2	0.00000	0.00003	0.00004	0.00005	0.00005	0	
Cobalt	mg/L	0.001	1	0.01	0.01	0.01	0.01	0.01	0	
Copper	mg/L	0.001	2	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Lead	mg/L	0.001	36	0.0005	0.0005	0.0005	0.0005	0.0005	11	0.0005
Manganese	mg/L	0.001	37	0	1.24	2.002	3.626	4.34	11	0.7
Nickel	mg/L	0.001	2	0	0.005	0.008	0.0095	0.01	0	
Zinc	mg/L	0.005	36	0.0025	0.02	0.03	0.0825	0.41	11	0.01
Iron	mg/L	0.05	37	0.025	0.08	1.226	2.45	5.54	11	0.025
Total Metals										
Aluminium	mg/L	0.01	23	0.03	0.22	0.662	1.78	4.01	11	0.06
Arsenic	mg/L	0.001	36	0	0	0.0005	0.01	0.01	11	0
Lead	mg/L	0.001	35	0	0.0005	0.0005	0.01	0.01	11	0
Manganese	mg/L	0.001	36	0.04	1.455	2.7	3.9	5.11	11	1.27
Zinc	mg/L	0.005	35	0.02	0.05	0.102	0.248	0.41	11	0.02
Iron	mg/L	0.05	36	0.08	1.795	3.84	5.69	12.1	11	0.4
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	35	10	10	10	10	30	11	10
C10 - C14 Fraction	µg/L	50	35	25	25	25	25	90	11	25
C15 - C28 Fraction	µg/L	100	35	50	50	50	178	910	11	50
C29 - C36 Fraction	µg/L	50	35	25	25	25	184	1130	11	25
C10 - C36 Fraction (sum)	µg/L	50	35	25	25	25	313	2040	11	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	35	10	10	10	10	20	11	10
>C10 - C16 Fraction	µg/L	100	35	50	50	50	50	100	11	50
>C16 - C34 Fraction	µg/L	100	35	50	50	50	296	2010	11	50
>C34 - C40 Fraction	µg/L	100	35	50	50	50	50	50	11	50
>C10 - C40 Fraction (sum)	µg/L	100	35	50	50	50	317	2010	11	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	35	50	50	50	50	100	11	50
BTEXN										
Benzene	µg/L	1	35	0.5	0.5	0.5	0.5	0.5	11	0.5
Toluene	µg/L	2	35	1	1	1	1	1	11	1
Ethylbenzene	µg/L	2	35	1	1	1	1	1	11	1
meta- & para-Xylene	µg/L	2	35	1	1	1	1	1	11	1
ortho-Xylene	µg/L	2	35	1	1	1	1	1	11	1
Total Xylenes	µg/L	2	35	1	1	1	1	1	11	1
Sum of BTEX	µg/L	1	35	0.5	0.5	0.5	0.5	0.5	11	0.5
Naphthalene	µg/L	5	35	2.5	2.5	2.5	2.5	2.5	11	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW1S - 2023-2025				EFGW2D - All data			
Aquifer			Alluvium				Rewan Formation			
Statistic			Median	p80	p95	Max	# Obs	Min	Median	p80
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.48	7.59	7.68	7.73	38	7.2	7.86	8
Electrical Conductivity	µS/cm	1	3,380	4,860	6,095	6,340	38	5,000	6,705	8,936
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	0.5	0.5	38	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	689	739	781	796	38	91	279	332.6
Dissolved Major Ions										
Calcium	mg/L	1	32	59	77	86	38	54	100	200
Magnesium	mg/L	1	43	73	97	102	38	14	27	50
Sodium	mg/L	1	663	927	1,105	1,140	38	880	1,245	1,666
Potassium	mg/L	1	4	6	7	7	38	6	8	11
Chloride	mg/L	1	733	1,140	1,495	1,610	38	1,460	1,885	2,786
Sulfate	mg/L	1	23	39	44	44	38	1	2	6
Dissolved Metals										
Aluminium	mg/L	0.01	0.005	0.005	0.0225	0.04	25	0.005	0.005	0.005
Arsenic	mg/L	0.001	0	0	0.00025	0.0005	38	0.0005	0.01	0.01
Cadmium	mg/L	0.0001					2	0.00005	0.00005	0.00005
Cobalt	mg/L	0.001					1	0.0005	0.0005	0.0005
Copper	mg/L	0.001					2	0	0.00025	0.0004
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	38	0	0.0005	0.0005
Manganese	mg/L	0.001	1.39	2.12	3.355	3.77	38	0.0005	0.53	0.956
Nickel	mg/L	0.001					2	0	0.00025	0.0004
Zinc	mg/L	0.005	0.02	0.03	0.04	0.04	38	0.0025	0.01	0.04
Iron	mg/L	0.05	1.28	2.07	2.495	2.57	38	0.025	0.025	0.056
Total Metals										
Aluminium	mg/L	0.01	0.44	0.78	1.46	1.86	24	0.005	0.06	0.104
Arsenic	mg/L	0.001	0	0.01	0.01	0.01	37	0.01	0.01	0.01
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	37	0	0.0005	0.0005
Manganese	mg/L	0.001	1.58	2.11	4.225	5.11	37	0.31	0.59	1.02
Zinc	mg/L	0.005	0.05	0.11	0.18	0.19	37	0.0025	0.04	0.07
Iron	mg/L	0.05	2.8	3.84	4.28	4.5	37	0.025	0.24	1.798
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	10	10	10	36	10	10	10
C10 - C14 Fraction	µg/L	50	25	25	57.5	90	36	25	25	25
C15 - C28 Fraction	µg/L	100	50	50	90	130	36	50	140	250
C29 - C36 Fraction	µg/L	50	25	25	25	25	36	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	25	25	122.5	220	36	25	145	250
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	10	10	36	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	75	100	36	50	50	50
>C16 - C34 Fraction	µg/L	100	50	50	90	130	36	50	135	260
>C34 - C40 Fraction	µg/L	100	50	50	50	50	36	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	50	50	140	230	36	50	135	260
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	75	100	36	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	0.5	0.5	0.5	36	0.5	0.5	0.5
Toluene	µg/L	2	1	1	1	1	36	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1	36	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1	36	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1	36	1	1	1
Total Xylenes	µg/L	2	1	1	1	1	36	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	0.5	0.5	36	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	2.5	2.5	36	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID					EFGW2D - 2023-2025					
Aquifer					Rewan Formation					
Statistic			p95	Max	# Obs	Min	Median	p80	p95	Max
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	8.116	8.18	11	7.2	7.78	7.93	8.015	8.04
Electrical Conductivity	µS/cm	1	12,520	16,800	11	5,160	5,600	5,780	11,600	16,800
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	11	0.5	0.5	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	355.8	385	11	91	330	335	353.5	354
Dissolved Major Ions										
Calcium	mg/L	1	298	573	11	54	63	71	331	573
Magnesium	mg/L	1	85	128	11	14	18	19	76	128
Sodium	mg/L	1	2,143	2,770	11	880	1,080	1,140	2,000	2,770
Potassium	mg/L	1	15	18	11	6	7	8	13	17
Chloride	mg/L	1	4,177	6,050	11	1,460	1,560	1,660	3,930	6,050
Sulfate	mg/L	1	9	110	11	1	1	1	4	5
Dissolved Metals										
Aluminium	mg/L	0.01	0.009	0.02	11	0.005	0.005	0.005	0.0075	0.01
Arsenic	mg/L	0.001	0.01	0.01	11	0.01	0.01	0.01	0.01	0.01
Cadmium	mg/L	0.0001	0.00005	0.00005	0					
Cobalt	mg/L	0.001	0.0005	0.0005	0					
Copper	mg/L	0.001	0.00048	0.0005	0					
Lead	mg/L	0.001	0.0005	0.0005	11	0.0005	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	1.5305	3.84	11	0.31	0.34	0.39	2.16	3.84
Nickel	mg/L	0.001	0.00048	0.0005	0					
Zinc	mg/L	0.005	0.073	0.13	11	0.0025	0.0025	0.01	0.015	0.02
Iron	mg/L	0.05	0.2365	0.73	11	0.025	0.025	0.11	0.435	0.73
Total Metals										
Aluminium	mg/L	0.01	2.696	3.43	11	0.005	0.05	0.08	1.595	3.08
Arsenic	mg/L	0.001	0.02	0.03	11	0.01	0.01	0.01	0.02	0.02
Lead	mg/L	0.001	0.012	0.1	11	0	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	2.728	5.55	11	0.32	0.37	0.42	1.99	3.52
Zinc	mg/L	0.005	0.128	0.53	11	0.0025	0.01	0.02	0.035	0.05
Iron	mg/L	0.05	12.08	151	11	0.025	0.14	0.24	2.725	5.2
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	10	11	10	10	10	10	10
C10 - C14 Fraction	µg/L	50	60	60	11	25	25	25	55	60
C15 - C28 Fraction	µg/L	100	440	1180	11	50	50	140	210	250
C29 - C36 Fraction	µg/L	50	112.5	1280	11	25	25	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	552.5	2460	11	25	25	180	240	250
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	11	10	10	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	11	50	50	50	50	50
>C16 - C34 Fraction	µg/L	100	457.5	2020	11	50	50	130	205	250
>C34 - C40 Fraction	µg/L	100	70	1210	11	50	50	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	487.5	3230	11	50	50	130	205	250
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	11	50	50	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	4	11	0.5	0.5	0.5	2.25	4
Toluene	µg/L	2	2	6	11	1	1	1	3	5
Ethylbenzene	µg/L	2	1	1	11	1	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	11	1	1	1	1	1
ortho-Xylene	µg/L	2	1	1	11	1	1	1	1	1
Total Xylenes	µg/L	2	1	1	11	1	1	1	1	1
Sum of BTEX	µg/L	1	4.25	6	11	0.5	0.5	0.5	4.5	5
Naphthalene	µg/L	5	2.5	2.5	11	2.5	2.5	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW2S - All data							
Aquifer			Alluvium							
Statistic			# Obs	Min	Median	p80	p95	Max	# Obs	Min
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	2	7.19	7.2	7.206	7.209	7.21	1	7.21
Electrical Conductivity	µS/cm	1	2	904	972	1,013	1,033	1,040	1	904
Alkalinity										
Carbonate Alkalinity	mg/L	1	2	0.5	0.5	0.5	0.5	0.5	1	0.5
Bicarbonate Alkalinity	mg/L	1	2	183	204	216.6	222.9	225	1	183
Dissolved Major Ions										
Calcium	mg/L	1	2	9	15	18	19	20	1	9
Magnesium	mg/L	1	2	10	14	16	18	18	1	10
Sodium	mg/L	1	2	150	164	172	176	177	1	177
Potassium	mg/L	1	2	1	1	1	1	1	1	1
Chloride	mg/L	1	2	148	164	174	178	180	1	180
Sulfate	mg/L	1	2	21	22	22	22	22	1	21
Dissolved Metals										
Aluminium	mg/L	0.01	1	0.01	0.01	0.01	0.01	0.01	1	0.01
Arsenic	mg/L	0.001	2	0.0005	0.0005	0.0005	0.0005	0.0005	1	0.0005
Cadmium	mg/L	0.0001	1	0.00005	0.00005	0.00005	0.00005	0.00005	0	
Cobalt	mg/L	0.001	0						0	
Copper	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Lead	mg/L	0.001	2	0.0005	0.0005	0.0005	0.0005	0.0005	1	0.0005
