

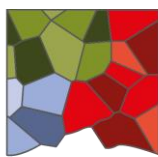
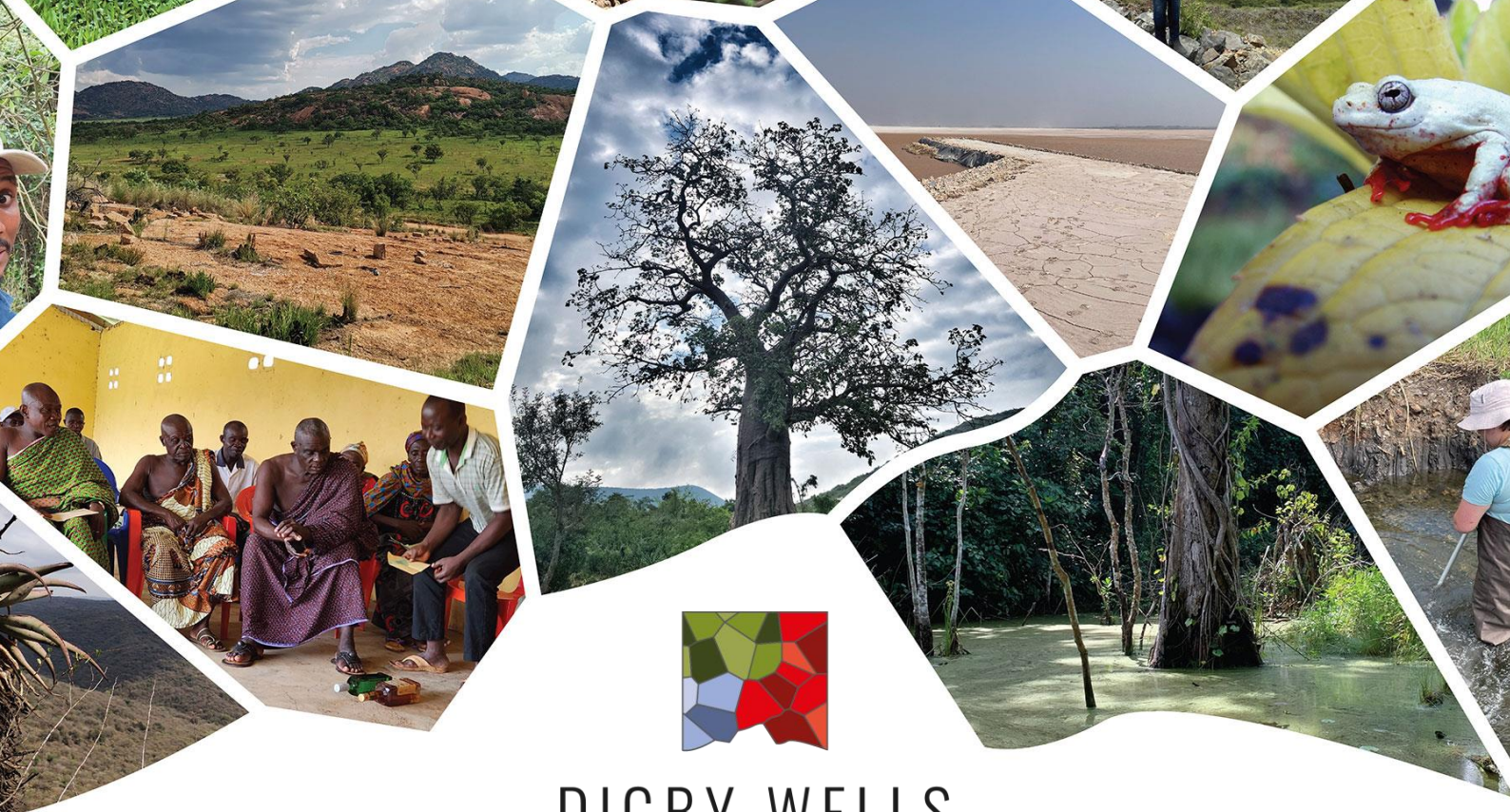


**Hagler Bailly** Pakistan



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## Appendix P: Mine Site Hydrogeological Assessment



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## Environmental Impact Assessment for the Reko Diq Mining Project, Pakistan

### Groundwater Impact Assessment

**Prepared for:**

Reko Diq Mining Company

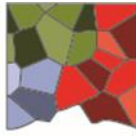
**Project Number:**

BAR7212

August 2024

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<b>Report Type:</b>	Groundwater Impact Assessment
<b>Project Name:</b>	Environmental Impact Assessment for the Reko Diq Mining Project, Pakistan
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<b>Name</b>	<b>Responsibility</b>	<b>Signature</b>	<b>Date</b>
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## EXECUTIVE SUMMARY

Barrick Gold Corporation (Barrick), through its subsidiary Reko Diq Mining Company (RDMC), is developing the Reko Diq Mining Project. The project will involve the mining of porphyry copper-gold deposits located at various mineralisation areas. The proposed mine will consist of a process plant, two main pits, waste rock dumps, a Tailings Storage Facility and other facilities. The project is located in the Chagai District of Balochistan Province of Pakistan, between the Iran (approximately 40 km away) and Afghanistan (approximately 35 km away) borders. The nearest community to the site is Humai, which is approximately 18 km away.

Digby Wells is undertaking an Environmental and Social Impact Assessment (ESIA) as well as Environmental and Social Management Plan (ESMP) for the Project. This report provides the specialist groundwater impact assessment to support the ESIA application.

The Project is characterised as having a hot desert climate with a mean annual rainfall of 32 mm and mean annual evaporation of 2800 mm. Considering the limited rainfall together with high evaporation, recharge from rainfall is expected to be insignificant. Using the numerical model calibration, groundwater recharge at the mine area is estimated to be 1.8% of annual precipitation or 0.42 mm per year. An isotope study had also shown that the age of the groundwater in the Tanjeel area is estimated at ~13 000 years, while at the Western Porphyry it is estimated at ~15 000 years.

The project is located on a watershed separating the Sistan and Mashkhel Basins. The watershed also represents a groundwater divide. The Sistan Basin drains to Gaud-i-Zirreh playa in Afghanistan, while the Mashkhel Basin drains to the Hamun-i-Mashkhel playa in Pakistan. Streams are ephemeral, flowing temporarily during high rainfall events.

There is a good correlation of 92% between topography and hydraulic head elevation whereby the groundwater elevation mimics topography. The watershed divide between the Sistan and Mashkhel Basins is also an approximate location of a groundwater divide, and therefore the overall groundwater flow direction is to the northwest towards Gaud-i-Zirreh and to the southeast towards Hamun-i-Mashkhel; although it could be different on a local scale, depending on the orientation and permeability of local structures. The groundwater levels measured within the mine lease range between 0.3 and 64.3 mbgl, with an average of 22.5 mbgl.

The Reko Diq Porphyry complex comprises of diorite, quartz diorite and granodiorite porphyry intrusions, emplaced into volcanic and sedimentary rocks. Significant structural deformation has occurred in the region and the deposits are highly fractured, however assessment of the piezometric surface indicates there is limited hydraulic connection between the deposits and the surrounding country rock. Aquifer tests indicate the hydraulic conductivity ranges between 0 – 1.8 m/d. Hydraulic conductivities decrease with depth unless a high yielding fracture is intersected. There are areas that are covered by more permeable quaternary aeolian deposits and unconsolidated sands. These are often shallow and are above the water table.



The natural groundwater is saline. TDS in the Project Area is typically more than 10 000 mg/L, which is significantly more than the drinking water quality limits established Balochistan (of 1 000 mg/L) and the guideline value established by the WHO.

- In the TSF area, the TDS ranges between 15 600 mg/L and 180 000 mg/L with an average of 43 400 mg/L.
- At the Western Porphyry and Tanjeel deposits, the concentration is slightly better at 11 500 mg/L and 16 600 mg/L.
- In the vicinity of the northern WRD, it is 16 000 mg/L.
- The groundwater pH is predominantly neutral, except at Tanjeel which has a pH of 3.5, caused by the oxidation of sulphide.

No groundwater receptors (groundwater users or eco-systems) were identified in the vicinity of the mine site. The closest village (Humai) is approximately 18 km to the east of the mine site, the Afghanistan border is approximately 35 km to north, while the Iranian border is approximately 40 km to the southwest. The settlement and transboundary aquifers are not expected to be impacted by the mine due to the pit sizes, distance and low permeabilities of the hydrostratigraphic units. The numerical model has further confirmed this whereby the cone of dewatering is expected to extend to a maximum distance of 350 m from the edges of the pits at the end of operation, and 850 m after 100 years after closure.

The design of the TSF is informed by the geochemical assessments of the tailings material. The cleaner tailings which comprises of the higher risk tailings material (containing 10% sulphide with high acid generating potential), will be deposited on a facility lined with a 1.5 mm HDPE. The permeability of the HDPE liner is  $1.7 \times 10^{-10}$  m/d and therefore seepage from the cleaner TSF will be negligible.

The rougher tailings comprises of low-risk material (0.5% sulphide with negligible acid generating potential). The rougher TSF will therefore not be lined, with the exception of the pond area. Underdrains will be constructed to maximise seepage recovery to conserve water. The seepage model, undertaken by Knight Piesold, indicates that about 1% of slurry water (or 13 L/s) could potentially seep to the groundwater hydrostratigraphy. This seepage rate is relatively small considering the size of the TSF footprint area and relatively better seepage quality of the rougher tailings (TDS of 3 500 mg/L). Model simulations show that no contamination plume is expected to migrate outside the TSF footprint.

The pits will need to be dewatered when mining extends below the water table. The maximum depth of the Western Porphyry Pit is expected to be approximately 840 m while that of Tanjeel is 195 m. The water level at the Western Porphyry Pit is approximately 86 m, while at Tanjeel is 60 m. As mining progresses below those depths, dewatering will be required to provide safe working conditions ensure slope stability and reduce mining costs.

Due to the hydrostratigraphic heterogeneity in the Project Area, the inflow rates and radius of influence are not expected to be uniform. The shape and size of the pits will also contribute to the fluctuation of the inflow rates. The estimated groundwater ingress could reach a maximum



of 9.2 L/s in the Western Porphyry Pit and 0.6 L/s in the Tanjeel Pit. Considering the pit surface area and high evaporation rate, however, most of this water will be lost to evaporation before it can be used for the mine.

Climate change has been assessed as part of the numerical model findings. The projected climate changes for the Project include increased flooding, extreme heat, drought, and storm surge intensity risks. Reko Diq would be required to monitor how the climate changes over the operational phase of the mine to inform contingency plans to prevent the overtopping or failure of the TSF or WRDs and managing the dewatering of the pits, should significant flood event occur. Direct rainfall into the pits would require significant volumes of water (~1.5Mm<sup>3</sup> based on a climate adjusted 100-year, 24-hour flood event) to be abstracted which could be beneficial to the project if able if Reko Diq are able to store the abstracted volume. In the event that water pumped from the pits must be discharged to the environment, the abstracted water will need to comply with permitted discharge limits.

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Appendix C: Knight Piesold Packer Tests and Geology Logs



## 1. Introduction

Barrick Gold Corporation (Barrick), through its subsidiary Reko Diq Mining Company (RDMC), is developing the Reko Diq Mining Project (the Project). Reko Diq is one of the largest global copper and gold reserves with an estimated 5.1 billion tons of ore, grading 0.41% of copper and containing 36.4 million ounces of gold (RDMC, 2023).

The Project is located in the Chagai District of Balochistan Province of Pakistan, between the Iran (approximately 40 km away) and Afghanistan (approximately 35 km away) borders (Figure 1-1). The nearest town is Nok Kundi, approximately 70 kilometres (km) southeast from the mine site. The nearest community to the mine is Humai, which is approximately 18 km away.

### 1.1. Project Description

The Project is a Copper-Gold mining operation with an onsite processing plant to produce a high-quality copper-gold concentrate (the Concentrate) that will be exported for final processing into various products. The current Life-of-Mine (LoM) is 38 years in terms of defined resources (resources that have been identified already) with significant exploration upside.

The construction phase is anticipated to take approximately 40 months, including pre-stripping. The mine will be a truck-and-shovel open pit mining operation with processing facilities that include crushing, grinding, and flotation. The final Concentrate will be railed to Port Qasim for final export by ship.

The mine will be developed in two phases, Phase 1 is expected to have a capacity of 45 Mt per annum (Mtpa) and Phase 2 is expected to have a combined processing capacity of 90 Mtpa. Phase 1 operations are anticipated to commence in 2028 and Phase 2 operations in 2030.

#### 1.1.1. Reko Diq Mine Site and Associated Facilities

Figure 1-2 provides an overview of the RDMS and the major proposed infrastructure.

The core infrastructure that will be established at the RDMS includes:

- Two main pits, Western Porphyry and Tanjeel (Figure 1-2). The mining method of these pits will be a 24-hour open-pit shovel and truck operation;
- Two designated Waste Rock Dumps (WRD) for the waste rock from the Western Porphyries pit. The Tajeel Pit will have a separate WRD in its proximity.
- Tailings storage facility (TSF).
- A processing plant.

##### 1.1.1.1. Supporting Infrastructure

The proposed supporting infrastructure at the RDMS includes:



- Several sources for power supply will be utilised for the Project. The Project's estimated peak power requirements will be 183 megawatts (MW) in Phase 1 and 348 MW in Phase 2:
  - Diesel generators during the early works and construction phases until the establishment of the Heavy Fuel Oil (HFO) power station;
  - A Solar Photovoltaic (PV) system with an installed capacity of 183 MW in Phase 1 and 384 MW in Phase 2;
  - It is anticipated that the Project's energy requirements will be met through a grid connection from Year 15 (operational phase).
- Diesel, HFO and other sources of fuel will be railed to the site from Port Qasim and stored in bunded contained atmospheric tanks at the designated storage areas.
- Accommodation Facility to provide on-site accommodation for all employees and contractors;
- Security infrastructure;
- Waste management facilities:

#### **1.1.1.2. Water Supply and Management**

Water for the Construction Phase, Phase 1 and Phase 2 of the Project will be sourced from a sedimentary groundwater system located approximately 70 km to the northwest of the mining area referred to as the Northern Groundwater System. The system represents a small and isolated part of a much larger basin and there are no communities or community water sources located within the proposed borefield and its area of influence.

Water in the system is saline and challenging to access, and as such is not suitable for human consumption or most agricultural or industrial uses without significant treatment and abstraction infrastructure. There are currently no planned developments or users of the target groundwater system, and the scope of the Project would not preclude future use of the broader basin by others. Independent international best practice environmental and social impact assessment and hydrogeological studies, using physical surveying and remote sensing techniques, have demonstrated that there are no surface expressions of the groundwater system and no known dependent biodiversity.

This groundwater system is considered capable of enabling development and sustaining operation of the Project, which is expected to add significantly to the socio-economic advancement within the region and country through employment, infrastructure, and services.