Manganese	mg/L	0.001	2	0	0.005	0.008	0.0095	0.01	1	0
Nickel	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Zinc	mg/L	0.005	2	0.0025	0.00625	0.0085	0.00963	0.01	1	0.0025
Iron	mg/L	0.05	2	0.025	0.025	0.025	0.025	0.025	1	0.025
Total Metals										
Aluminium	mg/L	0.01	1	0.38	0.38	0.38	0.38	0.38	1	0.38
Arsenic	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	1	0.0005
Lead	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	1	0.0005
Manganese	mg/L	0.001	1	0.01	0.01	0.01	0.01	0.01	1	0.01
Zinc	mg/L	0.005	1	0.0025	0.0025	0.0025	0.0025	0.0025	1	0.0025
Iron	mg/L	0.05	1	0.22	0.22	0.22	0.22	0.22	1	0.22
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	1	10	10	10	10	10	1	10
C10 - C14 Fraction	µg/L	50	1	25	25	25	25	25	1	25
C15 - C28 Fraction	µg/L	100	1	50	50	50	50	50	1	50
C29 - C36 Fraction	µg/L	50	1	25	25	25	25	25	1	25
C10 - C36 Fraction (sum)	µg/L	50	1	25	25	25	25	25	1	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	1	10	10	10	10	10	1	10
>C10 - C16 Fraction	µg/L	100	1	50	50	50	50	50	1	50
>C16 - C34 Fraction	µg/L	100	1	50	50	50	50	50	1	50
>C34 - C40 Fraction	µg/L	100	1	50	50	50	50	50	1	50
>C10 - C40 Fraction (sum)	µg/L	100	1	50	50	50	50	50	1	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	1	50	50	50	50	50	1	50
BTEXN										
Benzene	µg/L	1	1	0.5	0.5	0.5	0.5	0.5	1	0.5
Toluene	µg/L	2	1	1	1	1	1	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1	1	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1	1	1	1	1
Total Xylenes	µg/L	2	1	1	1	1	1	1	1	1
Sum of BTEX	µg/L	1	1	0.5	0.5	0.5	0.5	0.5	1	0.5
Naphthalene	µg/L	5	1	2.5	2.5	2.5	2.5	2.5	1	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW2S - 2023-2025				EFGW3D - All data			
Aquifer			Alluvium				Rewan Formation			
Statistic			Median	p80	p95	Max	# Obs	Min	Median	p80
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.21	7.21	7.21	7.21	38	6.87	7.39	7.542
Electrical Conductivity	µS/cm	1	904	904	904	904	38	15,700	19,250	20,060
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	0.5	0.5	38	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	183	183	183	183	38	52	90	108
Dissolved Major Ions										
Calcium	mg/L	1	9	9	9	9	38	463	589	674
Magnesium	mg/L	1	10	10	10	10	38	158	191	209
Sodium	mg/L	1	177	177	177	177	38	3,050	3,445	3,576
Potassium	mg/L	1	1	1	1	1	38	30	34	36
Chloride	mg/L	1	180	180	180	180	38	6,100	6,925	7,212
Sulfate	mg/L	1	21	21	21	21	38	45	154	187
Dissolved Metals										
Aluminium	mg/L	0.01	0.01	0.01	0.01	0.01	25	0.005	0.005	0.005
Arsenic	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	38	0	0	0.0005
Cadmium	mg/L	0.0001					2	0.00000	0.00003	0.00004
Cobalt	mg/L	0.001					1	0.0005	0.0005	0.0005
Copper	mg/L	0.001					2	0	0.00025	0.0004
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	38	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	0	0	0	0	38	0.52	0.895	1.04
Nickel	mg/L	0.001					2	0	0.005	0.008
Zinc	mg/L	0.005	0.0025	0.0025	0.0025	0.0025	38	0.0025	0.015	0.06
Iron	mg/L	0.05	0.025	0.025	0.025	0.025	38	0.025	0.025	0.202
Total Metals										
Aluminium	mg/L	0.01	0.38	0.38	0.38	0.38	24	0.01	0.08	0.236
Arsenic	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	37	0	0	0
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	37	0	0.0005	0.0005
Manganese	mg/L	0.001	0.01	0.01	0.01	0.01	37	0.55	0.89	1.03
Zinc	mg/L	0.005	0.0025	0.0025	0.0025	0.0025	37	0.01	0.03	0.098
Iron	mg/L	0.05	0.22	0.22	0.22	0.22	37	0.08	0.37	0.894
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	10	10	10	36	10	40	70
C10 - C14 Fraction	µg/L	50	25	25	25	25	36	25	25	25
C15 - C28 Fraction	µg/L	100	50	50	50	50	36	50	50	50
C29 - C36 Fraction	µg/L	50	25	25	25	25	36	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	25	25	25	25	36	25	25	110
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	10	10	36	10	35	70
>C10 - C16 Fraction	µg/L	100	50	50	50	50	36	50	50	50
>C16 - C34 Fraction	µg/L	100	50	50	50	50	36	50	50	110
>C34 - C40 Fraction	µg/L	100	50	50	50	50	36	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	50	50	50	50	36	50	50	110
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	50	50	36	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	0.5	0.5	0.5	36	0.5	0.5	0.5
Toluene	µg/L	2	1	1	1	1	36	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1	36	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1	36	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1	36	1	1	1
Total Xylenes	µg/L	2	1	1	1	1	36	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	0.5	0.5	36	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	2.5	2.5	36	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID					EFGW3D - 2023-2025					
Aquifer					Rewan Formation					
Statistic			p95	Max	# Obs	Min	Median	p80	p95	Max
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.693	7.96	11	7.24	7.36	7.5	7.555	7.58
Electrical Conductivity	µS/cm	1	20,715	22,200	11	19,700	20,000	20,300	21,500	22,200
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	11	0.5	0.5	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	352.6	626	11	82	99	105	110.5	111
Dissolved Major Ions										
Calcium	mg/L	1	744	766	11	463	558	596	630	640
Magnesium	mg/L	1	227	325	11	176	198	210	222	226
Sodium	mg/L	1	3,669	3,820	11	3,050	3,390	3,570	3,690	3,720
Potassium	mg/L	1	40	48	11	30	34	34	36	37
Chloride	mg/L	1	7,405	7,890	11	6,470	7,060	7,220	7,385	7,490
Sulfate	mg/L	1	195	800	11	103	113	118	120	120
Dissolved Metals										
Aluminium	mg/L	0.01	0.017	0.05	11	0.005	0.005	0.005	0.005	0.005
Arsenic	mg/L	0.001	0.00192	0.01	11	0	0.0005	0.0005	0.0005	0.0005
Cadmium	mg/L	0.0001	0.00005	0.00005	0					
Cobalt	mg/L	0.001	0.0005	0.0005	0					
Copper	mg/L	0.001	0.00048	0.0005	0					
Lead	mg/L	0.001	0.0005	0.0005	11	0.0005	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	1.115	1.9	11	0.8	1.04	1.09	1.145	1.2
Nickel	mg/L	0.001	0.0095	0.01	0					
Zinc	mg/L	0.005	0.0915	0.13	11	0.0025	0.01	0.02	0.05	0.07
Iron	mg/L	0.05	0.354	1.43	11	0.025	0.14	0.21	0.25	0.28
Total Metals										
Aluminium	mg/L	0.01	1.361	2.11	11	0.04	0.16	0.63	1.8	2.11
Arsenic	mg/L	0.001	0.0005	0.01	11	0	0	0.0005	0.0005	0.0005
Lead	mg/L	0.001	0.0005	0.01	11	0	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	1.19	1.27	11	0.8	1.03	1.1	1.205	1.23
Zinc	mg/L	0.005	0.118	0.17	11	0.01	0.02	0.03	0.06	0.09
Iron	mg/L	0.05	2.53	16	11	0.29	0.73	1.81	3.295	4.57
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	345	610	11	10	30	60	75	80
C10 - C14 Fraction	µg/L	50	33.75	120	11	25	25	25	25	25
C15 - C28 Fraction	µg/L	100	152.5	400	11	50	50	50	50	50
C29 - C36 Fraction	µg/L	50	60	60	11	25	25	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	260	460	11	25	25	25	25	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	372.5	600	11	10	30	60	70	70
>C10 - C16 Fraction	µg/L	100	50	120	11	50	50	50	50	50
>C16 - C34 Fraction	µg/L	100	180	430	11	50	50	50	75	100
>C34 - C40 Fraction	µg/L	100	50	50	11	50	50	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	270	430	11	50	50	50	75	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	120	11	50	50	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	0.5	11	0.5	0.5	0.5	0.5	0.5
Toluene	µg/L	2	1.75	4	11	1	1	1	1	1
Ethylbenzene	µg/L	2	1	1	11	1	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	11	1	1	1	1	1
ortho-Xylene	µg/L	2	1	1	11	1	1	1	1	1
Total Xylenes	µg/L	2	1	1	11	1	1	1	1	1
Sum of BTEX	µg/L	1	1.375	4	11	0.5	0.5	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	11	2.5	2.5	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW4D - All data							
Aquifer			Rewan Formation							
Statistic			# Obs	Min	Median	p80	p95	Max	# Obs	Min
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	35	6.78	7.11	7.414	7.595	7.93	10	6.92
Electrical Conductivity	µS/cm	1	35	16,100	26,300	27,440	28,920	34,400	10	25,900
Alkalinity										
Carbonate Alkalinity	mg/L	1	35	0.5	0.5	0.5	0.5	0.5	10	0.5
Bicarbonate Alkalinity	mg/L	1	35	370	425	446.4	456	463	10	370
Dissolved Major Ions										
Calcium	mg/L	1	35	470	587	616	646	664	10	470
Magnesium	mg/L	1	35	506	595	626	650	696	10	506
Sodium	mg/L	1	35	4,060	4,580	4,776	4,893	5,030	10	4,060
Potassium	mg/L	1	35	77	84	88	95	118	10	78
Chloride	mg/L	1	35	8,330	9,100	9,300	9,546	11,000	10	8,800
Sulfate	mg/L	1	35	590	692	726	742	748	10	624
Dissolved Metals										
Aluminium	mg/L	0.01	22	0.005	0.005	0.005	0.01925	0.05	10	0.005
Arsenic	mg/L	0.001	35	0	0	0.0005	0.00335	0.01	10	0
Cadmium	mg/L	0.0001	2	0.00000	0.00003	0.00004	0.00005	0.00005	0	
Cobalt	mg/L	0.001	1	0	0	0	0	0	0	
Copper	mg/L	0.001	2	0	0.00025	0.0004	0.00048	0.0005	0	
Lead	mg/L	0.001	35	0	0.0005	0.0005	0.0005	0.0005	10	0.0005
Manganese	mg/L	0.001	35	0.28	0.81	0.966	1.069	1.1	10	0.79
Nickel	mg/L	0.001	2	0	0	0	0	0	0	
Zinc	mg/L	0.005	35	0.0025	0.02	0.04	0.249	0.3	10	0.0025
Iron	mg/L	0.05	35	0.025	4.1	4.648	5.151	5.34	10	0.025
Total Metals										
Aluminium	mg/L	0.01	21	0.005	0.005	0.54	0.71	2.67	10	0.005
Arsenic	mg/L	0.001	34	0	0	0.0005	0.00382	0.01	10	0
Lead	mg/L	0.001	34	0	0.0005	0.0005	0.0005	0.0005	10	0
Manganese	mg/L	0.001	34	0.28	0.805	0.954	1.081	1.17	10	0.81
Zinc	mg/L	0.005	34	0.0025	0.02	0.05	0.2505	0.3	10	0.0025
Iron	mg/L	0.05	34	1.95	4.105	4.8	6.157	6.69	10	3.99
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	33	10	10	10	76	160	10	10
C10 - C14 Fraction	µg/L	50	33	25	25	25	60	150	10	25
C15 - C28 Fraction	µg/L	100	33	50	50	50	276	570	10	50
C29 - C36 Fraction	µg/L	50	33	25	25	25	25	110	10	25
C10 - C36 Fraction (sum)	µg/L	50	33	25	25	46	276	740	10	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	33	10	10	10	20	30	10	10
>C10 - C16 Fraction	µg/L	100	33	50	50	50	50	50	10	50
>C16 - C34 Fraction	µg/L	100	33	50	50	50	260	630	10	50
>C34 - C40 Fraction	µg/L	100	33	50	50	50	50	50	10	50
>C10 - C40 Fraction (sum)	µg/L	100	33	50	50	50	260	630	10	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	33	50	50	50	50	50	10	50
BTEXN										
Benzene	µg/L	1	33	0.5	0.5	0.5	19.1	89	10	0.5
Toluene	µg/L	2	33	1	1	1	3.6	113	10	1
Ethylbenzene	µg/L	2	33	1	1	1	1	1	10	1
meta- & para-Xylene	µg/L	2	33	1	1	1	1	1	10	1
ortho-Xylene	µg/L	2	33	1	1	1	1	1	10	1
Total Xylenes	µg/L	2	33	1	1	1	1	1	10	1
Sum of BTEX	µg/L	1	33	0.5	0.5	0.5	67.4	113	10	0.5
Naphthalene	µg/L	5	33	2.5	2.5	2.5	2.5	2.5	10	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW4D - 2023-2025				EFGW4S - All data			
Aquifer			Rewan Formation				Alluvium			
Statistic			Median	p80	p95	Max	# Obs	Min	Median	p80
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.05	7.306	7.421	7.43	3	6.74	6.95	6.956
Electrical Conductivity	µS/cm	1	26,600	27,120	27,600	27,600	3	402	414	421
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	0.5	0.5	3	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	418.5	432.4	449.85	453	3	81	125	150.2
Dissolved Major Ions										
Calcium	mg/L	1	565	595	608	615	3	7	7	27
Magnesium	mg/L	1	588	610	623	629	3	3	5	6
Sodium	mg/L	1	4,515	4,656	4,945	5,030	3	52	76	77
Potassium	mg/L	1	85	86	88	88	3	1	1	1
Chloride	mg/L	1	9,140	9,284	10,235	11,000	3	35	44	63
Sulfate	mg/L	1	727	737	746	748	3	3	8	16
Dissolved Metals										
Aluminium	mg/L	0.01	0.005	0.005	0.02975	0.05	3	0.05	0.25	0.43
Arsenic	mg/L	0.001	0.0005	0.0005	0.00572	0.01	3	0	0	0.006
Cadmium	mg/L	0.0001					0			
Cobalt	mg/L	0.001					0			
Copper	mg/L	0.001					0			
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	3	0.0005	0.0005	0.0062
Manganese	mg/L	0.001	0.86	0.954	1.072	1.09	3	0.06	0.08	0.182
Nickel	mg/L	0.001					0			
Zinc	mg/L	0.005	0.01125	0.04	0.04	0.04	3	0.0025	0.01	0.04
Iron	mg/L	0.05	4.09	4.458	5.1685	5.2	3	1.1	5.66	5.828
Total Metals										
Aluminium	mg/L	0.01	0.115	0.572	1.7655	2.67	3	3.29	8.17	29.968
Arsenic	mg/L	0.001	0.00025	0.0005	0.00572	0.01	3	0	0	0.006
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	3	0	0.01	0.022
Manganese	mg/L	0.001	0.88	0.952	1.0755	1.17	3	0.11	0.26	0.278
Zinc	mg/L	0.005	0.025	0.05	0.0555	0.06	3	0.03	0.06	0.12
Iron	mg/L	0.05	4.285	5.364	6.5145	6.69	3	9.6	13.5	35.64
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	68	133	160	3	10	10	10
C10 - C14 Fraction	µg/L	50	25	32	109.5	150	3	25	25	25
C15 - C28 Fraction	µg/L	100	50	50	50	50	3	50	50	50
C29 - C36 Fraction	µg/L	50	25	25	25	25	3	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	25	32	109.5	150	3	25	25	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	12	25.5	30	3	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	50	50	3	50	50	50
>C16 - C34 Fraction	µg/L	100	50	50	50	50	3	50	50	50
>C34 - C40 Fraction	µg/L	100	50	50	50	50	3	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	50	50	50	50	3	50	50	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	50	50	3	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	9.8	70.1	89	3	0.5	0.5	0.5
Toluene	µg/L	2	1	2.8	64.85	113	3	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1	3	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1	3	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1	3	1	1	1
Total Xylenes	µg/L	2	1	1	1	1	3	1	1	1
Sum of BTEX	µg/L	1	0.5	58.2	104.9	113	3	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID					EFGW4S - 2023-2025					
Aquifer					Alluvium					
Statistic			p95	Max	# Obs	Min	Median	p80	p95	Max
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	6.959	6.96	3	6.74	6.95	6.956	6.959	6.96
Electrical Conductivity	µS/cm	1	425	426	3	402	414	421	425	426
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	3	0.5	0.5	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	162.8	167	3	81	125	150.2	162.8	167
Dissolved Major Ions										
Calcium	mg/L	1	37	40	3	7	7	27	37	40
Magnesium	mg/L	1	6	6	3	3	5	6	6	6
Sodium	mg/L	1	78	78	3	52	76	77	78	78
Potassium	mg/L	1	1	1	3	1	1	1	1	1
Chloride	mg/L	1	72	75	3	35	44	63	72	75
Sulfate	mg/L	1	21	22	3	3	8	16	21	22
Dissolved Metals										
Aluminium	mg/L	0.01	0.52	0.55	3	0.05	0.25	0.43	0.52	0.55
Arsenic	mg/L	0.001	0.009	0.01	3	0	0	0.006	0.009	0.01
Cadmium	mg/L	0.0001			0					
Cobalt	mg/L	0.001			0					
Copper	mg/L	0.001			0					
Lead	mg/L	0.001	0.00905	0.01	3	0.0005	0.0005	0.0062	0.00905	0.01
Manganese	mg/L	0.001	0.233	0.25	3	0.06	0.08	0.182	0.233	0.25
Nickel	mg/L	0.001			0					
Zinc	mg/L	0.005	0.055	0.06	3	0.0025	0.01	0.04	0.055	0.06
Iron	mg/L	0.05	5.912	5.94	3	1.1	5.66	5.828	5.912	5.94
Total Metals										
Aluminium	mg/L	0.01	40.867	44.5	3	3.29	8.17	29.968	40.867	44.5
Arsenic	mg/L	0.001	0.009	0.01	3	0	0	0.006	0.009	0.01
Lead	mg/L	0.001	0.028	0.03	3	0	0.01	0.022	0.028	0.03
Manganese	mg/L	0.001	0.287	0.29	3	0.11	0.26	0.278	0.287	0.29
Zinc	mg/L	0.005	0.15	0.16	3	0.03	0.06	0.12	0.15	0.16
Iron	mg/L	0.05	46.71	50.4	3	9.6	13.5	35.64	46.71	50.4
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	10	3	10	10	10	10	10
C10 - C14 Fraction	µg/L	50	25	25	3	25	25	25	25	25
C15 - C28 Fraction	µg/L	100	50	50	3	50	50	50	50	50
C29 - C36 Fraction	µg/L	50	25	25	3	25	25	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	25	25	3	25	25	25	25	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	3	10	10	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	3	50	50	50	50	50
>C16 - C34 Fraction	µg/L	100	50	50	3	50	50	50	50	50
>C34 - C40 Fraction	µg/L	100	50	50	3	50	50	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	50	50	3	50	50	50	50	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	3	50	50	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	0.5	3	0.5	0.5	0.5	0.5	0.5
Toluene	µg/L	2	1	1	3	1	1	1	1	1
Ethylbenzene	µg/L	2	1	1	3	1	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	3	1	1	1	1	1
ortho-Xylene	µg/L	2	1	1	3	1	1	1	1	1
Total Xylenes	µg/L	2	1	1	3	1	1	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	3	0.5	0.5	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	3	2.5	2.5	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW5D - All data							
Aquifer			Rewan Formation							
Statistic			# Obs	Min	Median	p80	p95	Max	# Obs	Min
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	39	7.01	7.48	7.674	8.033	8.16	11	7.23
Electrical Conductivity	µS/cm	1	39	1,970	22,700	23,540	24,010	24,300	11	22,700
Alkalinity										
Carbonate Alkalinity	mg/L	1	39	0.5	0.5	0.5	0.5	0.5	11	0.5
Bicarbonate Alkalinity	mg/L	1	39	172	466	484	537.6	567	11	438
Dissolved Major Ions										
Calcium	mg/L	1	39	19	298	328	351	383	11	229
Magnesium	mg/L	1	39	18	475	498	518	557	11	421
Sodium	mg/L	1	39	304	4,130	4,352	4,485	4,710	11	3,670
Potassium	mg/L	1	39	14	81	84	91	100	11	73
Chloride	mg/L	1	39	378	8,140	8,348	8,651	9,640	11	6,280
Sulfate	mg/L	1	39	1	1	2	19	92	11	1
Dissolved Metals										
Aluminium	mg/L	0.01	25	0.005	0.005	0.005	0.017	0.17	11	0.005
Arsenic	mg/L	0.001	39	0	0	0	0.0005	0.01	11	0
Cadmium	mg/L	0.0001	2	0.00000	0.00003	0.00004	0.00005	0.00005	0	
Cobalt	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Copper	mg/L	0.001	2	0	0.00025	0.0004	0.00048	0.0005	0	
Lead	mg/L	0.001	39	0	0.0005	0.0005	0.0005	0.01	11	0.0005
Manganese	mg/L	0.001	39	0.03	0.27	0.294	0.33	0.74	11	0.26
Nickel	mg/L	0.001	2	0.0005	0.00525	0.0081	0.00953	0.01	0	
Zinc	mg/L	0.005	39	0.0025	0.01	0.02	0.075	0.2	11	0.0025
Iron	mg/L	0.05	39	0.025	9.73	10.42	10.8	11.1	11	9.42
Total Metals										
Aluminium	mg/L	0.01	24	0.005	0.895	1.88	3.0145	10.3	11	0.005
Arsenic	mg/L	0.001	38	0	0.00525	0.01	0.01	0.01	11	0
Lead	mg/L	0.001	38	0	0	0.0005	0.0115	0.03	11	0
Manganese	mg/L	0.001	38	0.22	0.305	0.32	0.4885	0.89	11	0.28