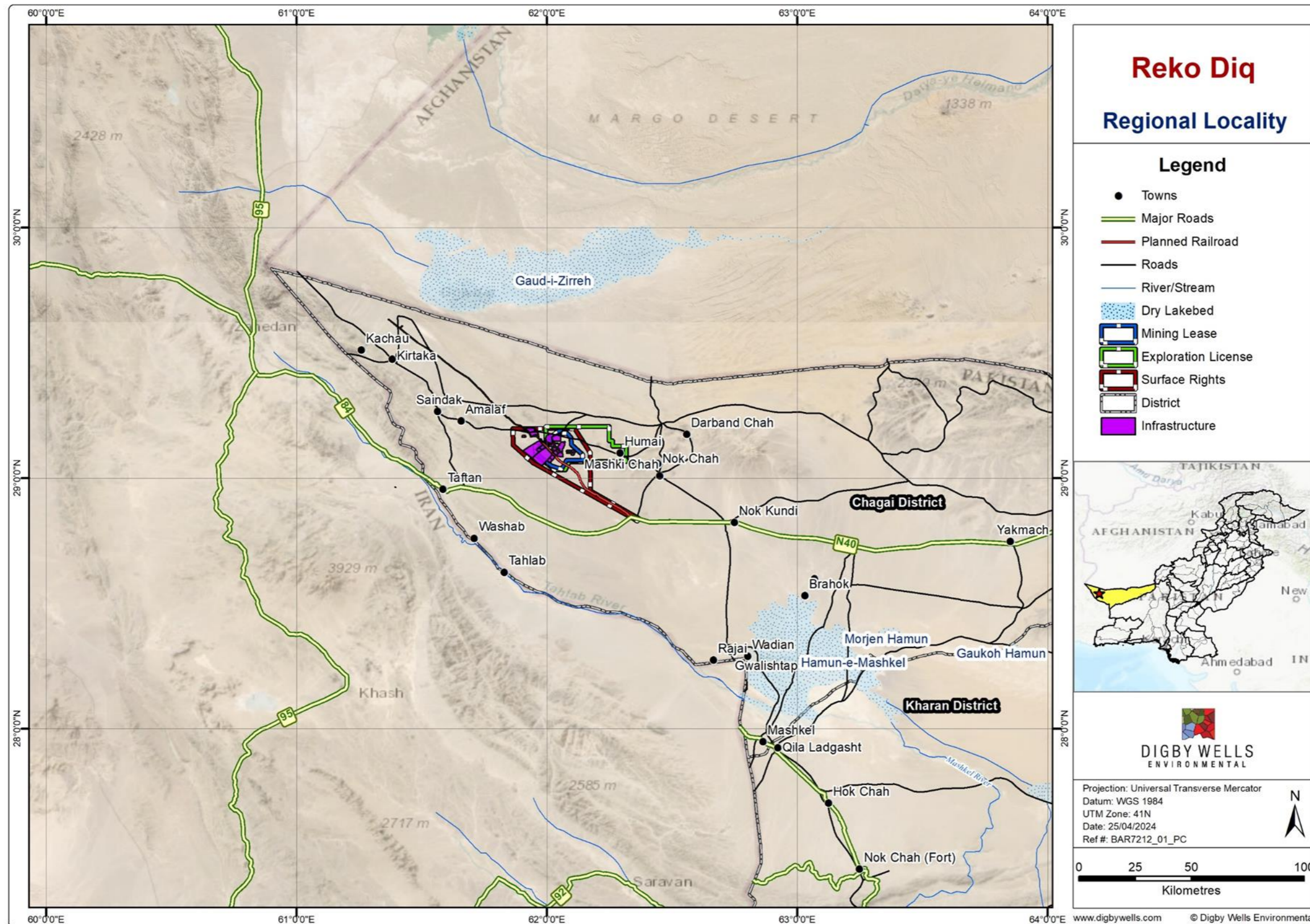


Figure 1-1: Regional Locality

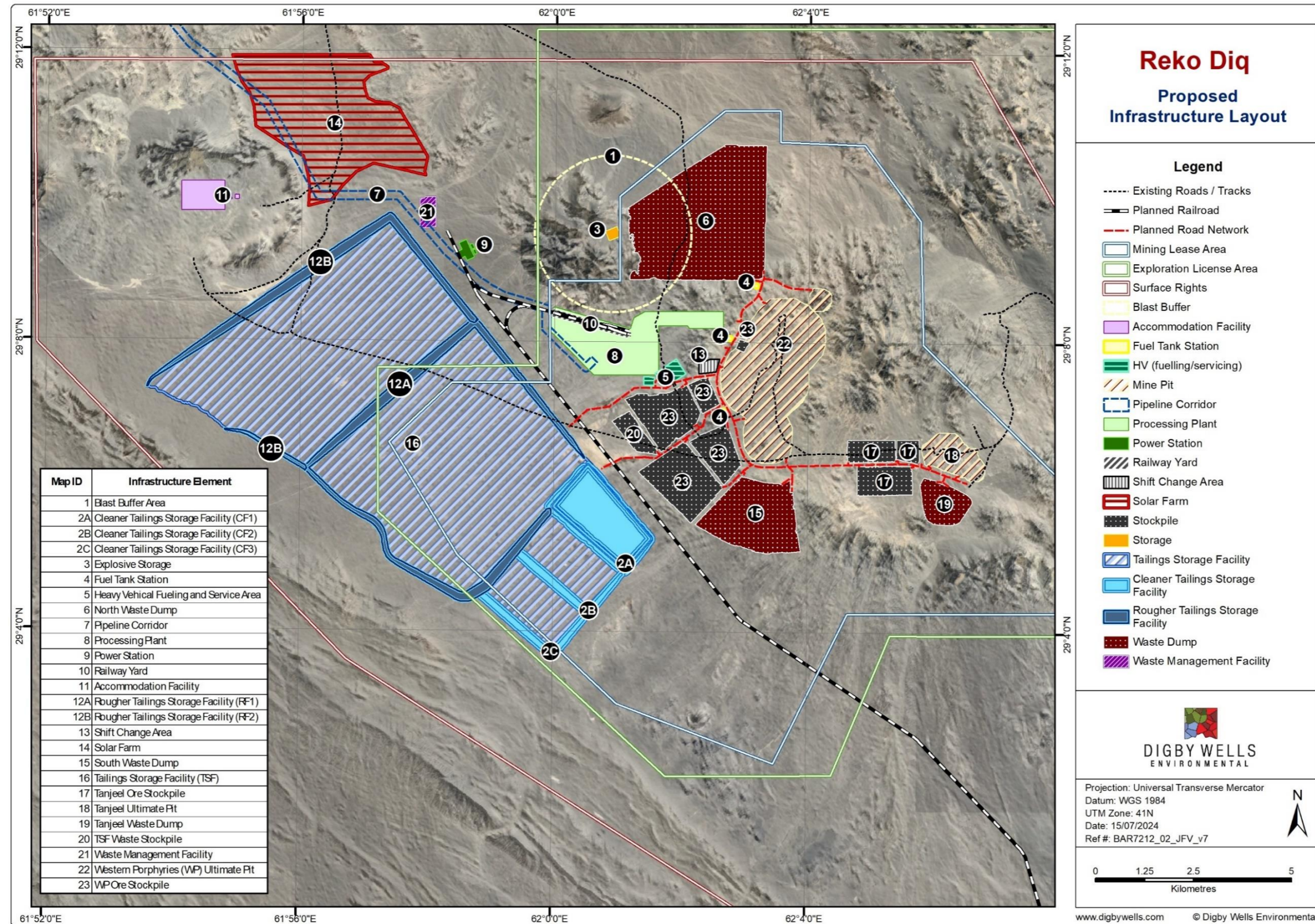


Figure 1-2: Proposed Reko Diq Mine Site Layout

## **1.1.2. Transport and Marine Port**

The Project will use the existing road and rail networks to transport materials during construction and operational phases and utilise the air transportation option for personnel. The main Project transport routes (Road Transport Route and Rail Transport Route) are shown in Figure 1-3.

### **1.1.2.1. Transport of Concentrate to Port Qasim**

The Concentrate will be transported from the RDMS processing plant to Port Qasim via an existing railway line, passing through the Balochistan and Sindh provinces. The existing rail route is approximately 1,350 km in length as outlined in Figure 1-3.

The Project will make use of the existing PIBT Terminal where all facilities are owned and operated by PIBT. An area will be leased to RDMC for the construction of a Concentrate storage shed.

An extract of the onshore and offshore layout is shown in Figure 1-5.

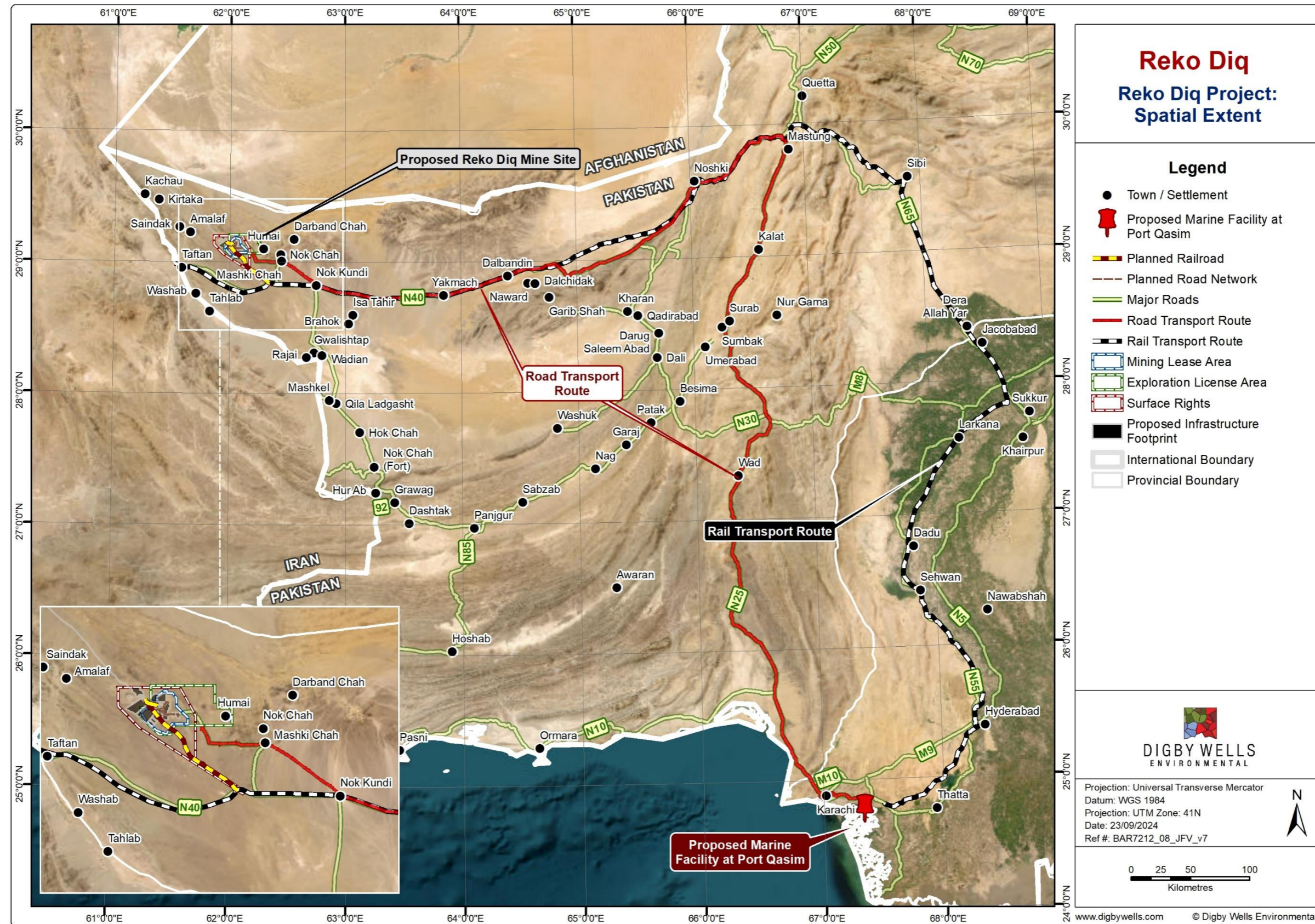


Figure 1-3: Reko Diq Spatial Extent and Transport Routes (Rail Transport Route and Road Transport Route)

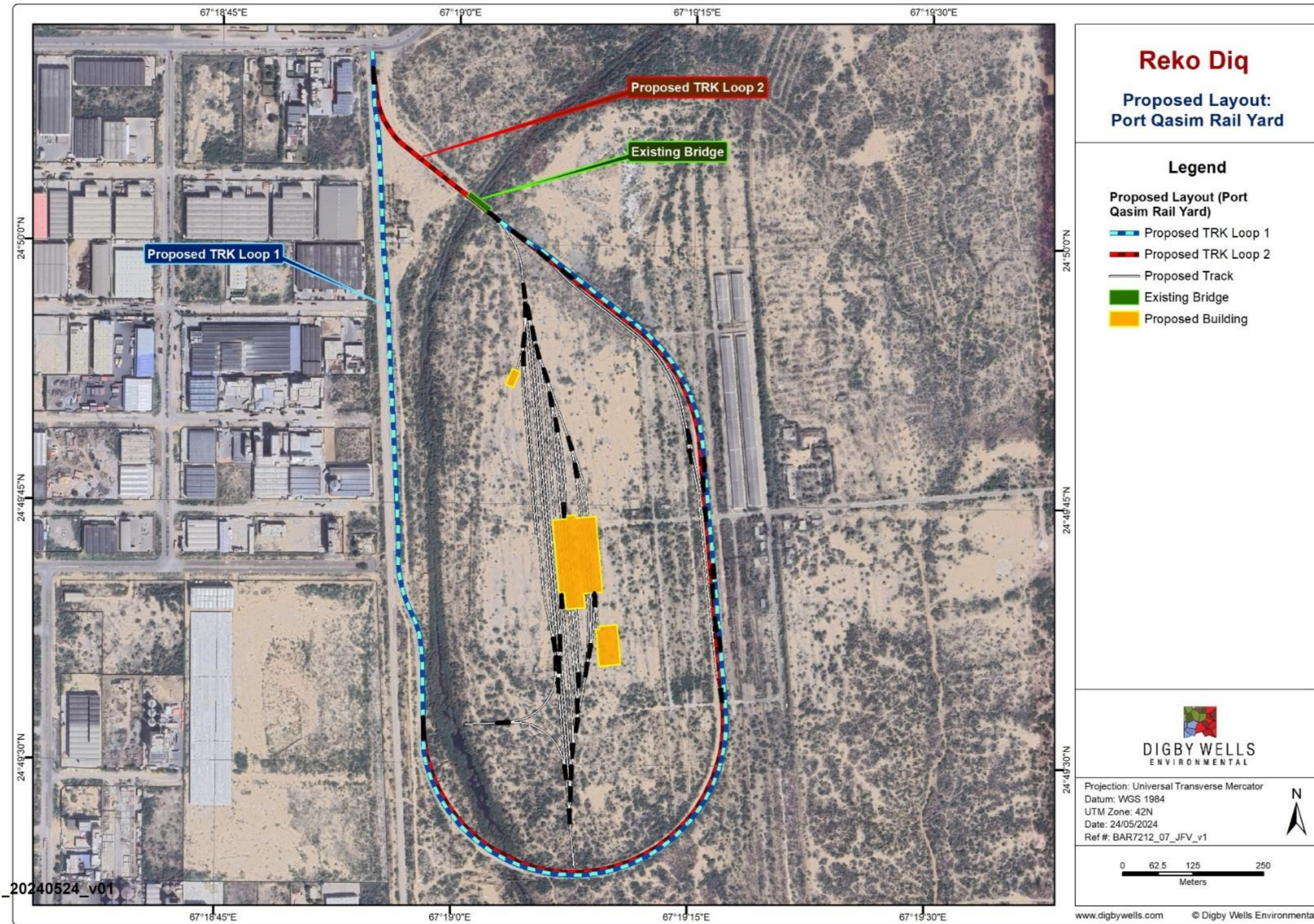


Figure 1-4: Proposed Rail Yard Layout at Port Qasim

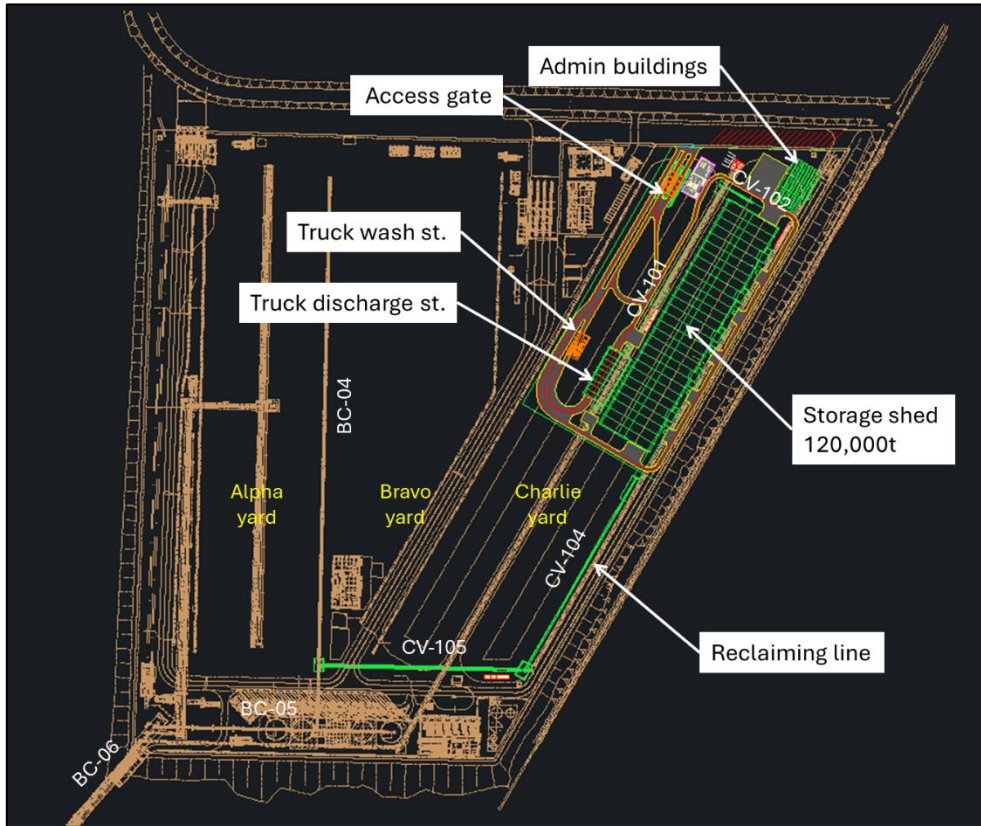


Figure 1-5: Layout of Concentrate Facilities at PIBT at Port Qasim



## 1.2. Study Objectives

Digby Wells is undertaking an Environmental and Social Impact Assessment (ESIA) for the project, in line with Pakistan and international standards and guidelines.

This report provides the specialist groundwater impact assessment as supporting input for the ESIA and ESMP. The scope of this report is focused on the potential hydrogeological impact of the mine site only as no groundwater risks or impacts are expected along the transport corridor and at the port. The impacts associated with the development and operation of the Borefield which will be used as a water source is addressed in a separate report.

## 2. Assumptions, Limitations and Exclusions

Numerical models are commonly used to simulate and develop hydrogeological management solutions, i.e. the prediction of contaminant plume migration; groundwater inflow rate and groundwater level changes over time. However, groundwater systems are often complex and the data input requirements are challenging. A model, no matter how sophisticated, will never describe the investigated groundwater system without deviation of model simulations from the actual physical process (Spitz, 1996). Therefore, it is necessary to make some assumptions to simplify the complex, real world hydrogeological conditions into a manageable model.

During the development of the site specific hydrogeological conceptual model, the following data gaps and/or uncertainties were identified:

- Limited aquifer tests were conducted previously at the mine site (by Coffey (2005) and SMEC (2010)). Between both of these studies, only three boreholes were pump tested for aquifer characterisation in the pits areas.
  - In addition, WW30 was drilled in 2004, and its construction details as well as aquifer test data could not be found, hence it cannot be used for transient state model calibration. It is only the interpreted data that is available which cannot be verified. This borehole was drilled near the Western Porphyry Pit.
  - The other two boreholes that were pump tested are WW11 and WW14, both at the Tanjeel orebody. Although they provide valuable aquifer permeability and storage values, they may not be representative of the entire pit properties considering that the aquifer system is fractured and heterogeneous.
- Due to the limited rock permeability and storativity data available nearby the orebodies, the groundwater ingress estimated during this study should be seen with some uncertainty which will be refined as more hydrogeological information is obtained through monitoring and model updating.
- TSF seepage model was conducted by Knight Piesold (2024). However, the model predicts the seepage rates during operation only. No post-closure seepage volumes are available.



During the development of the pit lake water balance, the following data gaps and/or uncertainties were identified:

- The pre-mining water level at the Western Porphyry Pit is determined from only one borehole (WW13) as well as the interpolation from nearby boreholes that are outside of the pit area. Considering the hydrogeological heterogeneity as well as topographic variation within the pit outline, water levels could vary.
- No aquifer test was conducted within the Western Porphyry Pit area for site-specific aquifer characterisation. The closest borehole that was pump tested by Coffey (2004) is WW30 which is 1100 m west of the pit.
- Boreholes WW11 and WW14 which are located within the Tanjeel orebody were aquifer tested by SMEC (2008). Although they provide valuable information, they may not be sufficiently represent the entire pit area considering the heterogeneity of the aquifer system.
- Due to the above-stated gaps, the groundwater ingress estimated during this study should be seen with some uncertainty which will be refined as more hydrogeological information is obtained through monitoring and model updating.

The pit water balance is conducted by just taking the pit perimeter into account for area calculation. The area immediately around the pits is assumed to be enclosed with berms to cut off surface water inflow.

### **3. Methodology**

#### **3.1. Desktop Review**

A desktop review was undertaken to review and collate existing information on the hydrogeological environment of the Project Area. An in-depth analysis of all relevant and available data such as reports, data sheets and maps were utilised to compile a baseline data that feeds into the groundwater impact assessment report. A WISH database was developed for the Project, to capture all hydrogeological data.

#### **3.2. Hydrocensus**

Digby Wells appointed Hagler Bailly Pakistan (hereinafter HBP) to undertake a hydrocensus within and around the groundwater supply NOC areas as well as the mine lease area. The HBP field report is included as an appendix to the Reko Diq ESIA report (2024). The laboratory certificates are provided in Appendix B.

#### **3.3. Drilling and Packer Testing**

A total of 22 exploration holes were drilled in the proposed TSF footprint area by Knight Piesold for geotechnical assessment. All the holes were 25 m deep except for two that were drilled to 150 m for deeper aquifer characterisation.



All of the holes were packer tested for rock permeability profiling. Water samples were also collected from 5 representative holes for baseline quality assessment. The geological and hydrogeological information from selected locations is provided in Appendix C.

### 3.4. Numerical Modelling

A numerical groundwater model was developed by Digby Wells as part of the impact assessment. The internationally recognised simulation package Modflow 6 (USGS, 2023) was used to simulate groundwater flow. MODFLOW is a modular three-dimensional finite-difference groundwater model published by the U.S. Geological Survey. ModelMuse was used as graphical user interface for pre and post processing. ModelMuse is also developed by USGS. Since both Modflow and ModelMuse are competent open-source software and do not require licenses, the project model can easily be upgraded and shared with the project team.

The contaminant plume that will potentially originate from the TSF and waste rock dumps are simulated using the transport module GWT. GWT is a modular three-dimensional transport model for the simulation of advection, dispersion, and chemical reactions of dissolved constituents (such as sulphate) in groundwater systems. GWT was used in conjunction with MODFLOW 6 in a phased flow and transport simulation approach.

### 3.5. Impact Assessment

The impact assessment methodology involves two phases, namely impact identification and impact rating. Impact identification was performed through the use of an input-output model, whereby Project activities are superimposed onto the environmental and social baseline characteristics of the Project Area to generate assessment outputs in the form of instances of potential positive or negative biophysical and socio-economic changes in the environment.

A numerical rating of the impact significance was then calculated as follows:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Whereby

$$\text{Consequence} = \text{Type of Impact} \times (\text{Intensity} + \text{Spatial Scale} + \text{Duration})$$

And

$$\text{Probability} = \text{Likelihood of an Impact Occurring}$$

In addition, the formula for calculating consequence:

$$\text{Type of Impact (Nature)} = +1 \text{ (Positive Impact) or } -1 \text{ (Negative Impact)}$$

Reko Diq Mining Company

Environmental Impact Assessment for the Reko Diq Mining Project, Pakistan

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**Table 3-1: Impact Assessment Parameter Ratings**

Rating	Intensity		Spatial scale	Duration (duration of an impact without mitigation)	Probability (over the life of the project)
	Negative Impacts (Type of Impact = -1)	Positive Impacts (Type of Impact = +1)			
5	Significant impact on the environment. Irreparable and irreplaceable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable and irreplaceable damage to highly valued items of great cultural significance or complete breakdown of social order.	Significant improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of the receiving environment.	<u>Global</u> Contribute to global impact	<u>Inter -Generational</u> >20 years	<u>Certain / Definite</u> There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)
4	Serious long term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of significance.	On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment. Average to intense social benefits to some people. Average to intense environmental enhancements.	<u>Regional</u> Will affect the entire province or region. A broad geographical area distinguished by similar features.	<u>Long term</u> 5-20 years	<u>Likely</u> The impact may occur (50-90%)
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. On-going social issues. Damage to items of significance.	Average, on-going positive benefits, not widespread but felt by some.	<u>Sub-regional</u> Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	<u>Medium term</u> 2 to 5 years	<u>Probable</u> Has occurred here or elsewhere and could therefore occur (20-50%)
2	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. On-going social issues. Damage to items of significance.	Average, on-going positive benefits, not widespread but felt by some.	<u>Local</u> Extending across the site and to nearby settlements. Sub-division of a district.	<u>Short term</u> Up to 2 years	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)
1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Functions and processes not affected	Low positive impacts experience by very few of population.	<u>Site Specific</u> Limited to the site and its immediate surroundings.	<u>Immediate</u> Hours to weeks but less than 1 month	<u>Rare / improbable</u> Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures (1-5%).



**Table 3-2: Probability Consequence Matrix**

		Significance																												
		5	4	3	2	1	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13
Probability	5	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75			
	4	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60			
	3	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45			
	2	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30			
	1	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15			
		Consequence																												


**Table 3: Significance Threshold Limits**

Score	Description	Rating
57 to 75	A very beneficial impact which may be sufficient by itself to justify implementation of the Project. The impact may result in permanent positive change.	Major (positive)
39 to 56	A beneficial impact which may help to justify the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Moderate (positive)
20 to 38	An important positive impact. The impact is insufficient by itself to justify the implementation of the Project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	Minor (positive)
3 to 19	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	Negligible (positive)
-3 to -19	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment. The impacts are reversible and will not result in the loss of irreplaceable aspects.	Negligible (negative)
-20 to -38	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	Minor (negative)
-39 to -56	A serious negative impact which may prevent the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects. The impacts may result in the irreversible damage to irreplaceable environmental or social aspects should mitigation measures not be implemented.	Moderate (negative)
-57 to -75	A very serious negative impact which may be sufficient by itself to prevent implementation of the Project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts will be irreplaceable and irreversible should adequate mitigation and management measures not be successfully implemented.	Major (negative)

## 4. Baseline Hydrogeological Conditions

### 4.1. Climate

The Project Area is characterised as having a hot desert climate (BWh) Köppen climate classification. The BWh is characterised as having year-round warm temperatures and low rainfall. The classification defines arid areas where rainfall is less than 50% of the evapotranspiration potential for the area. The mean annual rainfall is 32.7 mm, occurring between November and April (Figure 4-1) (Knight Piesold, 2024). Extreme rainfall events could result in flooding at the Project Area.

The mean annual evaporation (MAE) is calculated to be 5 026 mm (pan evaporation) and 2 505 mm (lake evaporation), which is significantly higher than the MAP (Knight Piesold, 2024). The potential evaporation is highest between April and October (Figure 4-1).

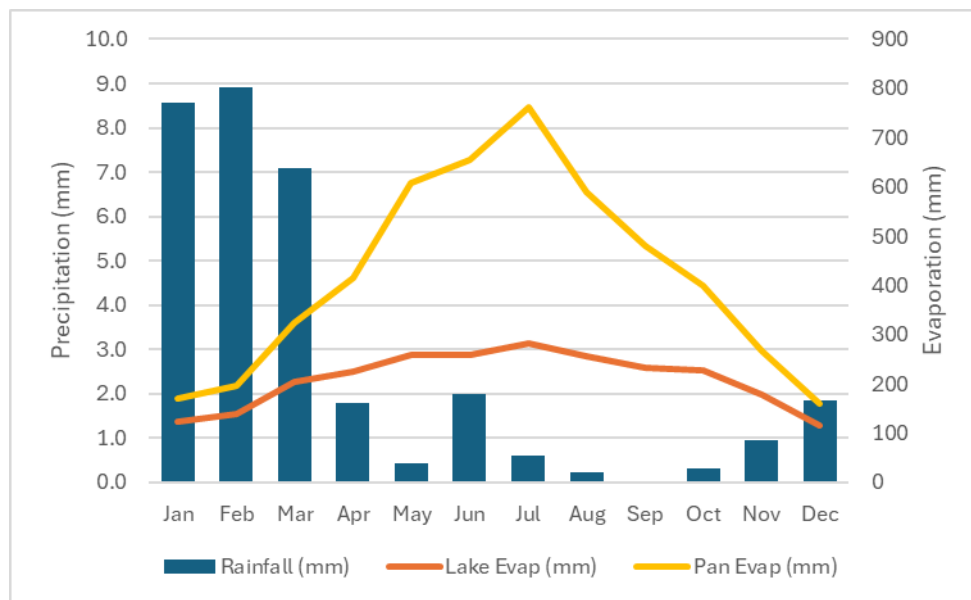


Figure 4-1: Average Monthly Precipitation and Evaporation

### 4.2. Topography and Drainage

The project is located on the Balochistan Plateau, consisting of an arid landscape of mountains, gravel and sandy plains. Streams are ephemeral, flowing temporarily during high rainfall events.

The topography at the mine site ranges between 697 m and 1 194 m above mean sea level (mamsl). The project is located at a regional watershed, separating the Sistan and Mashkel Basins (Figure 4-2). The Sistan Basin drains to Gaud-i-Zirreh playa in Afghanistan, while the Mashkel Basin drains to the Hamun-i-Mashkel playa in Pakistan. The mine infrastructure is predominantly within the Mashkel Basin, except for the northern WRD and portion of the TSF.

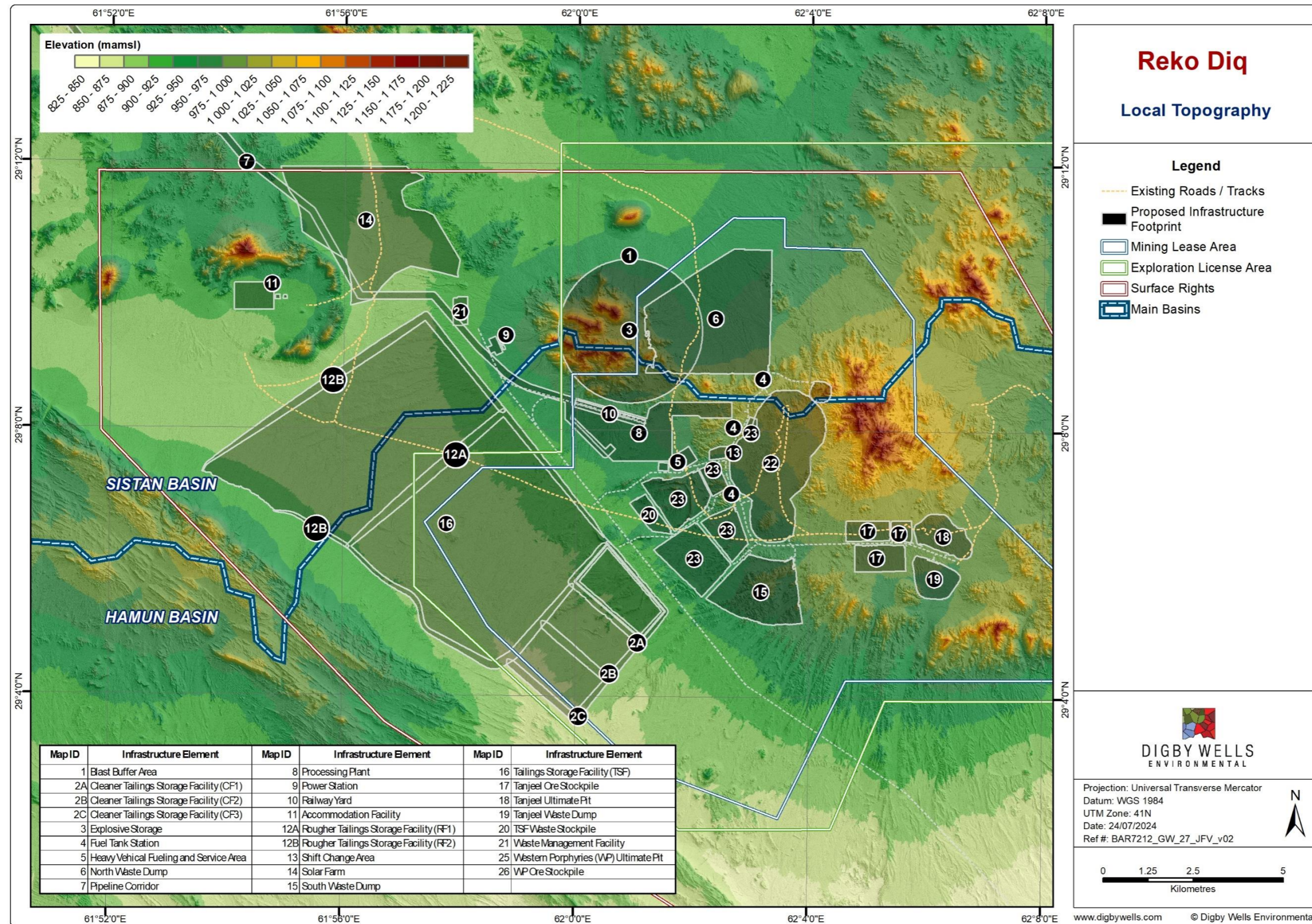


Figure 4-2: Regional Topography and Drainage Lines



## 4.3. Geology

### 4.3.1. Regional Geology

The Reko Diq Porphyry complex comprises of diorite, quartz diorite and granodiorite porphyry intrusions, emplaced into volcanic and sedimentary rocks of the Humai, Juzzak and Reko Diq formations (Figure 4-3) (Razique & Tosdal, 2009).