Zinc	mg/L	0.005	38	0.01	0.07	0.168	0.2875	0.38	11	0.01
Iron	mg/L	0.05	38	0.3	12.6	14.84	19.99	69	11	10
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	37	10	20	38	74	130	11	10
C10 - C14 Fraction	µg/L	50	37	25	25	60	80	100	11	25
C15 - C28 Fraction	µg/L	100	37	50	110	284	378	490	11	50
C29 - C36 Fraction	µg/L	50	37	25	25	25	84	280	11	25
C10 - C36 Fraction (sum)	µg/L	50	37	25	60	358	418	770	11	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	37	10	30	40	72	130	11	10
>C10 - C16 Fraction	µg/L	100	37	50	50	50	110	120	11	50
>C16 - C34 Fraction	µg/L	100	37	50	50	278	368	680	11	50
>C34 - C40 Fraction	µg/L	100	37	50	50	50	50	230	11	50
>C10 - C40 Fraction (sum)	µg/L	100	37	50	50	330	412	910	11	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	37	50	50	50	110	120	11	50
BTEXN										
Benzene	µg/L	1	37	0.5	0.5	0.5	0.5	0.5	11	0.5
Toluene	µg/L	2	37	1	1	1	1	2	11	1
Ethylbenzene	µg/L	2	37	1	1	1	1	1	11	1
meta- & para-Xylene	µg/L	2	37	1	1	1	1	1	11	1
ortho-Xylene	µg/L	2	37	1	1	1	1	1	11	1
Total Xylenes	µg/L	2	37	1	1	1	1	1	11	1
Sum of BTEX	µg/L	1	37	0.5	0.5	0.5	0.5	2	11	0.5
Naphthalene	µg/L	5	37	2.5	2.5	2.5	2.5	2.5	11	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			EFGW5D - 2023-2025				IBGW006 - All data			
Aquifer			Rewan Formation				Leichhardt Seam			
Statistic			Median	p80	p95	Max	# Obs	Min	Median	p80
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.34	7.59	7.645	7.68	6	7.35	7.6	7.64
Electrical Conductivity	µS/cm	1	23,400	23,800	24,150	24,300	6	11,500	11,750	12,600
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	0.5	0.5	6	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	469	481	505.5	512	6	81	93	428
Dissolved Major Ions										
Calcium	mg/L	1	286	307	313	313	6	74	172	194
Magnesium	mg/L	1	474	503	511	518	6	14	15	15
Sodium	mg/L	1	4,030	4,330	4,495	4,620	6	1,910	2,120	2,430
Potassium	mg/L	1	81	83	84	84	6	9	10	10
Chloride	mg/L	1	8,240	8,290	9,000	9,640	6	3,600	4,050	4,310
Sulfate	mg/L	1	1	1	1	2	6	1	1	1
Dissolved Metals										
Aluminium	mg/L	0.01	0.005	0.005	0.0875	0.17	6	0.005	0.005	0.02
Arsenic	mg/L	0.001	0	0	0.00025	0.0005	6	0	0	0.01
Cadmium	mg/L	0.0001					0			
Cobalt	mg/L	0.001					0			
Copper	mg/L	0.001					0			
Lead	mg/L	0.001	0.0005	0.0005	0.00525	0.01	6	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	0.29	0.3	0.315	0.33	6	0.49	0.73	0.75
Nickel	mg/L	0.001					0			
Zinc	mg/L	0.005	0.01	0.01	0.045	0.05	6	0.01	0.01	0.01
Iron	mg/L	0.05	10	10.6	10.7	10.8	6	0.33	1.455	2.83
Total Metals										
Aluminium	mg/L	0.01	0.94	1.26	2.43	3.1	6	0.04	0.495	1.49
Arsenic	mg/L	0.001	0	0.01	0.01	0.01	6	0	0	0.01
Lead	mg/L	0.001	0	0.0005	0.0005	0.0005	6	0	0.0005	0.0005
Manganese	mg/L	0.001	0.31	0.32	0.34	0.34	6	0.54	0.775	0.83
Zinc	mg/L	0.005	0.07	0.07	0.09	0.1	6	0.01	0.03	0.07
Iron	mg/L	0.05	11.9	13.6	15.35	16.8	6	1.63	2.38	5.87
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	30	40	45	50	6	10	10	10
C10 - C14 Fraction	µg/L	50	70	80	90	100	6	25	42.5	60
C15 - C28 Fraction	µg/L	100	260	310	390	410	6	120	195	330
C29 - C36 Fraction	µg/L	50	25	25	25	25	6	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	350	380	430	450	6	120	255	400
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	30	40	45	50	6	10	10	10
>C10 - C16 Fraction	µg/L	100	50	110	115	120	6	50	50	50
>C16 - C34 Fraction	µg/L	100	240	290	375	400	6	50	210	350
>C34 - C40 Fraction	µg/L	100	50	50	50	50	6	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	280	380	430	460	6	50	210	350
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	110	115	120	6	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	0.5	0.5	0.5	6	0.5	0.5	0.5
Toluene	µg/L	2	1	1	1	1	6	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1	6	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1	6	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1	6	1	1	1
Total Xylenes	µg/L	2	1	1	1	1	6	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	0.5	0.5	6	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	2.5	2.5	6	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID					IBGW006 - 2023-2025					
Aquifer					Leichhardt Seam					
Statistic			p95	Max	# Obs	Min	Median	p80	p95	Max
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.73	7.76	6	7.35	7.6	7.64	7.73	7.76
Electrical Conductivity	µS/cm	1	12,600	12,600	6	11,500	11,750	12,600	12,600	12,600
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	6	0.5	0.5	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	441.5	446	6	81	93	428	441.5	446
Dissolved Major Ions										
Calcium	mg/L	1	215	222	6	74	172	194	215	222
Magnesium	mg/L	1	16	16	6	14	15	15	16	16
Sodium	mg/L	1	2,550	2,590	6	1,910	2,120	2,430	2,550	2,590
Potassium	mg/L	1	11	11	6	9	10	10	11	11
Chloride	mg/L	1	4,445	4,490	6	3,600	4,050	4,310	4,445	4,490
Sulfate	mg/L	1	1	1	6	1	1	1	1	1
Dissolved Metals										
Aluminium	mg/L	0.01	0.02	0.02	6	0.005	0.005	0.02	0.02	0.02
Arsenic	mg/L	0.001	0.01	0.01	6	0	0	0.01	0.01	0.01
Cadmium	mg/L	0.0001			0					
Cobalt	mg/L	0.001			0					
Copper	mg/L	0.001			0					
Lead	mg/L	0.001	0.0005	0.0005	6	0.0005	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	0.765	0.77	6	0.49	0.73	0.75	0.765	0.77
Nickel	mg/L	0.001			0					
Zinc	mg/L	0.005	0.01	0.01	6	0.01	0.01	0.01	0.01	0.01
Iron	mg/L	0.05	3.0775	3.16	6	0.33	1.455	2.83	3.0775	3.16
Total Metals										
Aluminium	mg/L	0.01	3.74	4.49	6	0.04	0.495	1.49	3.74	4.49
Arsenic	mg/L	0.001	0.01	0.01	6	0	0	0.01	0.01	0.01
Lead	mg/L	0.001	0.00763	0.01	6	0	0.0005	0.0005	0.00763	0.01
Manganese	mg/L	0.001	0.8525	0.86	6	0.54	0.775	0.83	0.8525	0.86
Zinc	mg/L	0.005	0.1225	0.14	6	0.01	0.03	0.07	0.1225	0.14
Iron	mg/L	0.05	10.4675	12	6	1.63	2.38	5.87	10.4675	12
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	17.5	20	6	10	10	10	17.5	20
C10 - C14 Fraction	µg/L	50	75	80	6	25	42.5	60	75	80
C15 - C28 Fraction	µg/L	100	420	450	6	120	195	330	420	450
C29 - C36 Fraction	µg/L	50	58.75	70	6	25	25	25	58.75	70
C10 - C36 Fraction (sum)	µg/L	50	497.5	530	6	120	255	400	497.5	530
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	6	10	10	10	10	10
>C10 - C16 Fraction	µg/L	100	95	110	6	50	50	50	95	110
>C16 - C34 Fraction	µg/L	100	417.5	440	6	50	210	350	417.5	440
>C34 - C40 Fraction	µg/L	100	50	50	6	50	50	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	500	550	6	50	210	350	500	550
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	95	110	6	50	50	50	95	110
BTEXN										
Benzene	µg/L	1	0.5	0.5	6	0.5	0.5	0.5	0.5	0.5
Toluene	µg/L	2	1	1	6	1	1	1	1	1
Ethylbenzene	µg/L	2	1	1	6	1	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	6	1	1	1	1	1
ortho-Xylene	µg/L	2	1	1	6	1	1	1	1	1
Total Xylenes	µg/L	2	1	1	6	1	1	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	6	0.5	0.5	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	6	2.5	2.5	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			IBGWR1 - All data							
Aquifer			Rewan Formation							
Statistic			# Obs	Min	Median	p80	p95	Max	# Obs	Min
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	31	6.97	7.29	7.46	7.52	7.63	10	7.1
Electrical Conductivity	µS/cm	1	31	21,200	28,600	29,500	31,450	32,500	10	28,100
Alkalinity										
Carbonate Alkalinity	mg/L	1	31	0.5	0.5	0.5	0.5	0.5	10	0.5
Bicarbonate Alkalinity	mg/L	1	31	71	83	93	100.5	117	10	87
Dissolved Major Ions										
Calcium	mg/L	1	31	983	1,160	1,210	1,325	1,380	10	983
Magnesium	mg/L	1	31	299	365	384	398	402	10	299
Sodium	mg/L	1	31	4,070	4,830	5,110	5,370	5,530	10	4,070
Potassium	mg/L	1	31	42	48	50	54	58	10	42
Chloride	mg/L	1	31	8,880	10,200	10,400	10,850	12,500	10	8,880
Sulfate	mg/L	1	31	1	1	3	12	18	10	1
Dissolved Metals										
Aluminium	mg/L	0.01	23	0.005	0.005	0.005	0.005	0.005	10	0.005
Arsenic	mg/L	0.001	31	0	0.0005	0.01	0.01	0.01	10	0
Cadmium	mg/L	0.0001	0						0	
Cobalt	mg/L	0.001	0						0	
Copper	mg/L	0.001	0						0	
Lead	mg/L	0.001	31	0.0005	0.0005	0.0005	0.0005	0.01	10	0.0005
Manganese	mg/L	0.001	31	0.02	6.2	6.36	6.55	6.57	10	5.87
Nickel	mg/L	0.001	0						0	
Zinc	mg/L	0.005	31	0.0025	0.04	0.08	0.235	0.42	10	0.0025
Iron	mg/L	0.05	31	0.025	1.49	2.3	2.755	2.96	10	1.84
Total Metals										
Aluminium	mg/L	0.01	23	0.005	0.08	0.206	0.431	1.32	10	0.005
Arsenic	mg/L	0.001	31	0	0.0005	0.01	0.01	0.01	10	0
Lead	mg/L	0.001	31	0	0.0005	0.0005	0.00525	0.01	10	0.0005
Manganese	mg/L	0.001	31	0.03	5.89	6.52	6.875	7	10	5.77
Zinc	mg/L	0.005	31	0.0025	0.05	0.11	0.24	0.47	10	0.0025
Iron	mg/L	0.05	31	0.57	2.08	2.73	3.27	3.74	10	2.08
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	31	10	10	10	10	160	10	10
C10 - C14 Fraction	µg/L	50	31	25	25	25	25	70	10	25
C15 - C28 Fraction	µg/L	100	31	50	50	120	385	610	10	50
C29 - C36 Fraction	µg/L	50	31	25	25	25	25	50	10	25