The Humai formation comprises of calcareous and clastic sedimentary rocks, which includes a massive ~300 m thick biohermal limestone unit, within the ~2 km thick sequence. The Juzzak, Saindak and Amalaf formations overly the Humai formation, and together comprise a sequence, greater than 4 km, of shallow marine to fluvial shale, sandstone, conglomerate and shaly limestone. Lava flows of massive amygdaloidal, porphyritic andesite and basalt are present in the Juzzak and Saindak formations, whilst the Amalaf formation includes volcanic breccia and tuff, with locally imbedded massive, porphyritic and predominantly andesitic lava flows (PorterGeo, 2024).

The Reko Diq Formation comprises of ~400 m thick sequences of fine to medium grained and porphyritic andesitic lava flows which are interbedded with autoclastic volcanic breccia and pyroclastic debris. The younger poorly consolidated clastic sediments within the region comprise of buff silt, sand and fan gravel locally interbedded with ashfall tuff (PorterGeo, 2024).

Significant structural deformation has occurred in the region. Fault systems orientation vary from ESE through to ENE for lengths greater than 100 km. The fault systems are predominantly characterised with reverse motion with enough displacement to juxtapose Cretaceous and Paleogene strata over the Neogene stratigraphy. The geometry of the primary sedimentary basins are potentially controlled by these structures. Large antiformal structure folding has also been mapped in the Chagai Hills (PorterGeo, 2024).

The Reko Diq deposits are highly fractured, with structures predominantly orientated in the NW and NE directions (Figure 4-4). Assessments of the piezometric surface between the porphyry and surrounding country rock indicates a lack of hydraulic connection (SMEC International (Pty) Ltd, 2010).

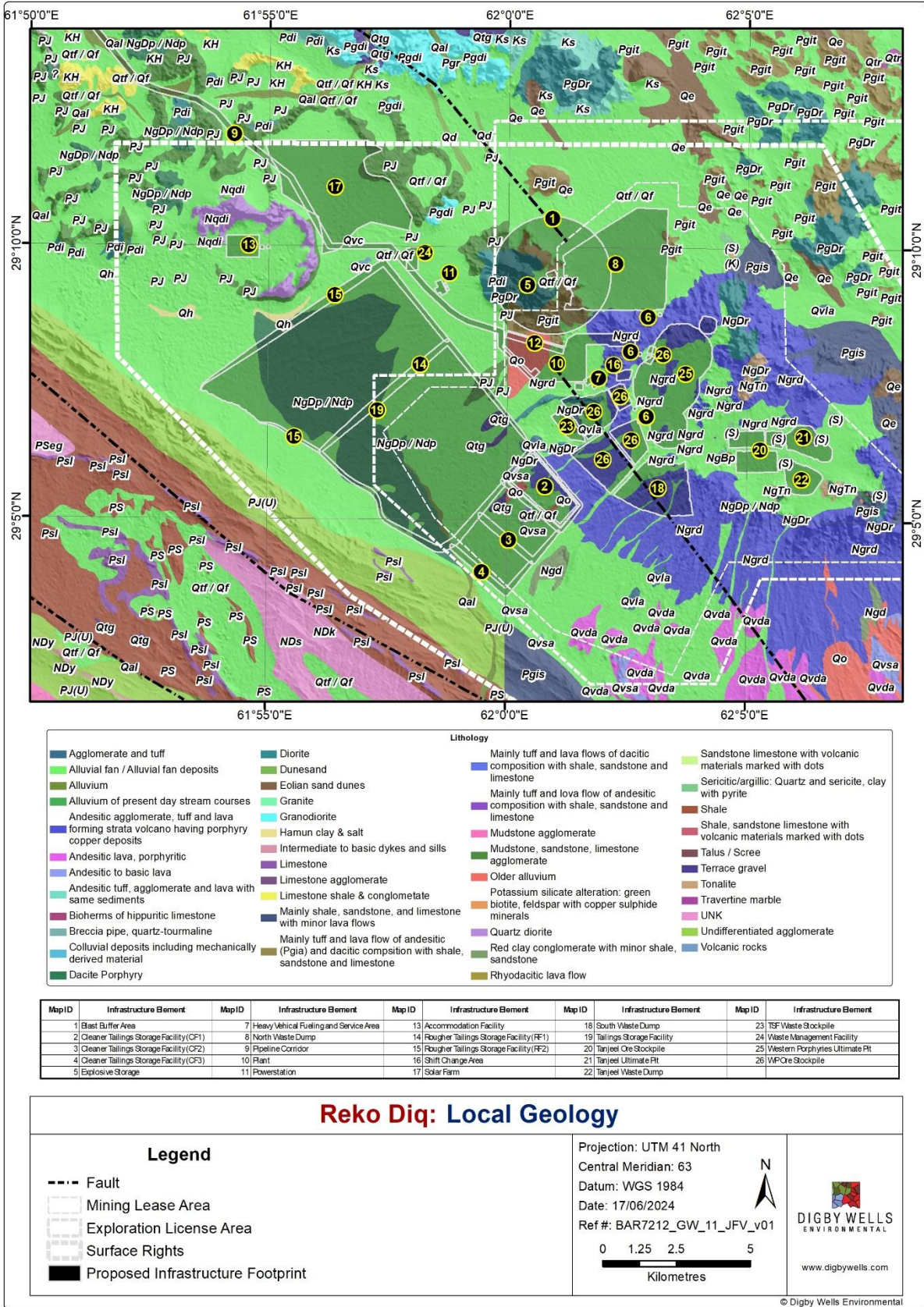


Figure 4-3: Geological Map of the Mine Site Area

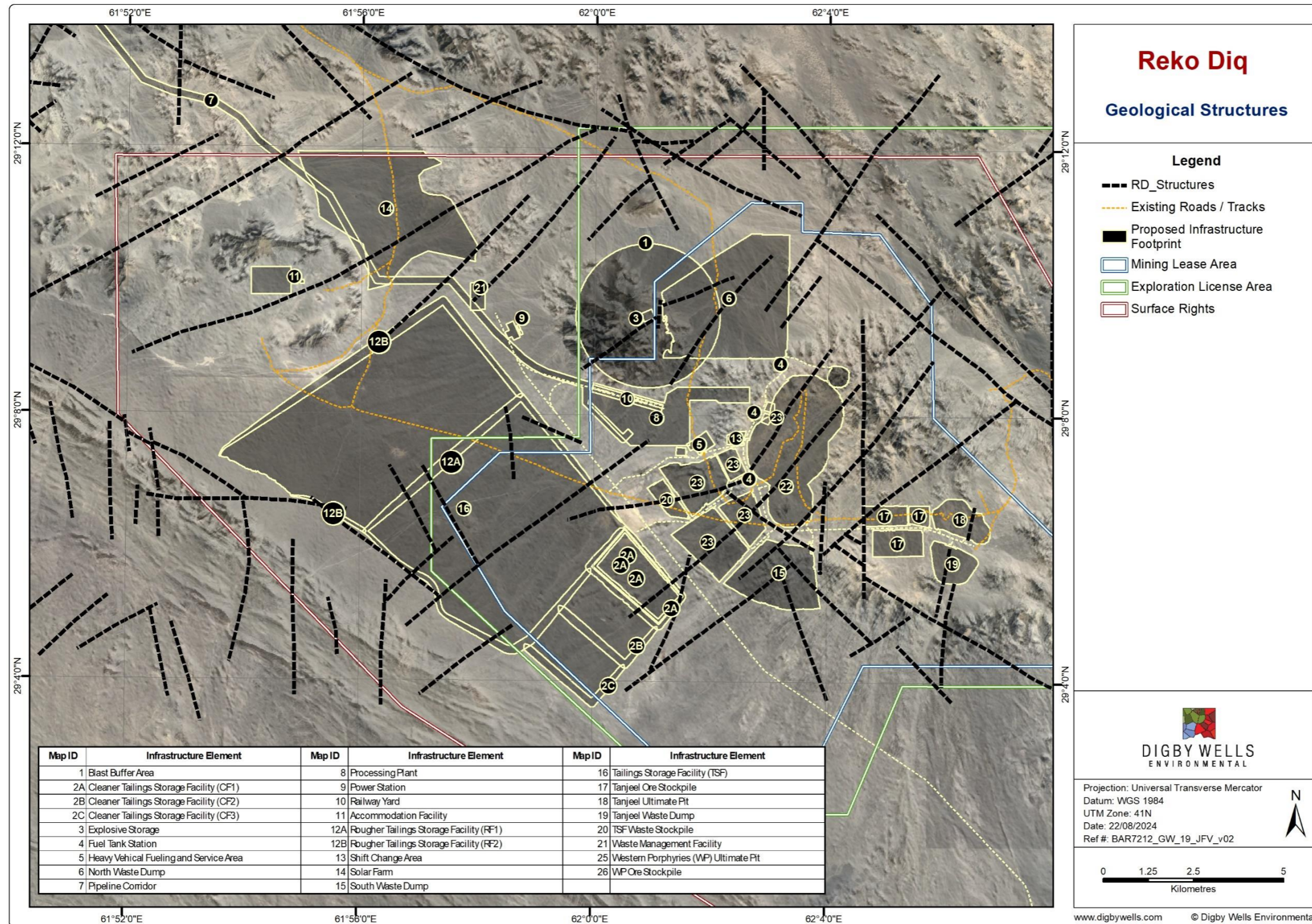


Figure 4-4: Geological Structures

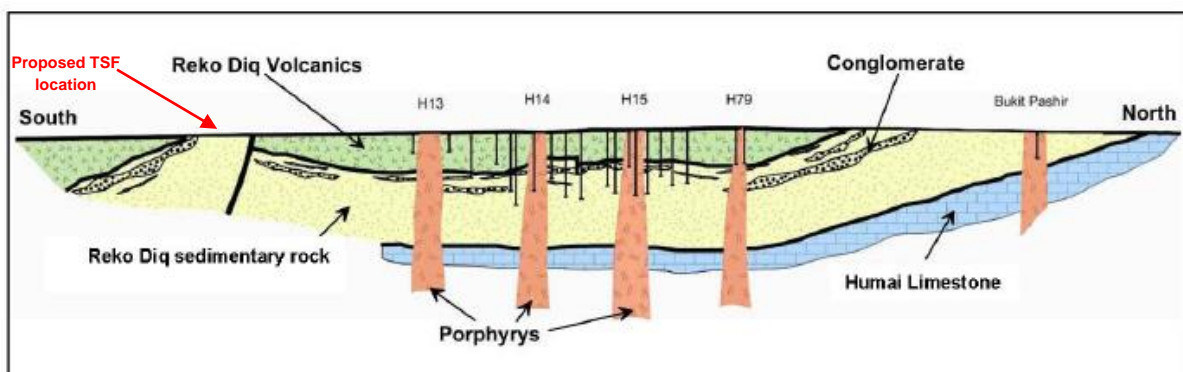
### 4.3.2. Local Geology

The project will involve the mining of porphyry copper-gold deposits located at various mineralisation areas. The proposed mine site will consist of two main pits: Western Porphyry and Tanjeel (Figure 1-2). The Western Porphyry deposit is a complex of four adjacent porphyry centres (H13, H14, H15 and H79) with the highest grades in the H14 and H15 complexes. The Tanjeel deposit represents a minor component of the ore body and will be brought into production after the first 10 years of mining.

The mineral deposits were formed under different geological processes (SMEC, 2010). Tanjeel is a supergene enriched deposit formed over a much older porphyry system while the Western Porphyry is a multiple intrusive classic porphyry system. Although close in proximity, the geology, mineralogy and age of both systems are different.

Tanjeel is a supergene enrichment deposit and is older than the Western Porphyry deposit. The rock is composed of quartz feldspar porphyry, felsic volcanics and intermediate volcanics. Some dykes and breccias are present. NW-SE and NE-SW orientated structural lineations cross this supergene deposit (Figure 4-4). The fractures are infilled with pyrite, which in the oxidised zone leaches to produce low pH groundwater. The groundwater is currently around pH 3.5 and the deposit is still considered to be actively forming. The Tanjeel pit will be mined to a depth of 165 m and has a water level of 60 mbgl.

At the Western Porphyry, the intrusive rock complex consists of several multiphase porphyritic diorite and tonalite intrusions emplaced with extensive hydrothermal alteration, veining and copper sulphide mineralisation. A number of multiple generation andesitic dykes and late-stage quartz veins also occur in this area. Drilling away from the intrusive cores intersect thick (250 to 280 meters) volcanics (oxidised and fresh andesite, trachyte and pyroclastics) overlying a sequence of sandstone, conglomerate, siltstone and limestone. Both volcanic and sedimentary rocks comprise the Reko Diq Formation (Figure 4-5). The Western Porphyry Pit will be mined to a depth of 839 m and has a water level of 55 mbgl.



**Figure 4-5: A Simplified Cross Section of the Western Porphyry (source: TCC)**

The mining sequence at the Western Porphyry and Tanjeel Pits is summarised in Table 4-1. The final shape and depth of the pits is displayed in Figure 4-7.



**Table 4-1: A Summary of the Pit Floor Depth and Elevation**

Year	Period	Pit floor depth (m bgl)		Pit floor elevation (m amsl)	
		Western Porphyry	Tanjeel	Western Porphyry	Tanjeel
1	2027	60		960	
2	2028	60		960	
3	2029	105		915	
4	2030	180		840	
5	2031	285		735	
6	2032	285		735	
7	2033	285		735	
8	2034	345		675	
9	2035	360		660	
10	2036	360		660	
11	2037	390	105	630	915
16	2042	495	165	525	855
21	2047	570	195	450	825
26	2052	660	195	360	825
31	2057	690	195	330	825
36	2062	840	195	180	825

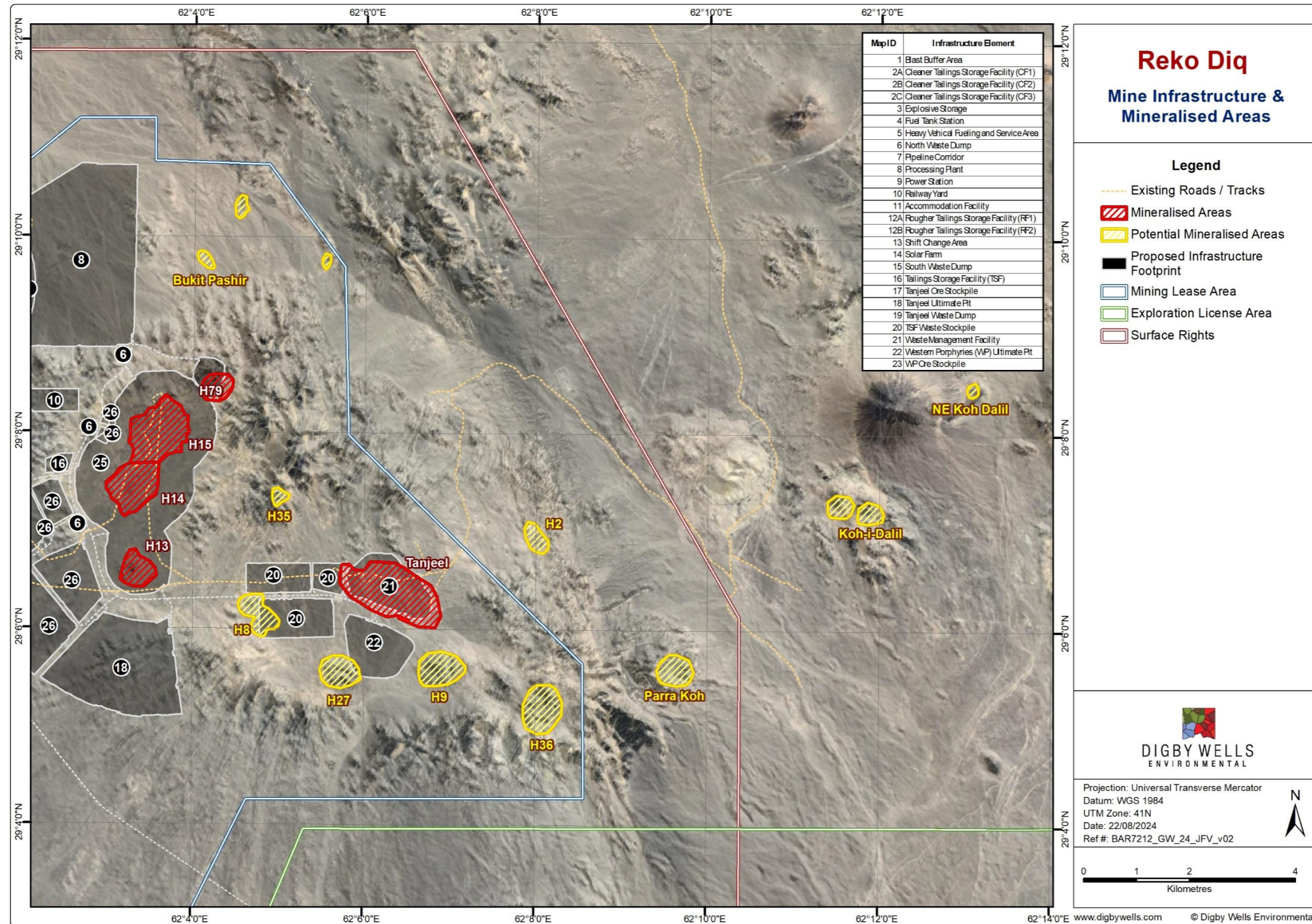


Figure 4-6: Project Infrastructure Including Mineralisation Areas

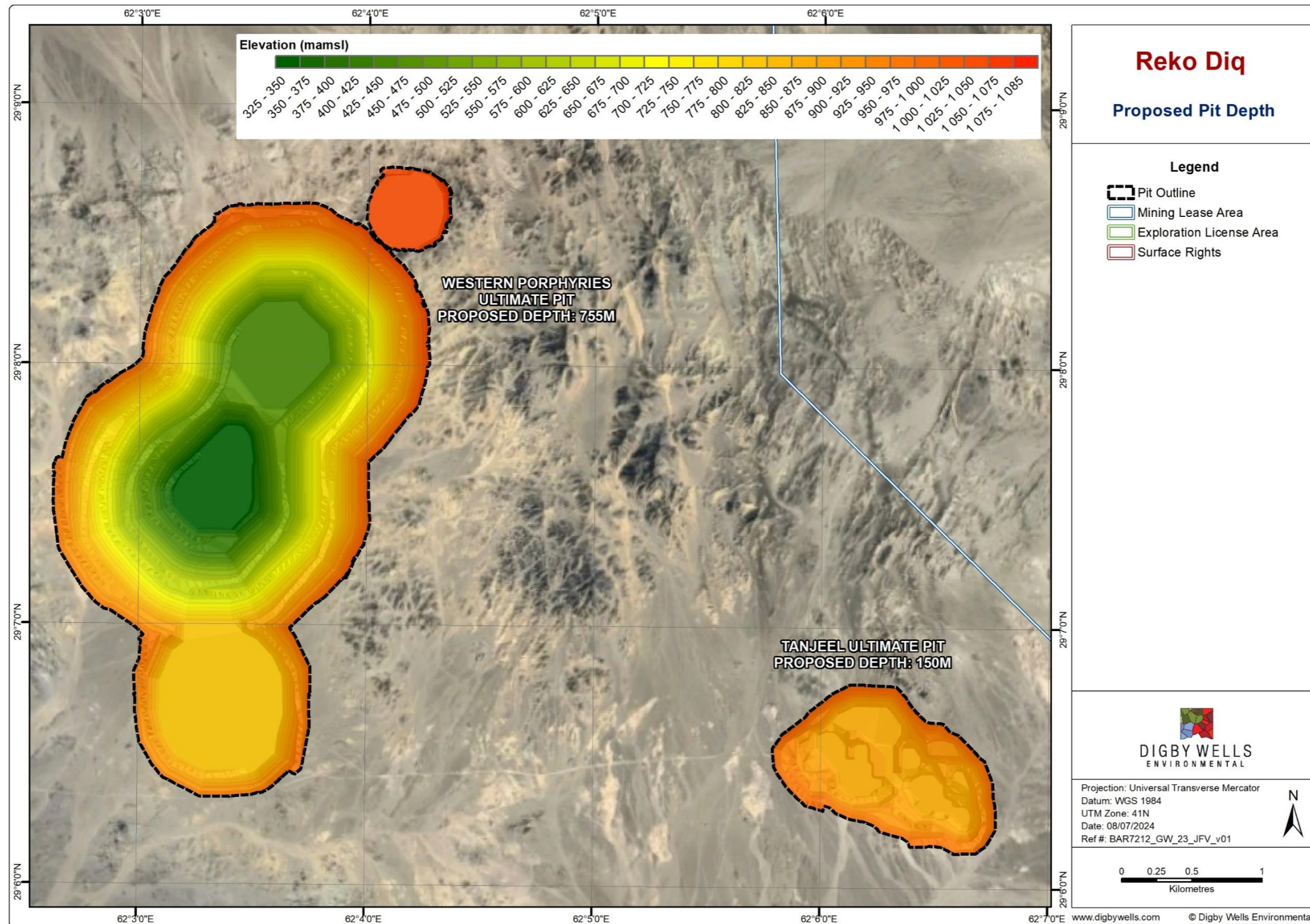


Figure 4-7: Proposed Final Shape and Depth of the Two Pits



#### 4.4. Aquifer Characterisation

SMEC (2010) indicated that where fractures are intersected, they are of limited extent with low permeabilities and poor interconnectedness. Several boreholes were drilled but most were found to be dry. From the few boreholes that contained water and that were pump tested, a summary of the hydrostratigraphic properties are provided in Table 4-2, which indicates a range in hydraulic conductivity between 0.04 – 1.8 m/d, with a geometric mean of 0.26 m/d. Calculated storativity values range between  $2.00 \times 10^{-4}$  –  $6.00 \times 10^{-3}$ , with an average of  $2.18 \times 10^{-3}$ , for the aquifer tests with observation boreholes.

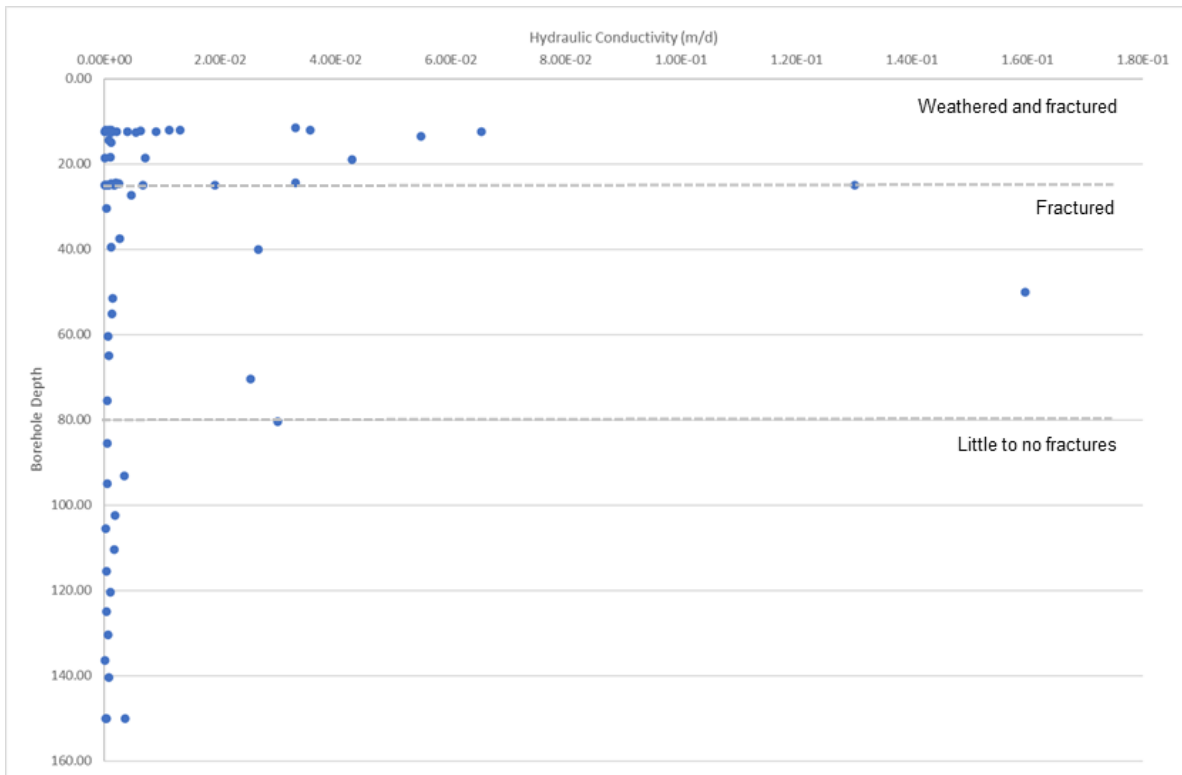
**Table 4-2: Pump Test Results (SMEC, 2010)**

Location	Transmissivity m <sup>2</sup> /d	Hydraulic Conductivity m/d	Storativity	Lithology
WW11-MB	18 - 35	0.20 – 0.31	$2.00 \times 10^{-4}$	
WW14-MB	20 - 74	0.31 – 1.16	$9.00 \times 10^{-4}$ - $6.00 \times 10^{-3}$	Andesite
WW30-MB	38.1	0.38	5.3	Tuff, Sandstone, Shale

Knight Piesold undertook packer tests as part of the TSF geotechnical investigations. The calculated hydraulic conductivities ranged between  $6.9 \times 10^{-5}$  and  $1.6 \times 10^{-1}$  m/d. The top transported deposits (usually less than 4 m deep) were not packer tested as they are unconsolidated sediments, making them unsuitable for packer testing.

Higher hydraulic conductivities are predominantly found in the first 25 m, likely associated with higher weathering and fractures. The geometric mean hydraulic conductivity within the first 25 m is  $1.5 \times 10^{-3}$  m/d. There are elevated conductivities measured at depths of up to 80 m. These conductivities are associated with breccia, siltstone and sandstones indicating the presence of fractures at depth, however, this does not necessarily mean that the fractures contain or transmit water. The average hydraulic conductivity for the interval between 25 – 80 m is  $4.1 \times 10^{-3}$  m/d. Below 80 m the geometric mean hydraulic conductivity decreases to  $6.5 \times 10^{-4}$  m/d.

It should be noted that packer tests are used only for permeability calculations and does not inform how much the stored water is in the aquifer or permeable zone.



**Figure 4-8: Knight Piesold Packer Test Hydraulic Conductivity Distribution<sup>1</sup>**

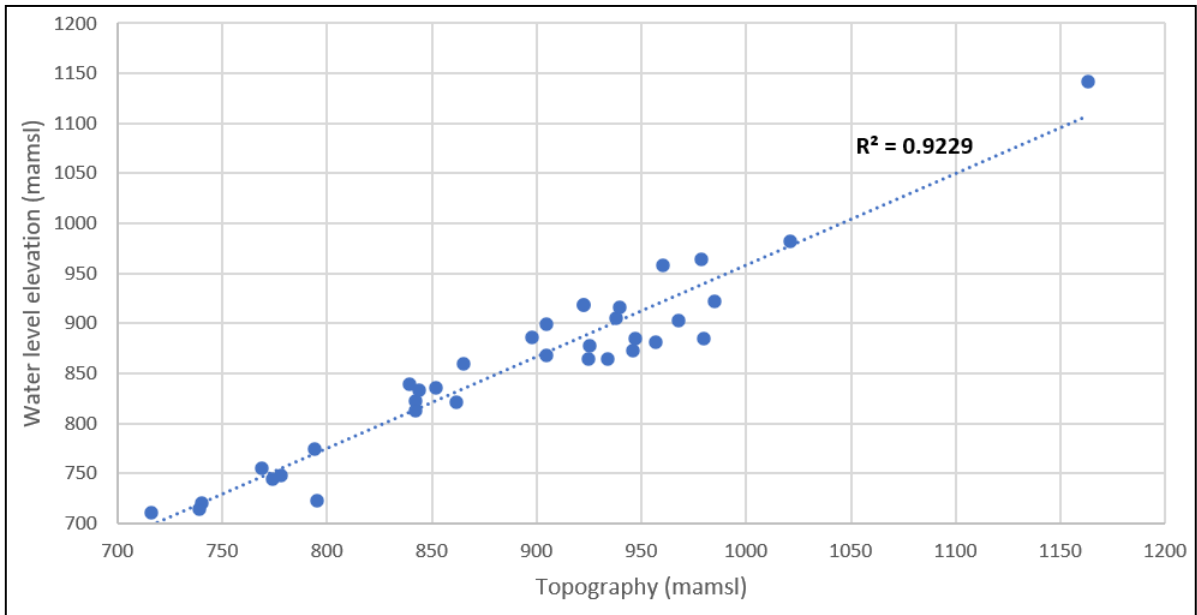
#### 4.5. Groundwater Levels and Flow Direction

There is a good correlation of 92% between topography and hydraulic head elevation (Figure 4-9) whereby the groundwater elevation mimics topography. The watershed divide between the Sistan and Mashkhel Basins is also an approximate location of a groundwater divide, and therefore the overall groundwater flow direction is to the northwest towards Gaud-i-Zirreh and to the southeast towards Hamun-i-Mashkhel. The interpolated hydraulic head and flow direction is displayed in Figure 4-11.

Although the overall flow direction is towards the northwest and southeast, it could be different on a local scale, depending on the orientation and permeability of local structures.

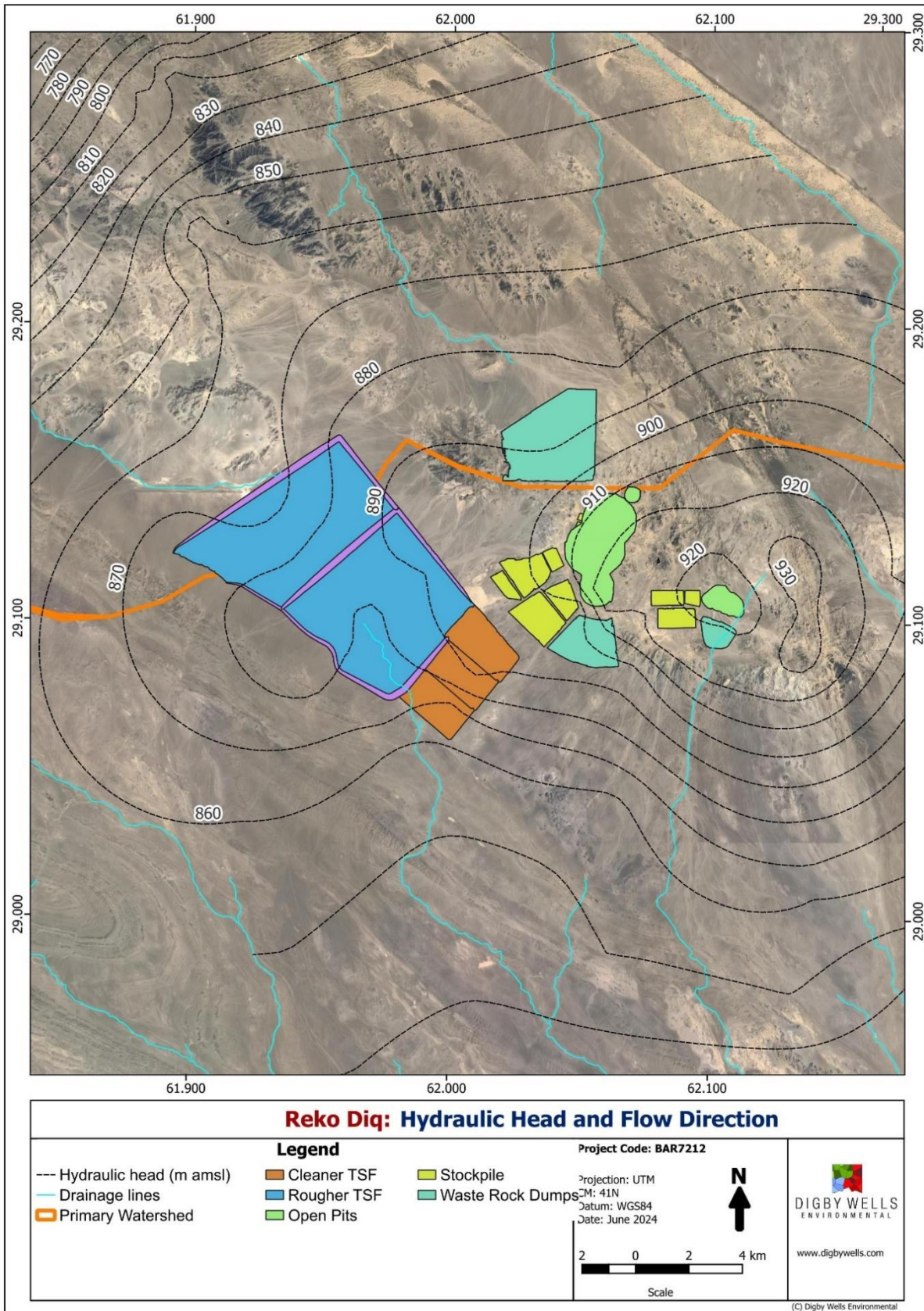
The groundwater levels measured within the mine lease range between 0.3 and 64.3 mbgl (839 – 949 mamsl), with an average of 22.5 mbgl (Figure 4-12). Comparison of the 2023-2024 groundwater levels with those taken during previous assessments (2004-2011) indicates little to no change in groundwater levels (Figure 4-10).