C10 - C36 Fraction (sum)	µg/L	50	31	25	25	120	420	610	10	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	31	10	10	10	10	40	10	10
>C10 - C16 Fraction	µg/L	100	31	50	50	50	50	140	10	50
>C16 - C34 Fraction	µg/L	100	31	50	50	120	340	600	10	50
>C34 - C40 Fraction	µg/L	100	31	50	50	50	50	50	10	50
>C10 - C40 Fraction (sum)	µg/L	100	31	50	50	120	410	600	10	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	31	50	50	50	50	140	10	50
BTEXN										
Benzene	µg/L	1	31	0.5	0.5	0.5	0.5	3	10	0.5
Toluene	µg/L	2	31	1	1	1	1	124	10	1
Ethylbenzene	µg/L	2	31	1	1	1	1	1	10	1
meta- & para-Xylene	µg/L	2	31	1	1	1	1	1	10	1
ortho-Xylene	µg/L	2	31	1	1	1	1	1	10	1
Total Xylenes	µg/L	2	31	1	1	1	1	1	10	1
Sum of BTEX	µg/L	1	31	0.5	0.5	0.5	1.75	124	10	0.5
Naphthalene	µg/L	5	31	2.5	2.5	2.5	2.5	2.5	10	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			IBGWR1 - 2023-2025				IBGWR2 - All data			
Aquifer			Rewan Formation				Rewan Formation			
Statistic			Median	p80	p95	Max	# Obs	Min	Median	p80
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.19	7.396	7.5355	7.63	33	6.74	7.19	7.47
Electrical Conductivity	µS/cm	1	29,050	29,740	30,505	31,000	33	22,500	31,600	32,820
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	0.5	0.5	33	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	95	99	110.7	117	33	692	795	841.6
Dissolved Major Ions										
Calcium	mg/L	1	1,125	1,178	1,232	1,250	33	188	403	419
Magnesium	mg/L	1	356	376	396	398	33	723	823	870
Sodium	mg/L	1	4,795	4,992	5,302	5,320	33	5,460	6,190	6,498
Potassium	mg/L	1	48	50	52	52	33	56	62	65
Chloride	mg/L	1	10,250	10,320	11,555	12,500	33	9,280	10,900	11,160
Sulfate	mg/L	1	1	1	1	2	33	821	971	1,000
Dissolved Metals										
Aluminium	mg/L	0.01	0.005	0.005	0.005	0.005	24	0.005	0.005	0.005
Arsenic	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	33	0	0.0005	0.0005
Cadmium	mg/L	0.0001					0			
Cobalt	mg/L	0.001					0			
Copper	mg/L	0.001					0			
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	33	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	6.225	6.404	6.5385	6.57	33	1.2	1.45	1.6
Nickel	mg/L	0.001					0			
Zinc	mg/L	0.005	0.03	0.032	0.04	0.04	33	0.0025	0.01	0.04
Iron	mg/L	0.05	2.385	2.644	2.951	2.96	33	0.025	0.025	0.025
Total Metals										
Aluminium	mg/L	0.01	0.11	0.212	0.3645	0.45	24	0.005	0.155	0.634
Arsenic	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	33	0	0.0005	0.0005
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	33	0	0.0005	0.0005
Manganese	mg/L	0.001	6.52	6.748	6.955	7	33	1.22	1.56	1.666
Zinc	mg/L	0.005	0.035	0.05	0.0555	0.06	33	0.0025	0.02	0.05
Iron	mg/L	0.05	2.705	2.96	3.533	3.74	33	0.025	0.41	1.49
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	10	10	10	33	10	10	10
C10 - C14 Fraction	µg/L	50	25	25	25	25	33	25	25	25
C15 - C28 Fraction	µg/L	100	50	102	115.5	120	33	50	50	50
C29 - C36 Fraction	µg/L	50	25	25	25	25	33	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	25	102	115.5	120	33	25	25	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	10	10	33	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	50	50	33	50	50	50
>C16 - C34 Fraction	µg/L	100	50	50	83	110	33	50	50	50
>C34 - C40 Fraction	µg/L	100	50	50	50	50	33	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	50	50	83	110	33	50	50	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	50	50	33	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	0.5	1.875	3	33	0.5	0.5	0.5
Toluene	µg/L	2	1	1	1	1	33	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1	33	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1	33	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1	33	1	1	1
Total Xylenes	µg/L	2	1	1	1	1	33	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	1.875	3	33	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	2.5	2.5	33	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID					IBGWR2 - 2023-2025					
Aquifer					Rewan Formation					
Statistic			p95	Max	# Obs	Min	Median	p80	p95	Max
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	7.664	7.75	11	6.84	7.09	7.38	7.57	7.67
Electrical Conductivity	µS/cm	1	34,300	35,400	11	31,100	31,700	32,600	33,250	33,800
Alkalinity										
Carbonate Alkalinity	mg/L	1	0.5	0.5	11	0.5	0.5	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	851.6	858	11	768	797	822	853	858
Dissolved Major Ions										
Calcium	mg/L	1	455	472	11	378	405	420	425	428
Magnesium	mg/L	1	894	916	11	788	822	844	873	873
Sodium	mg/L	1	6,634	6,660	11	5,630	6,030	6,440	6,575	6,640
Potassium	mg/L	1	70	73	11	56	62	65	67	68
Chloride	mg/L	1	11,480	13,000	11	9,280	10,900	11,000	12,000	13,000
Sulfate	mg/L	1	1,014	1,030	11	821	956	981	991	999
Dissolved Metals										
Aluminium	mg/L	0.01	0.005	0.005	11	0.005	0.005	0.005	0.005	0.005
Arsenic	mg/L	0.001	0.0005	0.01	11	0.0005	0.0005	0.0005	0.0005	0.0005
Cadmium	mg/L	0.0001			0					
Cobalt	mg/L	0.001			0					
Copper	mg/L	0.001			0					
Lead	mg/L	0.001	0.0043	0.01	11	0.0005	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	1.74	4.76	11	1.45	1.56	1.63	1.75	1.8
Nickel	mg/L	0.001			0					
Zinc	mg/L	0.005	0.208	0.22	11	0.0025	0.0025	0.03	0.04	0.04
Iron	mg/L	0.05	0.31	0.69	11	0.025	0.025	0.025	0.025	0.025
Total Metals										
Aluminium	mg/L	0.01	1.547	2.53	11	0.005	0.58	1.02	2.085	2.53
Arsenic	mg/L	0.001	0.0005	0.01	11	0.0005	0.0005	0.0005	0.0005	0.0005
Lead	mg/L	0.001	0.0043	0.01	11	0.0005	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	1.818	6.24	11	1.51	1.62	1.67	1.705	1.74
Zinc	mg/L	0.005	0.21	0.23	11	0.0025	0.03	0.04	0.045	0.05
Iron	mg/L	0.05	2.282	2.49	11	0.025	0.89	1.51	2.41	2.49
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	10	30	11	10	10	10	10	10
C10 - C14 Fraction	µg/L	50	25	25	11	25	25	25	25	25
C15 - C28 Fraction	µg/L	100	94	700	11	50	50	50	105	160
C29 - C36 Fraction	µg/L	50	25	430	11	25	25	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	79	1130	11	25	25	25	92.5	160
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	11	10	10	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	11	50	50	50	50	50
>C16 - C34 Fraction	µg/L	100	90	1040	11	50	50	50	100	150
>C34 - C40 Fraction	µg/L	100	50	260	11	50	50	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	90	1300	11	50	50	50	100	150
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	11	50	50	50	50	50
BTEXN										
Benzene	µg/L	1	0.5	1	11	0.5	0.5	0.5	0.75	1
Toluene	µg/L	2	5	19	11	1	1	1	2	3
Ethylbenzene	µg/L	2	1	1	11	1	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	11	1	1	1	1	1
ortho-Xylene	µg/L	2	1	1	11	1	1	1	1	1
Total Xylenes	µg/L	2	1	1	11	1	1	1	1	1
Sum of BTEX	µg/L	1	5	19	11	0.5	0.5	0.5	2	3
Naphthalene	µg/L	5	2.5	2.5	11	2.5	2.5	2.5	2.5	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			PT1 - All data							
Aquifer			Leichhardt Seam							
Statistic			# Obs	Min	Median	p80	p95	Max	# Obs	Min
Analyte	Units	LOR*								
Water Quality Indicators										
pH Value	pH Unit	0.01	38	7.45	7.795	7.946	8.039	8.09	11	7.56
Electrical Conductivity	µS/cm	1	38	10,000	11,250	12,000	12,400	12,400	11	11,600
Alkalinity										
Carbonate Alkalinity	mg/L	1	38	0.5	0.5	0.5	0.5	0.5	11	0.5
Bicarbonate Alkalinity	mg/L	1	38	188	223	235.6	257.2	272	11	191
Dissolved Major Ions										
Calcium	mg/L	1	38	107	146	176	190	209	11	107
Magnesium	mg/L	1	38	35	48	50	53	56	11	35
Sodium	mg/L	1	38	1,890	2,285	2,380	2,420	2,430	11	2,190
Potassium	mg/L	1	38	9	10	11	12	16	11	10
Chloride	mg/L	1	38	3,290	3,870	4,092	4,272	4,480	11	3,860
Sulfate	mg/L	1	38	1	1	1	18	26	11	1
Dissolved Metals										
Aluminium	mg/L	0.01	25	0.005	0.005	0.005	0.005	0.03	11	0.005
Arsenic	mg/L	0.001	38	0	0.01	0.01	0.01	0.01	11	0
Cadmium	mg/L	0.0001	1	0.00005	0.00005	0.00005	0.00005	0.00005	0	
Cobalt	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Copper	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Lead	mg/L	0.001	38	0.0005	0.0005	0.0005	0.0005	0.0005	11	0.0005
Manganese	mg/L	0.001	38	0.0005	0.03	0.03	0.0805	0.25	11	0.01
Nickel	mg/L	0.001	1	0.0005	0.0005	0.0005	0.0005	0.0005	0	
Zinc	mg/L	0.005	38	0.0025	0.01	0.02	0.0415	0.06	11	0.0025
Iron	mg/L	0.05	38	0.025	0.485	0.616	0.793	8.66	11	0.18
Total Metals										
Aluminium	mg/L	0.01	24	0.005	0.01	0.03	0.0585	0.07	11	0.005
Arsenic	mg/L	0.001	38	0	0.01	0.01	0.0115	0.02	11	0
Lead	mg/L	0.001	38	0	0.0005	0.0005	0.0005	0.0005	11	0
Manganese	mg/L	0.001	38	0.01	0.03	0.03	0.089	0.28	11	0.01
Zinc	mg/L	0.005	38	0.0025	0.01	0.02	0.07	0.08	11	0.01
Iron	mg/L	0.05	38	0.21	0.685	0.766	0.973	11	11	0.21
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	37	10	10	10	10	30	11	10
C10 - C14 Fraction	µg/L	50	37	25	25	25	25	25	11	25
C15 - C28 Fraction	µg/L	100	37	50	50	50	310	880	11	50