<sup>1</sup> Adapted from Knight Piesold provided data.



**Figure 4-9: Correlation between Topography and Hydraulic Head**





**Figure 4-11: Hydraulic Head and Groundwater Flow Direction**

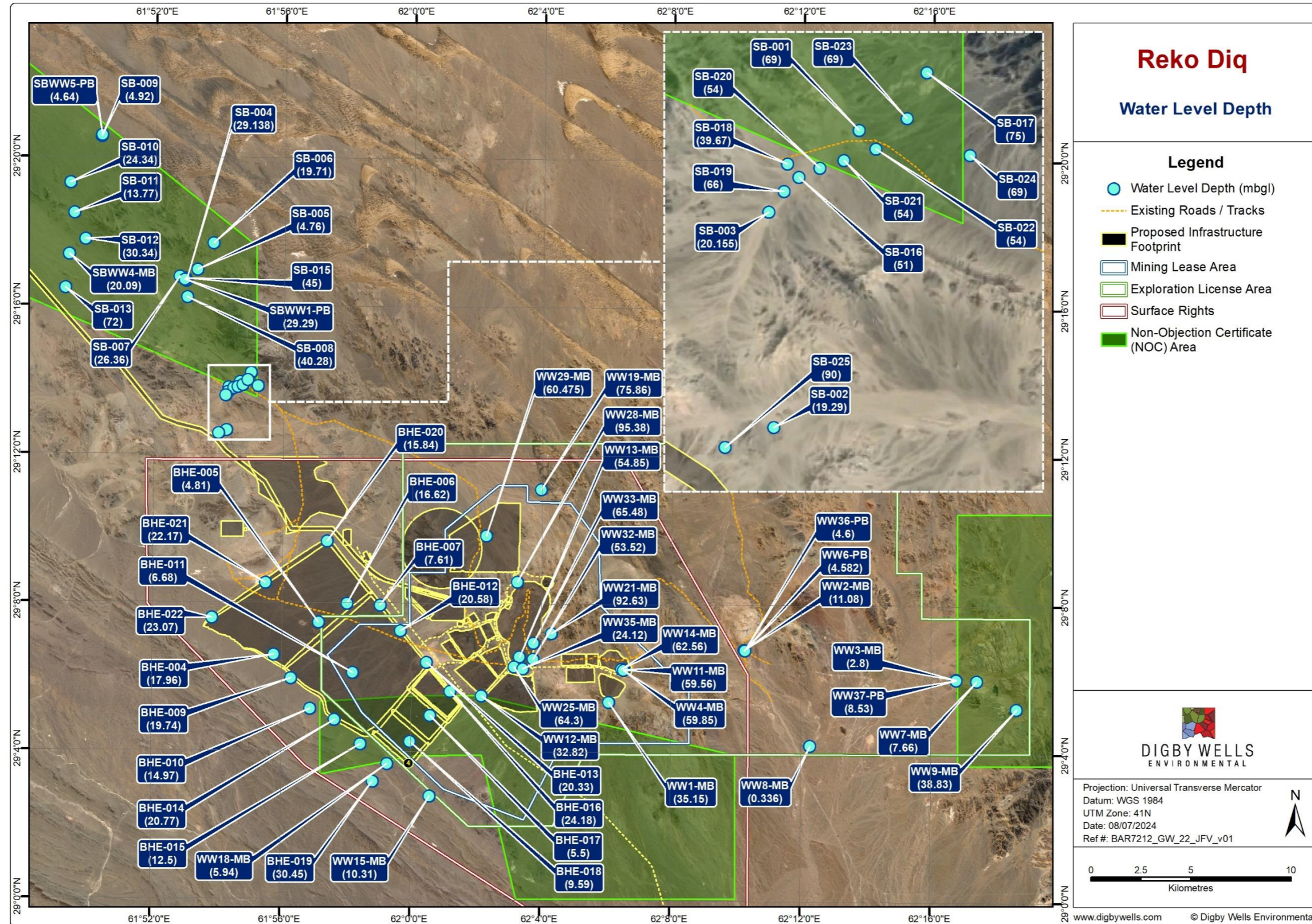


Figure 4-12: Water Level Depth



## 4.6. Groundwater Sources

At the mine site, groundwater will likely be recharged naturally from rainfall as well as artificially via seepage from the TSF (once in operation).

### 4.6.1. Rainfall Recharge

The only source of natural groundwater at the project site is recharged from the rainfall. The mean annual precipitation at the mine site is only 32 mm, while the potential annual evaporation is more than 2800 mm. Considering the limited rainfall together with high evaporation, recharge from rainfall is expected to be insignificant. Radiocarbon dating of groundwater confirms the low recharge to the hydrostratigraphy. The isotope study showed that groundwater in the Tanjeel area is estimated at ~13 000 years old, while at the Western Porphyry it is estimated at ~15 000 years old (SMEC, 2010).

Based on groundwater model calibration, the recharge at the project site is estimated to be 1.8% of MAP or 0.42 mm per year.

### 4.6.2. Natural Groundwater Quality

The natural groundwater is saline. TDS in the Project Area is typically more than 10 000 mg/L (Figure 4-13), which is significantly more than the drinking water quality limits established by Balochistan (of 1 000 mg/L) and the guideline value established by the WHO.

- In the TSF area, the TDS ranges between 15 600 mg/L and 180 000 mg/L with an average of 43 400 mg/L.
- At the Western Porphyry and Tanjeel deposits, the concentration is slightly better at 11 500 mg/L and 16 600 mg/L.
- In the vicinity of the northern WRD, it is 16 000 mg/L.

The main constituents of the TDS are sodium and chloride, which is a typical signature of groundwater that has had a long residence time within an aquifer and receives little to no recharge. This Na+Cl signature is displayed in the form of Stiff Diagrams in Figure 4-15.

The pH of the groundwater is neutral except at Tanjeel where it ranges between 3.2 and 3.7 (Figure 4-16). This is due to the supergene depositional environment of the Tanjeel ore, where sulfide minerals are oxidised in the deposition process.

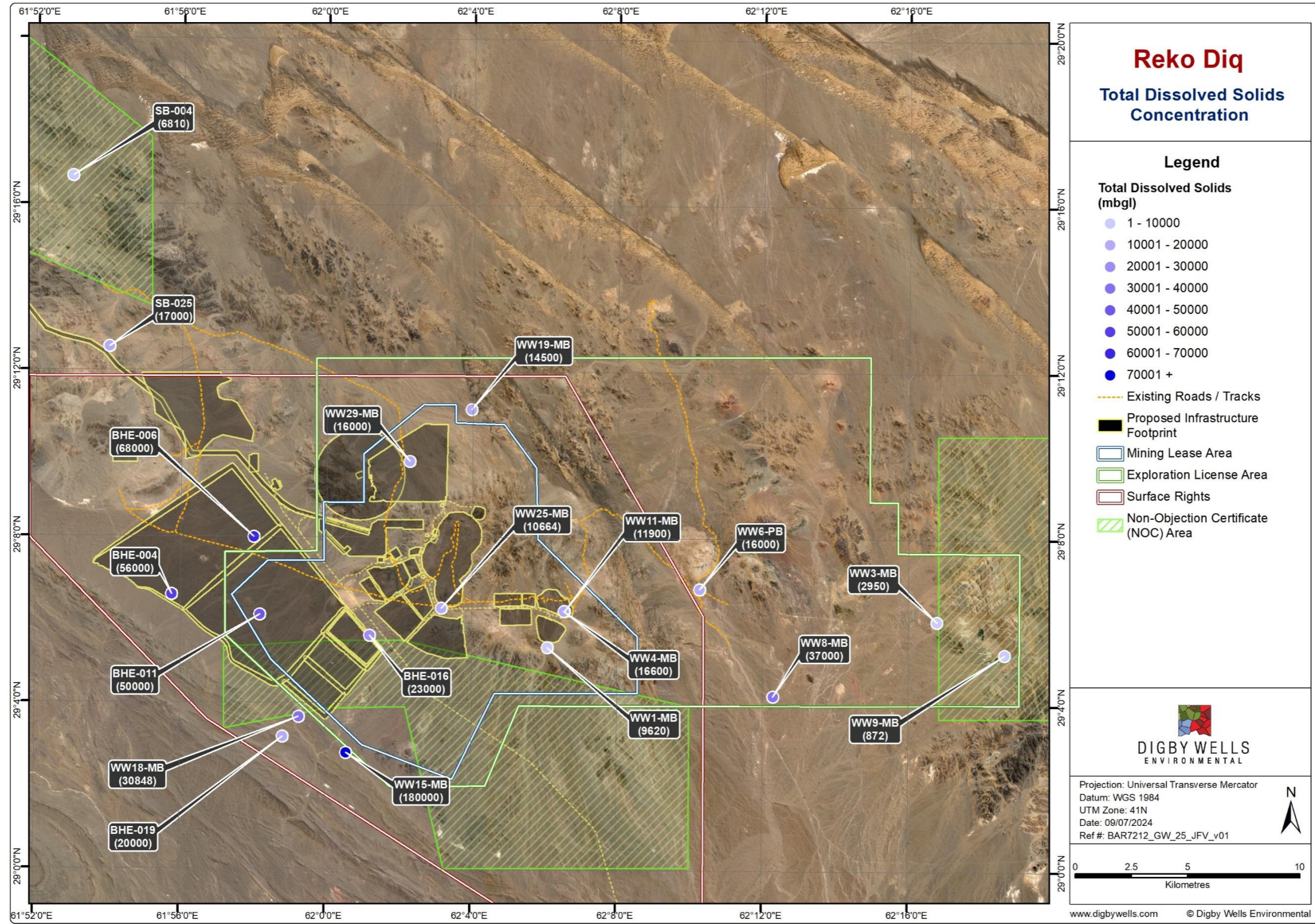


Figure 4-13: TDS Concentration (mg/L)

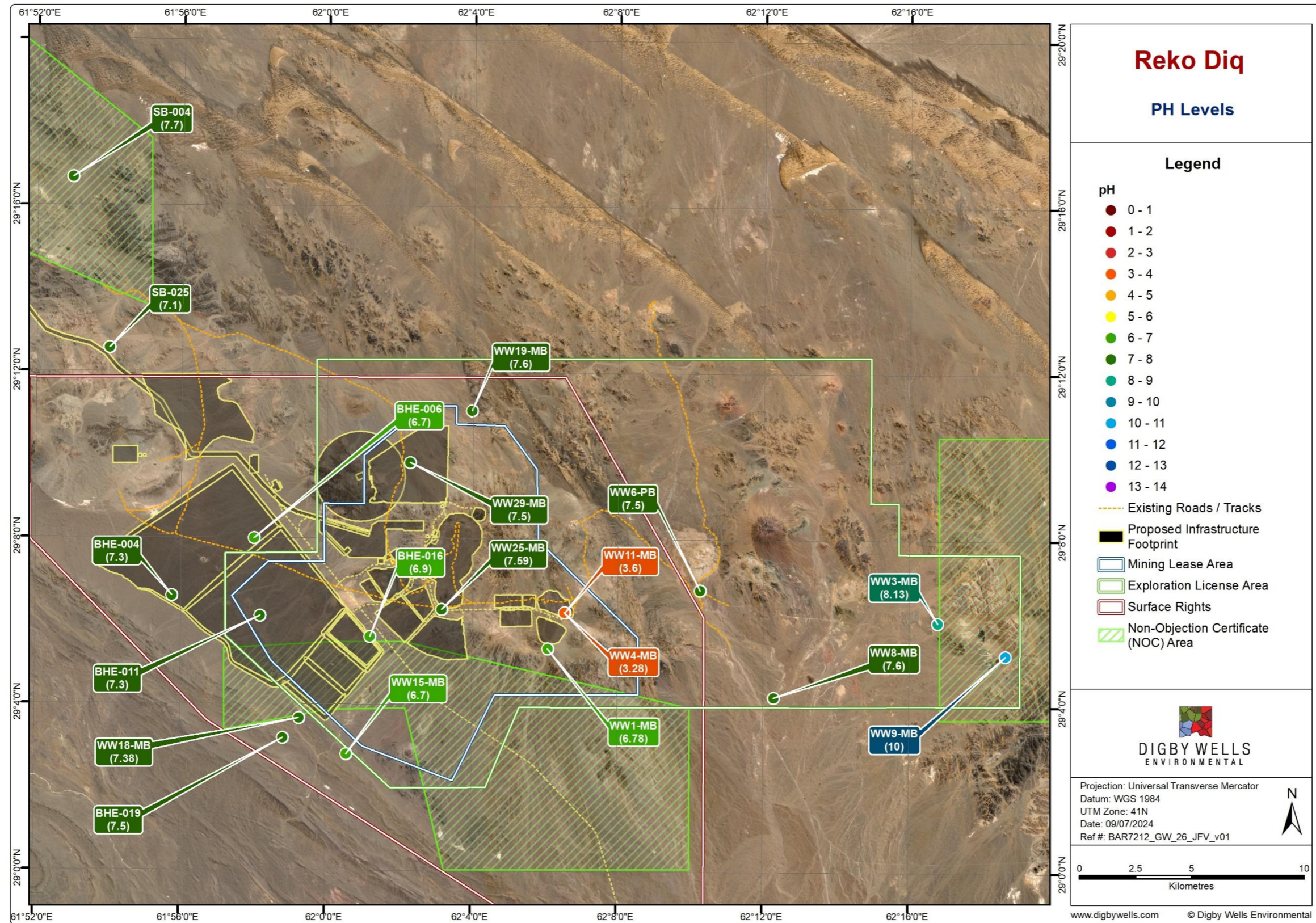


Figure 4-14: pH Levels in the Groundwater

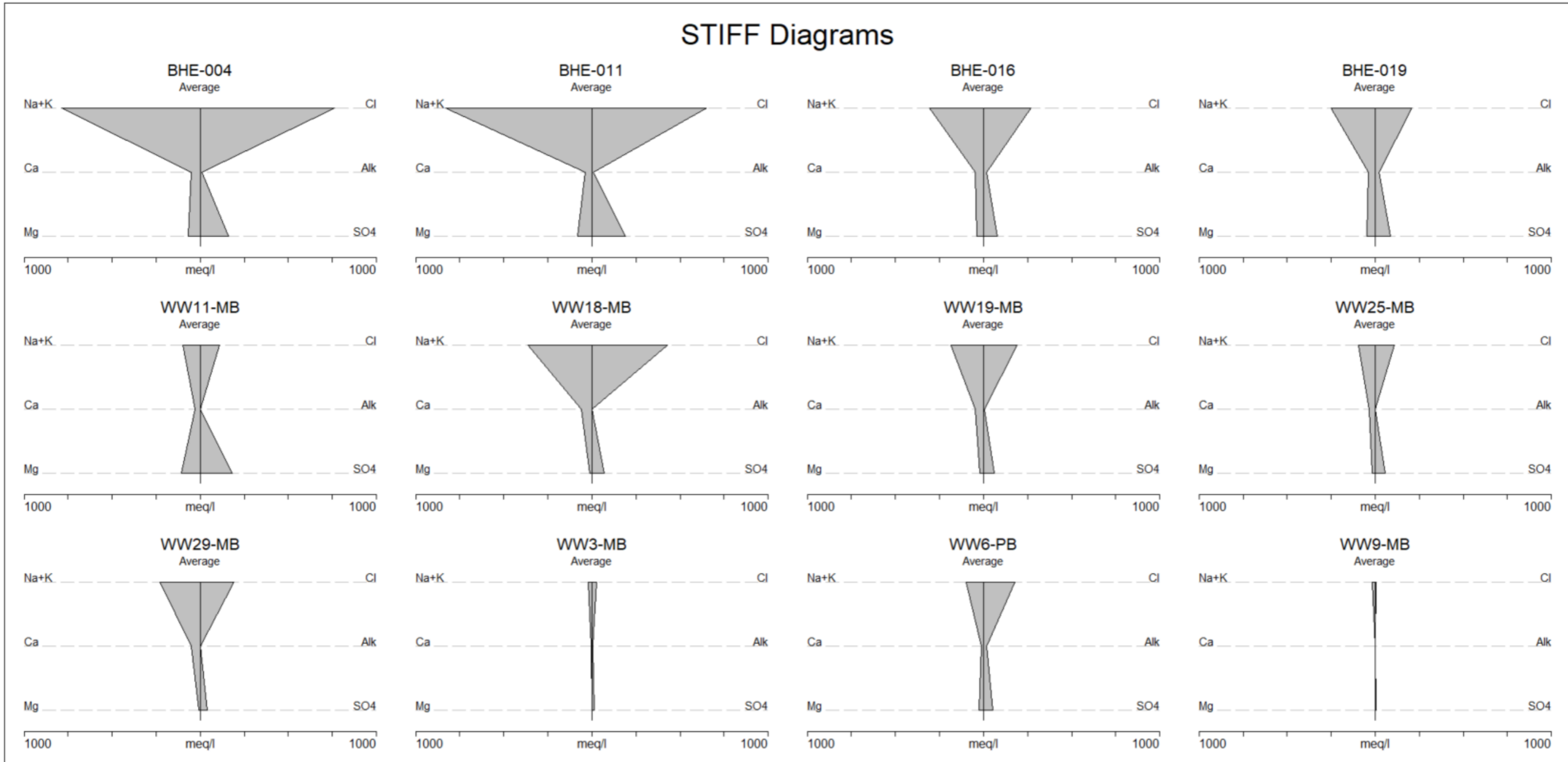


Figure 4-15: STIFF Diagram

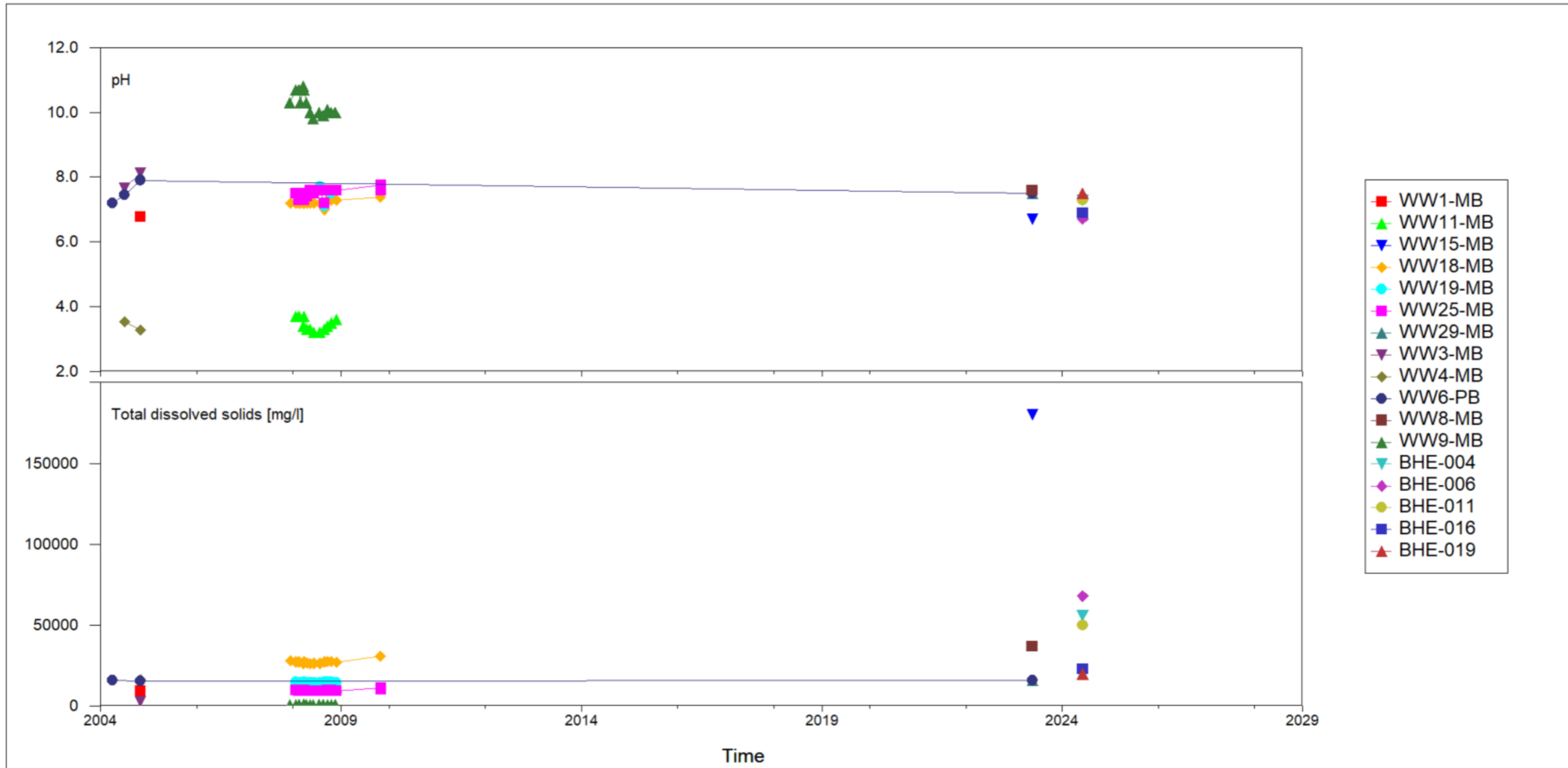


Figure 4-16: Time Series for TDS and pH



### 4.6.3. Seepage Quality from the TSF and WRD

Geochemical assessments undertaken in 2010 determined that the cleaner tailings contained over 10% sulphide and had high acid-generating potential. The water that interacts with these tailings has elevated metals, high sulphate levels and low pH. The rougher tailings contained less than 0.5% sulphide and had negligible acid-generating potential, leachate had low sulphates and metals, and pH was acidic to neutral. The TSF is therefore designed to store the cleaner and the rougher tailings in separate facilities, with the cleaner TSF being a lined facility.

Waste rock will be stored on waste rock dumps (WRDs) two of which are located north and south of the Western Porphyry Pit and another south of the Tanjeel Pit. The waste rock has been classified as potentially acid forming (PAF).

Geochemical analysis of the Western Porphyry indicates that the extracted rock is potentially acid forming (PAF), with 88% of the samples classified as highly potentially acid generating (HPAG), with a low acid neutralisation capacity. However, the potential impact for acid rock drainage could take a considerable amount of time to manifest due to the encapsulated nature of the sulphides in conjunction with the low humidity, high evaporation conditions of the Project Area (Digby Wells Environmental, 2024).

In contrast to Western Porphyry, the material at Tanjeel exhibits a more oxidised nature, with a greater exposure of sulphides in the waste rock, pit walls, and stockpiled ore, and therefore, even though the potential for acid generation is lower when compared to that of the Western Porphyry deposit, the higher reactivity of the Tanjeel deposit increases the potential risk for acid rock drainage. 98% of waste rock samples are classified as HPAG (Digby Wells Environmental, 2024).

The updated geochemical assessment (Digby Wells Environmental, 2024) indicates that the seepage from the cleaner TSF could have a sulphate source term of 2 340 mg/L, whilst the source term for the rougher TSF is 2 120 mg/L, the WRD containing material from the Western Porphyry Pit is 2 078 mg/L and the WRD containing material from the Tanjeel Pit is 775 mg/L.

### 4.6.4. Seepage Quantity from the TSF and WRD

The design of the TSF was informed by the 2010 geochemical assessments of the proposed tailings material. The cleaner tailings which comprises of the higher risk tailings material (containing 10% sulphide with high acid generating potential), will be deposited on a facility lined with a 1.5 mm HDPE. The permeability of the HDPE liner is  $1.7 \times 10^{-10}$  m/d (EPA, 2020) and therefore seepage from the cleaner TSF will be negligible.

The rougher tailings comprises of low risk material (0.5% sulphide with negligible acid generating potential). The rougher TSF will therefore not be lined, with the exception of the pond area. Underdrains will be constructed to maximise seepage recovery to conserve water.

The seepage model, undertaken by Knight Piesold (Knight Piesold, 2024), indicates that ~1% of slurry water (or 13 L/s) could potentially seep to the groundwater hydrostratigraphy.

#### **4.7. Groundwater Receptors**

No groundwater receptors (groundwater users or eco-systems) were identified in the vicinity of the mine site. The closest village (Humai) is approximately 20 km to the east of the mine site, and is not expected to be impacted by the mine due to the distance and low permeabilities of the hydrostratigraphic units.

The numerical model has further confirmed this whereby the cone of dewatering is expected to extend to a maximum distance of 350 m from the edges of the pits at the end of operation, and 850 m after 100 years after closure.

### **5. Groundwater Numerical Model**

A numerical model was developed to predict the potential impacts of the proposed pits, the TSF and WRDs on the receiving environment.

#### **5.1. Model Set-up and Boundaries**

The model setup entails selecting the model domain, defining the model boundary conditions, discretising the data spatially and over time, defining the initial conditions, selecting the aquifer type, and preparing the model input data. The above conditions together with the input data are used to simulate the groundwater flow in the model domain for pre-mining steady state conditions.

##### **5.1.1. Model Domain**

As shown in Figure 5-1, the model domain covers an area of 1,578 km<sup>2</sup>, with a maximum length of 45.6 km and a maximum width of 47 km.

A large model domain was selected so that model boundaries do not affect simulation results.

##### **5.1.2. Boundary Conditions**

Considering the good correlation between topography and hydraulic head elevation, a no-flow boundary condition is applied to simulate the watershed boundaries to the east and west of the mine site. The surface water drainages were not simulated in the model as they are not interacting with the groundwater. Even if the drainage lines are simulated with a drain, they do not have any influence on the model.

A general head boundary (GHB) condition was selected at the northern and southern boundaries to simulate the regional groundwater outflow component (Figure 5-1). The advantage of GHB over a Constant Head Boundary or Well package is that the in-or-out flow is head dependent. Since groundwater flow is proportional to the hydraulic gradient, the flow direction could reverse in the event that the cone of dewatering reaches the GHB.

In addition to the natural boundary conditions:

- The open pits are modelled using the drain package to simulate groundwater abstraction;
- The TSF and WRDs were simulated as recharge zones.

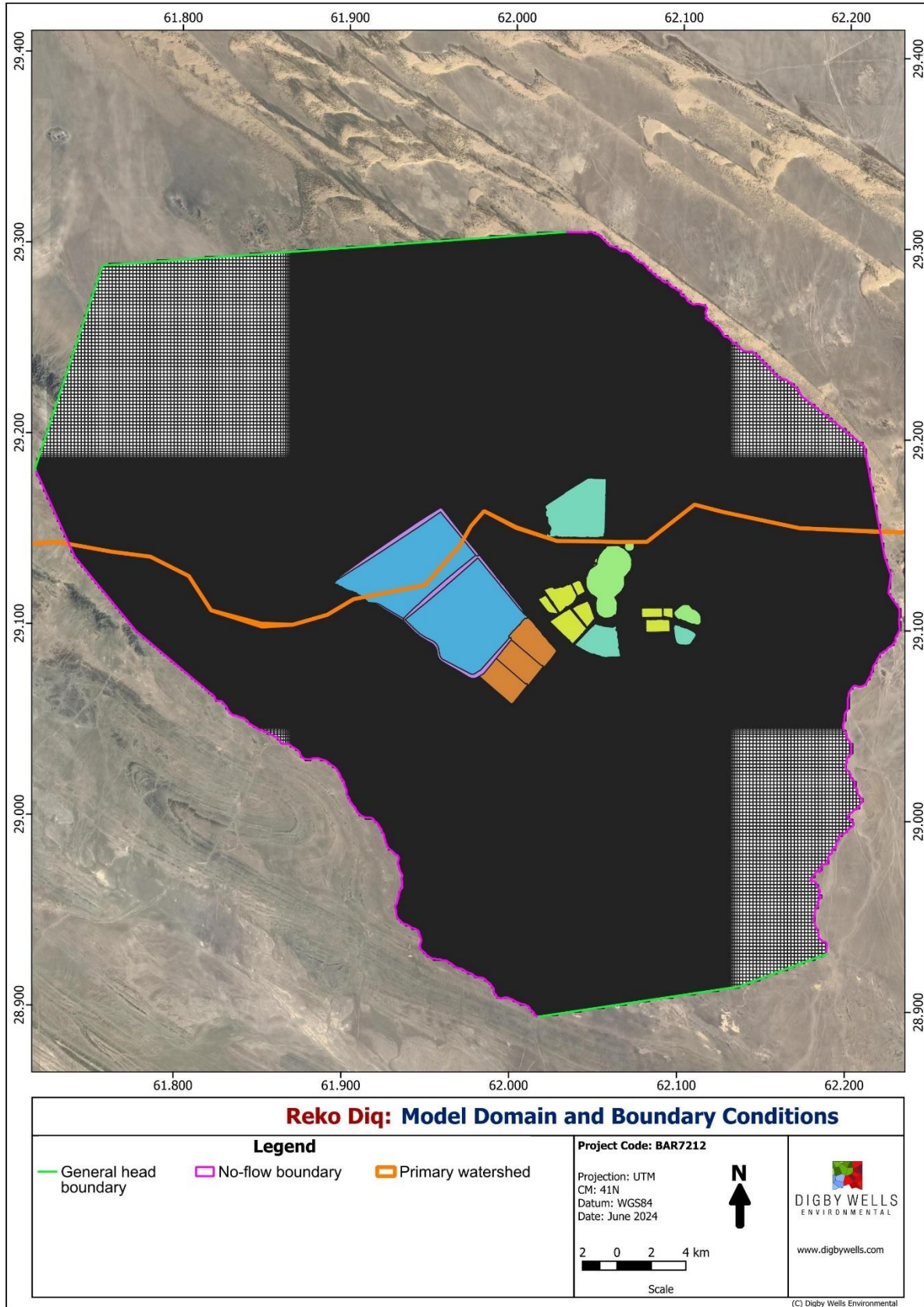


Figure 5-1: Model Domain and Boundary Conditions

### 5.1.3. Model Mesh

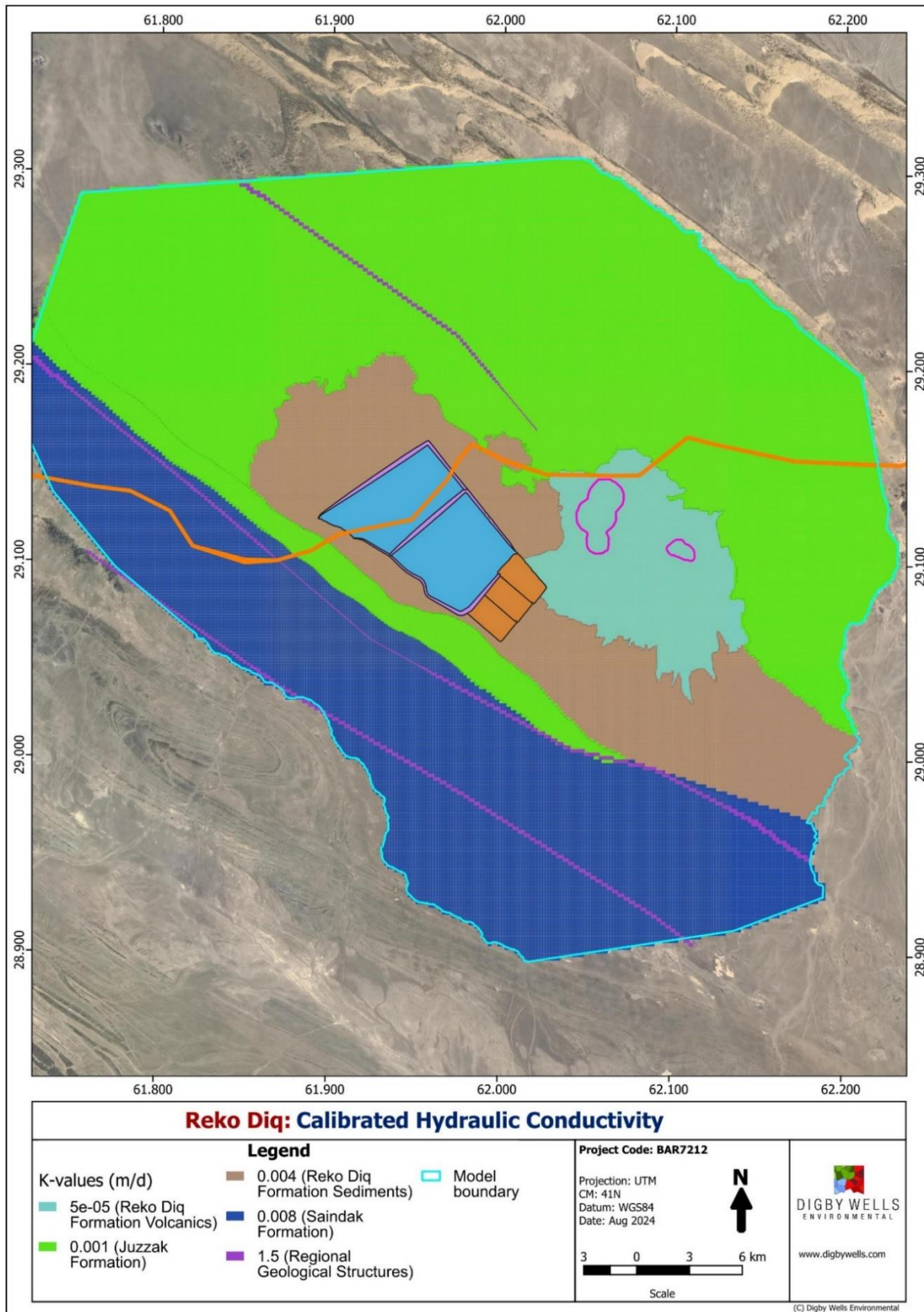
A rectangular mesh was generated over the model domain, consisting of 466 rows and 640 columns (Figure 5-1). The mesh was refined to 50 m x 50 m in the target areas (proposed pits, TSF and WRD areas), while the remainder of the model domain is grided at 200 m x 200 m.