C29 - C36 Fraction	µg/L	50	37	25	25	25	25	25	11	25
C10 - C36 Fraction (sum)	µg/L	50	37	25	25	25	310	880	11	25
TotalRecoverable Hydrocarbons										
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	37	10	10	10	10	10	11	10
>C10 - C16 Fraction	µg/L	100	37	50	50	50	50	50	11	50
>C16 - C34 Fraction	µg/L	100	37	50	50	50	316	900	11	50
>C34 - C40 Fraction	µg/L	100	37	50	50	50	50	50	11	50
>C10 - C40 Fraction (sum)	µg/L	100	37	50	50	50	316	900	11	50
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	37	50	50	50	50	50	11	50
BTEXN										
Benzene	µg/L	1	37	0.5	0.5	0.5	0.5	0.5	11	0.5
Toluene	µg/L	2	37	1	1	1	1	1	11	1
Ethylbenzene	µg/L	2	37	1	1	1	1	1	11	1
meta- & para-Xylene	µg/L	2	37	1	1	1	1	1	11	1
ortho-Xylene	µg/L	2	37	1	1	1	1	1	11	1
Total Xylenes	µg/L	2	37	1	1	1	1	1	11	1
Sum of BTEX	µg/L	1	37	0.5	0.5	0.5	0.5	0.5	11	0.5
Naphthalene	µg/L	5	37	2.5	2.5	2.5	2.5	2.5	11	2.5
*Laboratory limit of reporting										

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID			PT1 - 2023-2025			
Aquifer			Leichhardt Seam			
Statistic			Median	p80	p95	Max
Analyte	Units	LOR*				
Water Quality Indicators						
pH Value	pH Unit	0.01	7.75	7.84	7.895	7.94
Electrical Conductivity	µS/cm	1	12,200	12,400	12,400	12,400
Alkalinity						
Carbonate Alkalinity	mg/L	1	0.5	0.5	0.5	0.5
Bicarbonate Alkalinity	mg/L	1	236	256	268	272
Dissolved Major Ions						
Calcium	mg/L	1	136	149	152	154
Magnesium	mg/L	1	41	44	47	48
Sodium	mg/L	1	2,360	2,410	2,425	2,430
Potassium	mg/L	1	11	12	16	16
Chloride	mg/L	1	4,080	4,270	4,380	4,480
Sulfate	mg/L	1	1	16	23	26
Dissolved Metals						
Aluminium	mg/L	0.01	0.005	0.005	0.005	0.005
Arsenic	mg/L	0.001	0	0	0.01	0.01
Cadmium	mg/L	0.0001				
Cobalt	mg/L	0.001				
Copper	mg/L	0.001				
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	0.02	0.03	0.05	0.07
Nickel	mg/L	0.001				
Zinc	mg/L	0.005	0.01	0.02	0.02	0.02
Iron	mg/L	0.05	0.44	0.55	0.66	0.67
Total Metals						
Aluminium	mg/L	0.01	0.01	0.02	0.035	0.05
Arsenic	mg/L	0.001	0	0	0.01	0.01
Lead	mg/L	0.001	0.0005	0.0005	0.0005	0.0005
Manganese	mg/L	0.001	0.02	0.03	0.05	0.07
Zinc	mg/L	0.005	0.01	0.02	0.03	0.03
Iron	mg/L	0.05	0.49	0.66	0.825	0.91
Total Petroleum Hydrocarbons						
C6 - C9 Fraction	µg/L	20	10	10	10	10
C10 - C14 Fraction	µg/L	50	25	25	25	25
C15 - C28 Fraction	µg/L	100	50	250	715	880
C29 - C36 Fraction	µg/L	50	25	25	25	25
C10 - C36 Fraction (sum)	µg/L	50	25	250	715	880
TotalRecoverable Hydrocarbons						
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	10	10	10
>C10 - C16 Fraction	µg/L	100	50	50	50	50
>C16 - C34 Fraction	µg/L	100	50	260	720	900
>C34 - C40 Fraction	µg/L	100	50	50	50	50
>C10 - C40 Fraction (sum)	µg/L	100	50	260	720	900
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	50	50	50	50
BTEXN						
Benzene	µg/L	1	0.5	0.5	0.5	0.5
Toluene	µg/L	2	1	1	1	1
Ethylbenzene	µg/L	2	1	1	1	1
meta- & para-Xylene	µg/L	2	1	1	1	1
ortho-Xylene	µg/L	2	1	1	1	1
Total Xylenes	µg/L	2	1	1	1	1
Sum of BTEX	µg/L	1	0.5	0.5	0.5	0.5
Naphthalene	µg/L	5	2.5	2.5	2.5	2.5
*Laboratory limit of reporting						

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix D – Water Quality – Summary Statistics (Project No. IRB5005.001)

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Appendix E

Water Quality Trends

Sample ID			EFGW1S						EFGW2D			
Aquifer			Alluvium						Rewan Formation			
Statistic			# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p
Analyte	Units	LOR*										
Water Quality Indicators												
pH Value	pH Unit	0.01	37	26	11	0.0581	no trend	0.5826	38	27	11	0.4114
Electrical Conductivity	µS/cm	1	37	26	11	0.0044	no trend	0.2939	38	27	11	0.0205
Alkalinity												
Carbonate Alkalinity	mg/L	1	37	26	11	1.0000	no trend	1.0000	38	27	11	1.0000
Bicarbonate Alkalinity	mg/L	1	37	26	11	0.4546	no trend	0.8547	38	27	11	0.0164
Dissolved Major Ions												
Calcium	mg/L	1	37	26	11	0.2380	decrease	0.0079	38	27	11	0.0051
Magnesium	mg/L	1	37	26	11	0.2188	decrease	0.0089	38	27	11	0.0045
Sodium	mg/L	1	37	26	11	0.4154	decrease	0.0139	38	27	11	0.0053
Potassium	mg/L	1	37	26	11	0.3726	decrease	0.0166	38	27	11	0.0345
Chloride	mg/L	1	37	26	11	0.1730	decrease	0.0032	38	27	11	0.0019
Sulfate	mg/L	1	37	26	11	0.0190	decrease	0.0001	38	27	11	0.0018
Dissolved Metals												
Aluminium	mg/L	0.01	24	13	11	0.9038	no trend	1.0000	25	14	11	0.9536
Arsenic	mg/L	0.001	37	26	11	0.0131	decrease	0.0195	38	27	11	0.5617
Cadmium	mg/L	0.0001										
Cobalt	mg/L	0.001										
Copper	mg/L	0.001										
Lead	mg/L	0.001	36	25	11	1.0000	no trend	1.0000	38	27	11	0.5617
Manganese	mg/L	0.001	37	26	11	0.0754	no trend	0.0752	38	27	11	0.0143
Nickel	mg/L	0.001										
Zinc	mg/L	0.005	36	25	11	0.8158	no trend	0.6482	38	27	11	0.0008
Iron	mg/L	0.05	37	26	11	0.0039	increase	0.0107	38	27	11	0.2027
Total Metals												
Aluminium_total	mg/L	0.01	23	12	11	0.0742	no trend	0.1462	24	13	11	0.3991
Arsenic_total	mg/L	0.001	36	25	11	0.1491	no trend	0.4303	37	26	11	0.4050
Lead_total	mg/L	0.001	35	24	11	0.7338	no trend	0.8977	37	26	11	0.2235
Manganese_total	mg/L	0.001	36	25	11	0.1491	increase	0.0423	37	26	11	0.0028
Zinc_total	mg/L	0.005	35	24	11	0.7342	no trend	0.7422	37	26	11	0.0001
Iron_total	mg/L	0.05	36	25	11	0.3627	no trend	0.5580	37	26	11	0.0248
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	35	24	11	0.5383	no trend	0.8819	36	25	11	1.0000
C10 - C14 Fraction	µg/L	50	35	24	11	0.1569	no trend	0.4577	36	25	11	0.4311
C15 - C28 Fraction	µg/L	100	35	24	11	1.0000	no trend	0.5175	36	25	11	0.0487
C29 - C36 Fraction	µg/L	50	35	24	11	0.2417	no trend	0.7241	36	25	11	0.0855
C10 - C36 Fraction (sum)	µg/L	50	35	24	11	0.7723	no trend	0.4852	36	25	11	0.0727
TotalRecoverable Hydrocarbons												
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	35	24	11	0.5383	no trend	0.8819	36	25	11	1.0000
>C10 - C16 Fraction	µg/L	100	35	24	11	0.1569	no trend	0.4577	36	25	11	1.0000
>C16 - C34 Fraction	µg/L	100	35	24	11	0.7236	no trend	0.5181	36	25	11	0.0305
>C34 - C40 Fraction	µg/L	100	35	24	11	1.0000	no trend	1.0000	36	25	11	0.3638
>C10 - C40 Fraction (sum)	µg/L	100	35	24	11	0.7723	no trend	0.4852	36	25	11	0.0305
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	35	24	11	0.1569	no trend	0.4577	36	25	11	1.0000
BTEXN												
Benzene	µg/L	1	35	24	11	1.0000	no trend	1.0000	36	25	11	0.1478
Toluene	µg/L	2	35	24	11	1.0000	no trend	1.0000	36	25	11	0.6038
Ethylbenzene	µg/L	2	35	24	11	1.0000	no trend	1.0000	36	25	11	1.0000
meta- & para-Xylene	µg/L	2	35	24	11	1.0000	no trend	1.0000	36	25	11	1.0000
ortho-Xylene	µg/L	2	35	24	11	1.0000	no trend	1.0000	36	25	11	1.0000
Total Xylenes	µg/L	2	35	24	11	1.0000	no trend	1.0000	36	25	11	1.0000
Sum of BTEX	µg/L	1	35	24	11	1.0000	no trend	1.0000	36	25	11	0.1973
Naphthalene	µg/L	5	35	24	11	1.0000	no trend	1.0000	36	25	11	1.0000
*Laboratory limit of reporting												

Sample ID					EFGW3D							
Aquifer					Rewan Formation							
Statistic			Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023
Analyte	Units	LOR*										
Water Quality Indicators												
pH Value	pH Unit	0.01	no trend	0.8306	38	27	11	1.0000	no trend	0.9598	35	25
Electrical Conductivity	µS/cm	1	decrease	0.0003	38	27	11	0.0001	increase	0.0008	35	25
Alkalinity												
Carbonate Alkalinity	mg/L	1	no trend	1.0000	38	27	11	1.0000	no trend	1.0000	35	25
Bicarbonate Alkalinity	mg/L	1	increase	0.0007	38	27	11	0.3027	no trend	0.3650	35	25
Dissolved Major Ions												
Calcium	mg/L	1	decrease	0.0001	38	27	11	0.0410	no trend	0.0544	35	25
Magnesium	mg/L	1	decrease	0.0000	38	27	11	0.1343	no trend	0.0527	35	25
Sodium	mg/L	1	decrease	0.0001	38	27	11	0.6519	no trend	0.5456	35	25
Potassium	mg/L	1	decrease	0.0009	38	27	11	0.0801	no trend	0.1125	35	25
Chloride	mg/L	1	decrease	0.0000	38	27	11	0.1006	increase	0.0001	35	25
Sulfate	mg/L	1	decrease	0.0000	38	27	11	0.0000	decrease	0.0000	35	25
Dissolved Metals												
Aluminium	mg/L	0.01	no trend	0.6890	25	14	11	0.2220	no trend	0.2299	22	12
Arsenic	mg/L	0.001	no trend	0.6484	38	27	11	0.1073	no trend	0.5176	35	25
Cadmium	mg/L	0.0001										
Cobalt	mg/L	0.001										
Copper	mg/L	0.001										
Lead	mg/L	0.001	no trend	1.0000	38	27	11	1.0000	no trend	1.0000	35	25
Manganese	mg/L	0.001	decrease	0.0003	38	27	11	0.0026	increase	0.0009	35	25
Nickel	mg/L	0.001										
Zinc	mg/L	0.005	no trend	0.1832	38	27	11	0.1886	no trend	0.1894	35	25
Iron	mg/L	0.05	no trend	0.4065	38	27	11	0.1648	no trend	0.7883	35	25
Total Metals												
Aluminium_total	mg/L	0.01	no trend	0.3436	24	13	11	0.1722	no trend	0.3317	21	11
Arsenic_total	mg/L	0.001	no trend	0.4346	37	26	11	0.1071	no trend	0.5235	34	24
Lead_total	mg/L	0.001	no trend	0.1468	37	26	11	0.7471	increase	0.0484	34	24
Manganese_total	mg/L	0.001	decrease	0.0000	37	26	11	0.0033	increase	0.0008	34	24
Zinc_total	mg/L	0.005	decrease	0.0006	37	26	11	0.0803	decrease	0.0001	34	24
Iron_total	mg/L	0.05	decrease	0.0001	37	26	11	0.0047	no trend	0.1997	34	24
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	no trend	1.0000	36	25	11	0.9723	no trend	1.0000	33	23
C10 - C14 Fraction	µg/L	50	no trend	0.6510	36	25	11	0.3638	decrease	0.0227	33	23
C15 - C28 Fraction	µg/L	100	decrease	0.0101	36	25	11	0.0586	decrease	0.0372	33	23
C29 - C36 Fraction	µg/L	50	decrease	0.0019	36	25	11	0.1757	decrease	0.0090	33	23
C10 - C36 Fraction (sum)	µg/L	50	decrease	0.0073	36	25	11	0.0268	decrease	0.0020	33	23
TotalRecoverable Hydrocarbons												
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	no trend	1.0000	36	25	11	0.9308	no trend	0.9670	33	23
>C10 - C16 Fraction	µg/L	100	no trend	1.0000	36	25	11	0.5465	no trend	0.1235	33	23
>C16 - C34 Fraction	µg/L	100	decrease	0.0033	36	25	11	0.0781	decrease	0.0050	33	23
>C34 - C40 Fraction	µg/L	100	decrease	0.0272	36	25	11	1.0000	no trend	1.0000	33	23
>C10 - C40 Fraction (sum)	µg/L	100	decrease	0.0028	36	25	11	0.0781	decrease	0.0047	33	23
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	no trend	1.0000	36	25	11	0.5465	no trend	0.1235	33	23
BTEXN												
Benzene	µg/L	1	no trend	0.1235	36	25	11	1.0000	no trend	1.0000	33	23
Toluene	µg/L	2	no trend	0.8360	36	25	11	0.3636	decrease	0.0416	33	23
Ethylbenzene	µg/L	2	no trend	1.0000	36	25	11	1.0000	no trend	1.0000	33	23
meta- & para-Xylene	µg/L	2	no trend	1.0000	36	25	11	1.0000	no trend	1.0000	33	23
ortho-Xylene	µg/L	2	no trend	1.0000	36	25	11	1.0000	no trend	1.0000	33	23
Total Xylenes	µg/L	2	no trend	1.0000	36	25	11	1.0000	no trend	1.0000	33	23
Sum of BTEX	µg/L	1	no trend	0.5110	36	25	11	0.3636	decrease	0.0416	33	23
Naphthalene	µg/L	5	no trend	1.0000	36	25	11	1.0000	no trend	1.0000	33	23
*Laboratory limit of reporting												

Sample ID			EFGW4D				EFGW5D					
Aquifer			Rewan Formation				Rewan Formation					
Statistic			# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p
Analyte	Units	LOR*										
Water Quality Indicators												
pH Value	pH Unit	0.01	10	0.7285	no trend	0.7437	39	28	11	0.3102	no trend	0.5133
Electrical Conductivity	µS/cm	1	10	0.2497	no trend	0.8982	39	28	11	0.0016	increase	0.0009
Alkalinity												
Carbonate Alkalinity	mg/L	1	10	1.0000	no trend	1.0000	39	28	11	1.0000	no trend	1.0000
Bicarbonate Alkalinity	mg/L	1	10	0.4650	no trend	0.1213	39	28	11	0.3992	no trend	1.0000
Dissolved Major Ions												
Calcium	mg/L	1	10	0.0151	decrease	0.0184	39	28	11	0.1744	no trend	0.2552
Magnesium	mg/L	1	10	0.1825	no trend	0.1726	39	28	11	0.7907	no trend	0.1676
Sodium	mg/L	1	10	0.2812	no trend	0.8982	39	28	11	0.5222	no trend	0.0857
Potassium	mg/L	1	10	0.7272	no trend	0.6067	39	28	11	0.3804	no trend	0.4438
Chloride	mg/L	1	10	0.2076	increase	0.0157	39	28	11	0.1898	increase	0.0000
Sulfate	mg/L	1	10	0.0144	increase	0.0066	39	28	11	0.1692	decrease	0.0015
Dissolved Metals												
Aluminium	mg/L	0.01	10	0.8949	no trend	0.5686	25	14	11	0.8615	no trend	0.4837
Arsenic	mg/L	0.001	10	0.1329	no trend	0.0614	39	28	11	0.5012	no trend	0.3316
Cadmium	mg/L	0.0001										
Cobalt	mg/L	0.001										
Copper	mg/L	0.001										
Lead	mg/L	0.001	10	0.3884	no trend	0.8590	39	28	11	0.1310	increase	0.0259
Manganese	mg/L	0.001	10	0.0247	increase	0.0027	39	28	11	0.0167	increase	0.0025
Nickel	mg/L	0.001										
Zinc	mg/L	0.005	10	0.5245	no trend	0.2550	39	28	11	0.2873	no trend	0.0578
Iron	mg/L	0.05	10	0.9273	no trend	0.5894	39	28	11	0.0491	increase	0.0015
Total Metals												
Aluminium_total	mg/L	0.01	10	0.0236	increase	0.0341	24	13	11	0.6850	no trend	0.9604
Arsenic_total	mg/L	0.001	10	0.2507	no trend	0.0572	38	27	11	0.0749	no trend	0.7346
Lead_total	mg/L	0.001	10	0.3607	no trend	0.1277	38	27	11	0.6039	no trend	0.2506
Manganese_total	mg/L	0.001	10	0.0065	increase	0.0003	38	27	11	0.1123	no trend	0.1521
Zinc_total	mg/L	0.005	10	0.9387	no trend	0.0530	38	27	11	0.2997	no trend	0.9192
Iron_total	mg/L	0.05	10	0.0889	increase	0.0199	38	27	11	0.9615	no trend	0.9198
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	10	0.0900	increase	0.0081	37	26	11	0.0924	no trend	0.4887
C10 - C14 Fraction	µg/L	50	10	0.1574	no trend	0.0855	37	26	11	0.0001	increase	0.0003
C15 - C28 Fraction	µg/L	100	10	0.1240	no trend	0.3821	37	26	11	0.0049	no trend	0.1629
C29 - C36 Fraction	µg/L	50	10	0.5529	no trend	0.7929	37	26	11	0.2615	no trend	0.2665
C10 - C36 Fraction (sum)	µg/L	50	10	0.7841	no trend	0.7111	37	26	11	0.0033	increase	0.0191
TotalRecoverable Hydrocarbons												
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10	0.3505	no trend	0.1523	37	26	11	0.0408	no trend	0.6191
>C10 - C16 Fraction	µg/L	100	10	1.0000	no trend	1.0000	37	26	11	0.0069	increase	0.0211
>C16 - C34 Fraction	µg/L	100	10	0.0858	no trend	0.5167	37	26	11	0.0036	increase	0.0381
>C34 - C40 Fraction	µg/L	100	10	1.0000	no trend	1.0000	37	26	11	0.5543	no trend	0.1012
>C10 - C40 Fraction (sum)	µg/L	100	10	0.0858	no trend	0.5167	37	26	11	0.0020	increase	0.0199
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	10	1.0000	no trend	1.0000	37	26	11	0.0069	increase	0.0211
BTEXN												
Benzene	µg/L	1	10	0.0331	increase	0.0237	37	26	11	1.0000	no trend	1.0000
Toluene	µg/L	2	10	0.0076	increase	0.0104	37	26	11	0.5543	no trend	0.1744
Ethylbenzene	µg/L	2	10	1.0000	no trend	1.0000	37	26	11	1.0000	no trend	1.0000
meta- & para-Xylene	µg/L	2	10	1.0000	no trend	1.0000	37	26	11	1.0000	no trend	1.0000
ortho-Xylene	µg/L	2	10	1.0000	no trend	1.0000	37	26	11	1.0000	no trend	1.0000
Total Xylenes	µg/L	2	10	1.0000	no trend	1.0000	37	26	11	1.0000	no trend	1.0000
Sum of BTEX	µg/L	1	10	0.0076	increase	0.0104	37	26	11	0.5543	no trend	0.1744
Naphthalene	µg/L	5	10	1.0000	no trend	1.0000	37	26	11	1.0000	no trend	1.0000
*Laboratory limit of reporting												

Sample ID			IBGW006						IBGWR1			
Aquifer			Leichhardt Seam						Rewan Formation			
Statistic			# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p
Analyte	Units	LOR*										
Water Quality Indicators												
pH Value	pH Unit	0.01	6	0	6	0.0000	no trend	0.5661	31	21	10	0.3746
Electrical Conductivity	µS/cm	1	6	0	6	0.0000	no trend	0.1806	31	21	10	0.0383
Alkalinity												
Carbonate Alkalinity	mg/L	1	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
Bicarbonate Alkalinity	mg/L	1	6	0	6	0.0000	no trend	0.0603	31	21	10	0.0000
Dissolved Major Ions												
Calcium	mg/L	1	6	0	6	0.0000	no trend	0.2597	31	21	10	0.0789
Magnesium	mg/L	1	6	0	6	0.0000	no trend	0.4109	31	21	10	0.5680
Sodium	mg/L	1	6	0	6	0.0000	no trend	0.4524	31	21	10	0.5123
Potassium	mg/L	1	6	0	6	0.0000	no trend	0.3671	31	21	10	0.7824
Chloride	mg/L	1	6	0	6	0.0000	no trend	0.2597	31	21	10	0.7813
Sulfate	mg/L	1	6	0	6	0.0000	no trend	1.0000	31	21	10	0.0378
Dissolved Metals												
Aluminium	mg/L	0.01	6	0	6	0.0000	no trend	0.1052	23	13	10	1.0000
Arsenic	mg/L	0.001	6	0	6	0.0000	no trend	0.1052	31	21	10	0.0006
Cadmium	mg/L	0.0001										
Cobalt	mg/L	0.001										
Copper	mg/L	0.001										
Lead	mg/L	0.001	6	0	6	0.0000	no trend	1.0000	31	21	10	0.5346
Manganese	mg/L	0.001	6	0	6	0.0000	no trend	0.2423	31	21	10	0.0831
Nickel	mg/L	0.001										
Zinc	mg/L	0.005	6	0	6	0.0000	no trend	1.0000	31	21	10	0.0017
Iron	mg/L	0.05	6	0	6	0.0000	no trend	0.4524	31	21	10	0.0000
Total Metals												
Aluminium_total	mg/L	0.01	6	0	6	0.0000	no trend	0.2597	23	13	10	0.3748
Arsenic_total	mg/L	0.001	6	0	6	0.0000	no trend	0.1052	31	21	10	0.0006
Lead_total	mg/L	0.001	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
Manganese_total	mg/L	0.001	6	0	6	0.0000	no trend	0.4524	31	21	10	0.0025
Zinc_total	mg/L	0.005	6	0	6	0.0000	no trend	0.1806	31	21	10	0.0106
Iron_total	mg/L	0.05	6	0	6	0.0000	no trend	0.0603	31	21	10	0.0006
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	6	0	6	0.0000	no trend	0.2416	31	21	10	0.5346
C10 - C14 Fraction	µg/L	50	6	0	6	0.0000	no trend	0.2174	31	21	10	0.5346
C15 - C28 Fraction	µg/L	100	6	0	6	0.0000	no trend	0.8483	31	21	10	0.0918
C29 - C36 Fraction	µg/L	50	6	0	6	0.0000	no trend	0.5582	31	21	10	0.5346
C10 - C36 Fraction (sum)	µg/L	50	6	0	6	0.0000	no trend	0.7071	31	21	10	0.0918
TotalRecoverable Hydrocarbons												
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	6	0	6	0.0000	no trend	1.0000	31	21	10	0.5346
>C10 - C16 Fraction	µg/L	100	6	0	6	0.0000	no trend	0.5582	31	21	10	0.5346
>C16 - C34 Fraction	µg/L	100	6	0	6	0.0000	no trend	1.0000	31	21	10	0.0124
>C34 - C40 Fraction	µg/L	100	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
>C10 - C40 Fraction (sum)	µg/L	100	6	0	6	0.0000	no trend	1.0000	31	21	10	0.0124
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	6	0	6	0.0000	no trend	0.5582	31	21	10	0.5346
BTEXN												
Benzene	µg/L	1	6	0	6	0.0000	no trend	1.0000	31	21	10	0.1675
Toluene	µg/L	2	6	0	6	0.0000	no trend	1.0000	31	21	10	0.5346
Ethylbenzene	µg/L	2	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
meta- & para-Xylene	µg/L	2	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
ortho-Xylene	µg/L	2	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
Total Xylenes	µg/L	2	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
Sum of BTEX	µg/L	1	6	0	6	0.0000	no trend	1.0000	31	21	10	0.6553
Naphthalene	µg/L	5	6	0	6	0.0000	no trend	1.0000	31	21	10	1.0000
*Laboratory limit of reporting												

Sample ID					IBGWR2							
Aquifer					Rewan Formation							
Statistic			Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023	# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p	# Obs	# Obs pre-2023
Analyte	Units	LOR*										
Water Quality Indicators												
pH Value	pH Unit	0.01	no trend	0.7986	33	22	11	0.6604	no trend	0.6308	38	27
Electrical Conductivity	µS/cm	1	no trend	0.4963	33	22	11	0.4331	no trend	0.7681	38	27
Alkalinity												
Carbonate Alkalinity	mg/L	1	no trend	1.0000	33	22	11	1.0000	no trend	1.0000	38	27
Bicarbonate Alkalinity	mg/L	1	increase	0.0000	33	22	11	0.5666	no trend	0.8524	38	27
Dissolved Major Ions												
Calcium	mg/L	1	no trend	0.0916	33	22	11	0.2679	no trend	0.7921	38	27
Magnesium	mg/L	1	no trend	0.9864	33	22	11	0.5409	no trend	0.7097	38	27
Sodium	mg/L	1	no trend	0.5181	33	22	11	0.7167	no trend	0.1877	38	27
Potassium	mg/L	1	no trend	0.9591	33	22	11	0.6313	no trend	0.2421	38	27
Chloride	mg/L	1	no trend	0.0951	33	22	11	0.9234	increase	0.0087	38	27
Sulfate	mg/L	1	decrease	0.0002	33	22	11	0.0241	no trend	0.0968	38	27
Dissolved Metals												
Aluminium	mg/L	0.01	no trend	1.0000	24	13	11	1.0000	no trend	1.0000	25	14
Arsenic	mg/L	0.001	decrease	0.0000	33	22	11	1.0000	no trend	0.5977	38	27
Cadmium	mg/L	0.0001										
Cobalt	mg/L	0.001										
Copper	mg/L	0.001										
Lead	mg/L	0.001	no trend	0.6149	33	22	11	0.3321	no trend	0.7917	38	27
Manganese	mg/L	0.001	increase	0.0308	33	22	11	0.0052	increase	0.0016	38	27
Nickel	mg/L	0.001										
Zinc	mg/L	0.005	decrease	0.0296	33	22	11	0.1798	no trend	0.9868	38	27
Iron	mg/L	0.05	increase	0.0000	33	22	11	0.0984	no trend	0.3301	38	27
Total Metals												
Aluminium_total	mg/L	0.01	no trend	0.1515	24	13	11	0.0590	no trend	0.3318	24	13
Arsenic_total	mg/L	0.001	decrease	0.0000	33	22	11	0.7018	no trend	0.7309	38	27
Lead_total	mg/L	0.001	no trend	0.5373	33	22	11	0.7593	no trend	0.4092	38	27
Manganese_total	mg/L	0.001	increase	0.0011	33	22	11	0.0083	increase	0.0003	38	27
Zinc_total	mg/L	0.005	no trend	0.0715	33	22	11	0.6578	no trend	0.8185	38	27
Iron_total	mg/L	0.05	increase	0.0000	33	22	11	0.5667	no trend	0.2579	38	27
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	no trend	0.1050	33	22	11	0.5203	no trend	0.1036	37	26
C10 - C14 Fraction	µg/L	50	no trend	0.6149	33	22	11	1.0000	no trend	1.0000	37	26
C15 - C28 Fraction	µg/L	100	no trend	0.4184	33	22	11	0.6778	no trend	0.3656	37	26
C29 - C36 Fraction	µg/L	50	no trend	0.4674	33	22	11	0.5203	no trend	0.9581	37	26
C10 - C36 Fraction (sum)	µg/L	50	no trend	0.4398	33	22	11	0.6778	no trend	0.3656	37	26
TotalRecoverable Hydrocarbons												
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	no trend	0.1050	33	22	11	1.0000	no trend	1.0000	37	26
>C10 - C16 Fraction	µg/L	100	no trend	0.6149	33	22	11	1.0000	no trend	1.0000	37	26
>C16 - C34 Fraction	µg/L	100	no trend	0.0865	33	22	11	0.6778	no trend	0.3656	37	26
>C34 - C40 Fraction	µg/L	100	no trend	1.0000	33	22	11	0.5203	no trend	0.9581	37	26
>C10 - C40 Fraction (sum)	µg/L	100	no trend	0.0937	33	22	11	0.6778	no trend	0.3656	37	26
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	no trend	0.6149	33	22	11	1.0000	no trend	1.0000	37	26
BTEXN												
Benzene	µg/L	1	no trend	0.1050	33	22	11	0.1770	no trend	0.1278	37	26
Toluene	µg/L	2	no trend	0.1050	33	22	11	0.9695	no trend	0.1691	37	26
Ethylbenzene	µg/L	2	no trend	1.0000	33	22	11	1.0000	no trend	1.0000	37	26
meta- & para-Xylene	µg/L	2	no trend	1.0000	33	22	11	1.0000	no trend	1.0000	37	26
ortho-Xylene	µg/L	2	no trend	1.0000	33	22	11	1.0000	no trend	1.0000	37	26
Total Xylenes	µg/L	2	no trend	1.0000	33	22	11	1.0000	no trend	1.0000	37	26
Sum of BTEX	µg/L	1	no trend	1.0000	33	22	11	0.5670	no trend	0.6403	37	26
Naphthalene	µg/L	5	no trend	1.0000	33	22	11	1.0000	no trend	1.0000	37	26

*Laboratory limit of reporting

Sample ID			PT1			
Aquifer			Leichhardt Seam			
Statistic			# Obs post-2023	Mann-Whitney p	Mann-Kendall trend	Mann-Kendall p
Analyte	Units	LOR*				
Water Quality Indicators						
pH Value	pH Unit	0.01	11	0.2877	no trend	0.3451
Electrical Conductivity	µS/cm	1	11	0.0000	increase	0.0003
Alkalinity						
Carbonate Alkalinity	mg/L	1	11	1.0000	no trend	1.0000
Bicarbonate Alkalinity	mg/L	1	11	0.0120	no trend	0.1045
Dissolved Major Ions						
Calcium	mg/L	1	11	0.0110	decrease	0.0008
Magnesium	mg/L	1	11	0.0000	decrease	0.0000
Sodium	mg/L	1	11	0.0212	increase	0.0041
Potassium	mg/L	1	11	0.0018	increase	0.0024
Chloride	mg/L	1	11	0.0002	increase	0.0000
Sulfate	mg/L	1	11	0.0326	no trend	0.3692
Dissolved Metals						
Aluminium	mg/L	0.01	11	0.4203	no trend	0.6274
Arsenic	mg/L	0.001	11	0.0002	decrease	0.0008
Cadmium	mg/L	0.0001				
Cobalt	mg/L	0.001				
Copper	mg/L	0.001				
Lead	mg/L	0.001	11	1.0000	no trend	1.0000
Manganese	mg/L	0.001	11	0.0482	no trend	0.1390
Nickel	mg/L	0.001				
Zinc	mg/L	0.005	11	0.6344	no trend	0.2395
Iron	mg/L	0.05	11	0.7230	no trend	0.5207
Total Metals						
Aluminium_total	mg/L	0.01	11	0.2199	no trend	0.1358
Arsenic_total	mg/L	0.001	11	0.0000	decrease	0.0000
Lead_total	mg/L	0.001	11	0.8904	no trend	0.4168
Manganese_total	mg/L	0.001	11	0.0076	decrease	0.0130
Zinc_total	mg/L	0.005	11	0.5694	increase	0.0424
Iron_total	mg/L	0.05	11	0.0110	decrease	0.0004
Total Petroleum Hydrocarbons						
C6 - C9 Fraction	µg/L	20	11	0.5543	no trend	0.2417
C10 - C14 Fraction	µg/L	50	11	1.0000	no trend	1.0000
C15 - C28 Fraction	µg/L	100	11	0.0070	no trend	0.1547
C29 - C36 Fraction	µg/L	50	11	1.0000	no trend	1.0000
C10 - C36 Fraction (sum)	µg/L	50	11	0.0070	no trend	0.1547
TotalRecoverable Hydrocarbons						
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	11	1.0000	no trend	1.0000
>C10 - C16 Fraction	µg/L	100	11	1.0000	no trend	1.0000
>C16 - C34 Fraction	µg/L	100	11	0.0081	no trend	0.1662
>C34 - C40 Fraction	µg/L	100	11	1.0000	no trend	1.0000
>C10 - C40 Fraction (sum)	µg/L	100	11	0.0081	no trend	0.1662
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	11	1.0000	no trend	1.0000
BTEXN						
Benzene	µg/L	1	11	1.0000	no trend	1.0000
Toluene	µg/L	2	11	1.0000	no trend	1.0000
Ethylbenzene	µg/L	2	11	1.0000	no trend	1.0000
meta- & para-Xylene	µg/L	2	11	1.0000	no trend	1.0000
ortho-Xylene	µg/L	2	11	1.0000	no trend	1.0000
Total Xylenes	µg/L	2	11	1.0000	no trend	1.0000
Sum of BTEX	µg/L	1	11	1.0000	no trend	1.0000
Naphthalene	µg/L	5	11	1.0000	no trend	1.0000
*Laboratory limit of reporting						

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		

Sample ID		
Aquifer		
Statistic		
Analyte	Units	LOR*
Water Quality Indicators		
pH Value	pH Unit	0.01
Electrical Conductivity	µS/cm	1
Alkalinity		
Carbonate Alkalinity	mg/L	1
Bicarbonate Alkalinity	mg/L	1
Dissolved Major Ions		
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Chloride	mg/L	1
Sulfate	mg/L	1
Dissolved Metals		
Aluminium	mg/L	0.01
Arsenic	mg/L	0.001
Cadmium	mg/L	0.0001
Cobalt	mg/L	0.001
Copper	mg/L	0.001
Lead	mg/L	0.001
Manganese	mg/L	0.001
Nickel	mg/L	0.001
Zinc	mg/L	0.005
Iron	mg/L	0.05
Total Metals		
Aluminium_total	mg/L	0.01
Arsenic_total	mg/L	0.001
Lead_total	mg/L	0.001
Manganese_total	mg/L	0.001
Zinc_total	mg/L	0.005
Iron_total	mg/L	0.05
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	20
C10 - C14 Fraction	µg/L	50
C15 - C28 Fraction	µg/L	100
C29 - C36 Fraction	µg/L	50
C10 - C36 Fraction (sum)	µg/L	50
TotalRecoverable Hydrocarbons		
C6 - C10 Fraction minus BTEX (F1)	µg/L	20
>C10 - C16 Fraction	µg/L	100
>C16 - C34 Fraction	µg/L	100
>C34 - C40 Fraction	µg/L	100
>C10 - C40 Fraction (sum)	µg/L	100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100
BTEXN		
Benzene	µg/L	1
Toluene	µg/L	2
Ethylbenzene	µg/L	2
meta- & para-Xylene	µg/L	2
ortho-Xylene	µg/L	2
Total Xylenes	µg/L	2
Sum of BTEX	µg/L	1
Naphthalene	µg/L	5
*Laboratory limit of reporting		