## 5.2. Aquifer Geometry

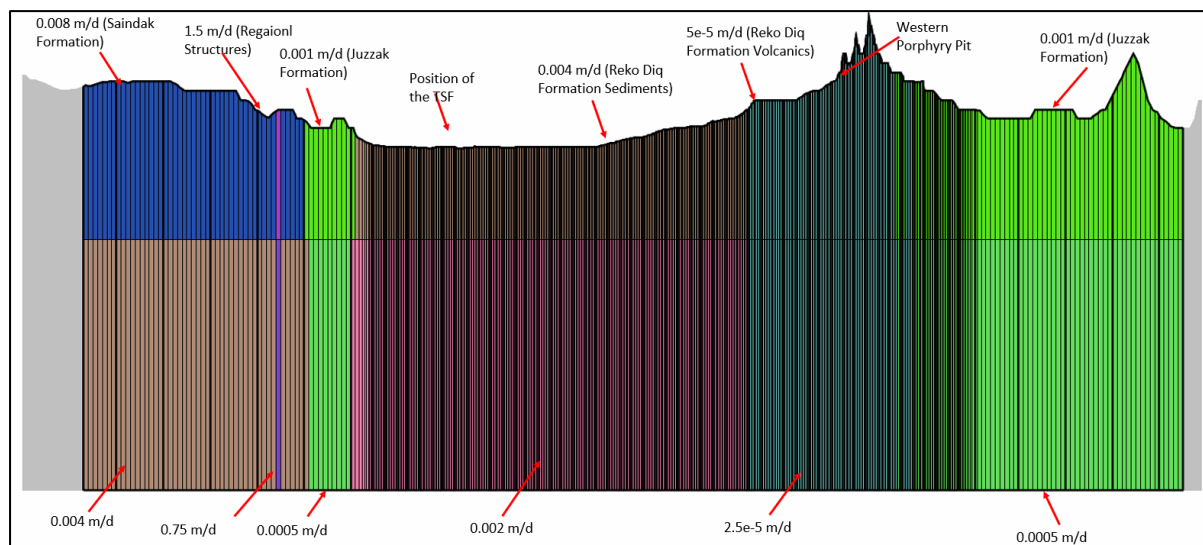
Two hydrostratigraphic layers are simulated in this study in line with the geological profile displayed in Figure 4-4. The top extrusive volcanics of the Reko Diq formation are simulated as a semi-confined aquifer, while the sedimentary rocks underneath the volcanics are simulated as confined. Within the formation, the water is contained within the fractures of the upper volcanic rocks followed by the sedimentary rocks. SMEC (2010) identified that the fractures are pertinent in the first 300 m, hence the first layer was assumed to be 300 m deep. The depth of the second layer was extended to 840 m so that the entire pit depth will be modelled.

There are areas within the model domain that are covered by quaternary aeolian deposits and unconsolidated sands. These are often shallow and are above the water table, hence no unconfined layer is included in the model.

The TSF will be sited largely in an area where the sedimentary rocks of the Reko Diq formation outcrops (no volcanic rocks underneath). Site-specific permeability values obtained from the packer tests were applied to observe the migration patterns of any seepage from the TSF. For the remainder of the geological formations where aquifer test data is limited, a steady state model calibration was used to determine the hydraulic conductivities that would produce best fit to the observed hydraulic heads. The distribution of the hydraulic conductivity in the first layer is shown in Figure 5-2. As observed from the packer test (Knight Piesold, 2024), the fracture permeability decreased with depth due to the compaction of the overburden rocks and the hydrostratigraphic unit changes gradually from semi-confined to confined. To represent the reduction of permeability with depth, the hydraulic conductivity of the second layer was taken as 50% of the upper layer. The vertical conductivity of Layer 1 is assumed to be 10% of the horizontal conductivity. An east-west cross section of the model domain is displayed in Figure 5-3.



**Figure 5-2: Calibrated Hydraulic Conductivity and the Various Geological Formations**



**Figure 5-3: East-west profile of the model grid**

### 5.3. Model Calibration

Prior to the simulation of the mining and dewatering activities, a baseline (pre-mining) steady state groundwater flow model was set-up and calibrated. The objective of the steady state model was to simulate the undisturbed groundwater system in the region prior to commencement of open pit expansion. The impacts of mining activities can then be determined by comparing the transient state results with the steady state results.

#### 5.3.1. Steady State Calibration

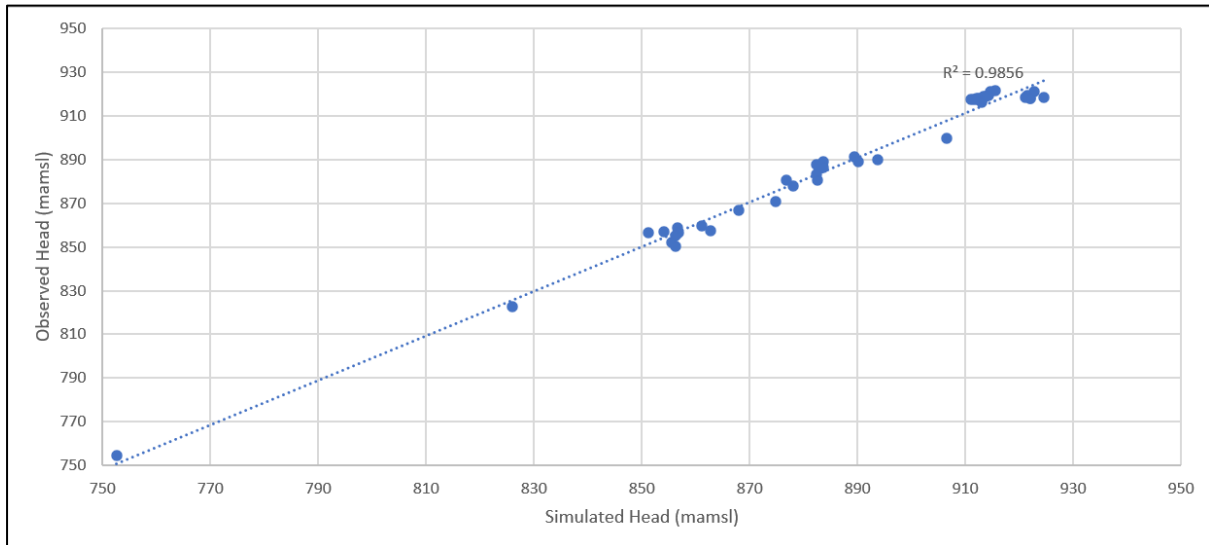
Digby Wells compiled all historical water monitoring data into a centralised Excel database; in a WISH (Windows Interpretation System for Hydrogeologists) format. The steady state model was calibrated with this data to produce a model simulating the baseline groundwater conditions. A total of 42 observation boreholes were used for the steady state calibration. Where more than one water level measurement is available, the average value was used.

The model was calibrated by varying model input data over realistic ranges of values until a satisfactory match between simulated and observed water level data was achieved.

Since recharge and permeability are dependent on each other via the measured heads, the model was not calibrated by changing the permeability and recharge simultaneously. The permeability was calibrated based on the aquifer and packer test data discussed in Section 4.4, while the recharge value was adjusted manually until a best fit is obtained.

After model calibration, a good correlation of 98.6% was obtained between the simulated and observed groundwater elevation (Figure 5-4).

With the steady state calibration, the recharge in the groundwater was found to be at 1.3% of the mean annual precipitation, or 0.4 mm/yr.



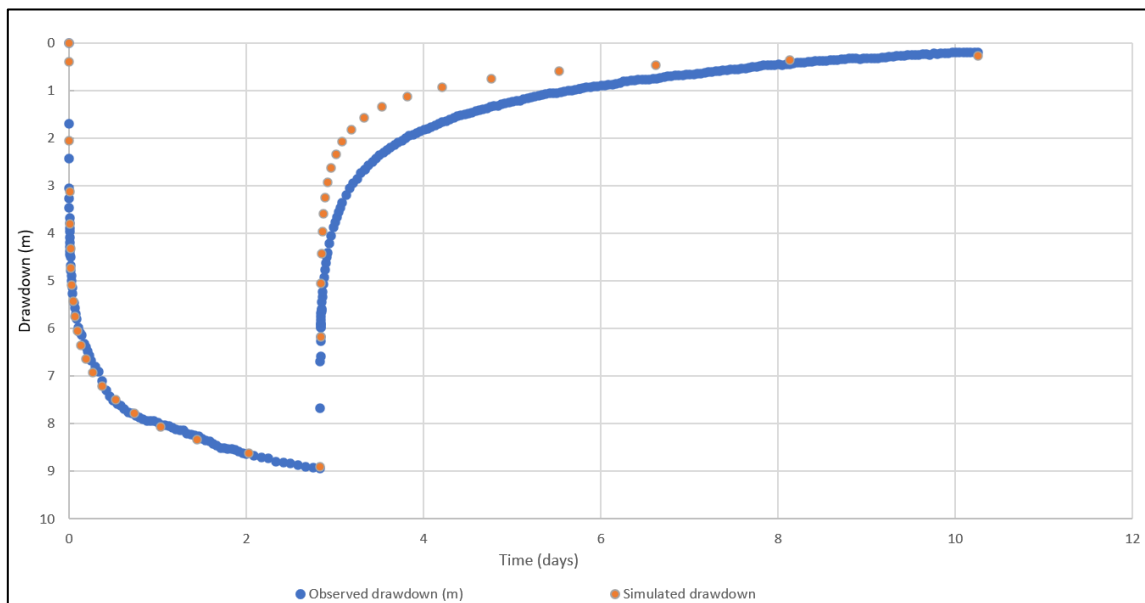
**Figure 5-4: Correlation Between Observed and Simulated Head**

### 5.3.2. Transient State Calibration

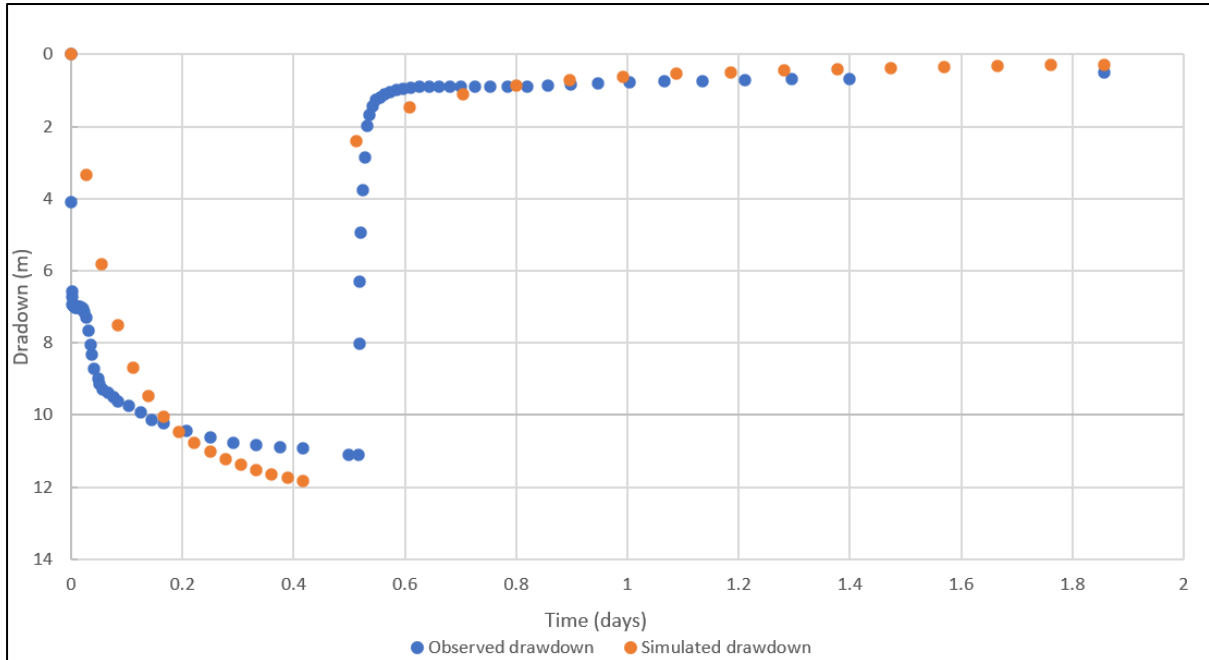
Historically, three boreholes were pump tested in the area of the open pits, which include WW30 (Coffey, 2004), WW11 and WW14 (SMEC, 2008).

Borehole WW30 was nearby the Western Porphyry Pit. However, the construction details, including its depth, were not available. The borehole was therefore not used for transient state calibration during this study.

Both WW11 and WW14 are located within the Tanjeel deposit are for the transient state calibration as shown in Figure 5-5 and Figure 5-6. From these calibrations, the average specific storage and specific yields were determined to be  $2 \times 10^{-4} m^{-1}$  and 0.13 respectively.



**Figure 5-5: Pump Test Calibration of Boreholes WW14**



**Figure 5-6: Pump Test Calibration of Boreholes WW11**

## 5.4. Numerical Model Findings

### 5.4.1. Water Balance of the Pits

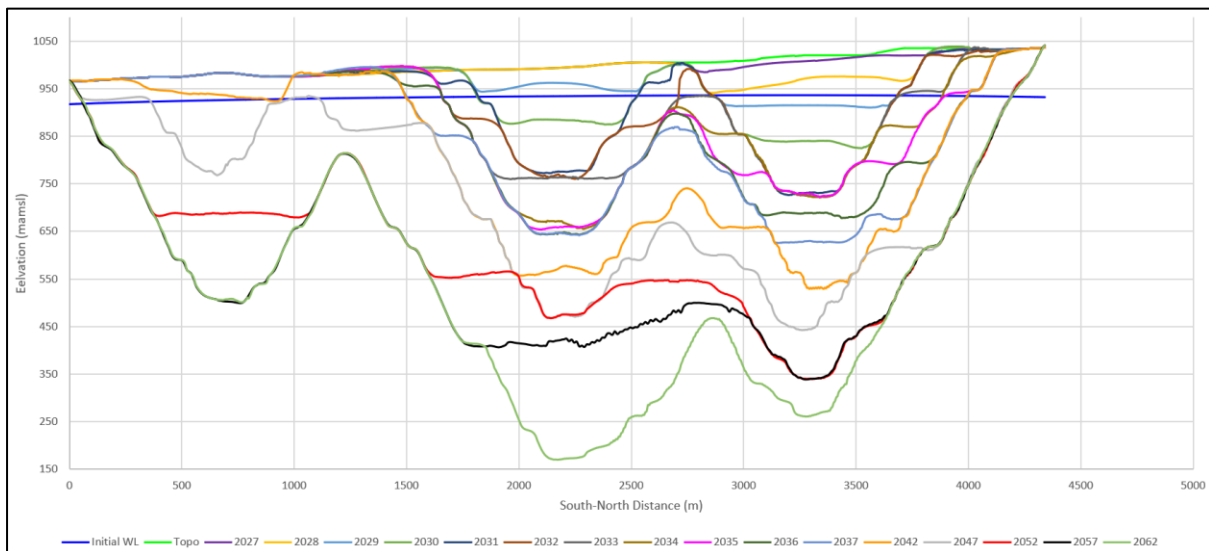
The baseline groundwater table in the Western Porphyry Pit is ~86 mbgl (893 mamsl) and 60 mbgl (925 mamsl) in the Tanjeel pit. Whilst mining activities are above the groundwater table, no ingress into the pits is expected. No perched aquifers were encountered in the vadose zone during field investigations. Should perched aquifers be intersected, the inflow into the open pit workings is expected to be negligible and of short duration as a result of their localised nature.

The life of mine (LoM) for both pits, including the planned depths and areas are provided in Table 5-1. The LoM is also shown graphically in relation to the baseline groundwater levels, in Figure 5-7 for the Western Porphyry Pit and Figure 5-8 for the Tanjeel pit. The maximum depth of the Western Porphyry Pit is expected to be approximately 840 m while that of Tanjeel is 195 m.

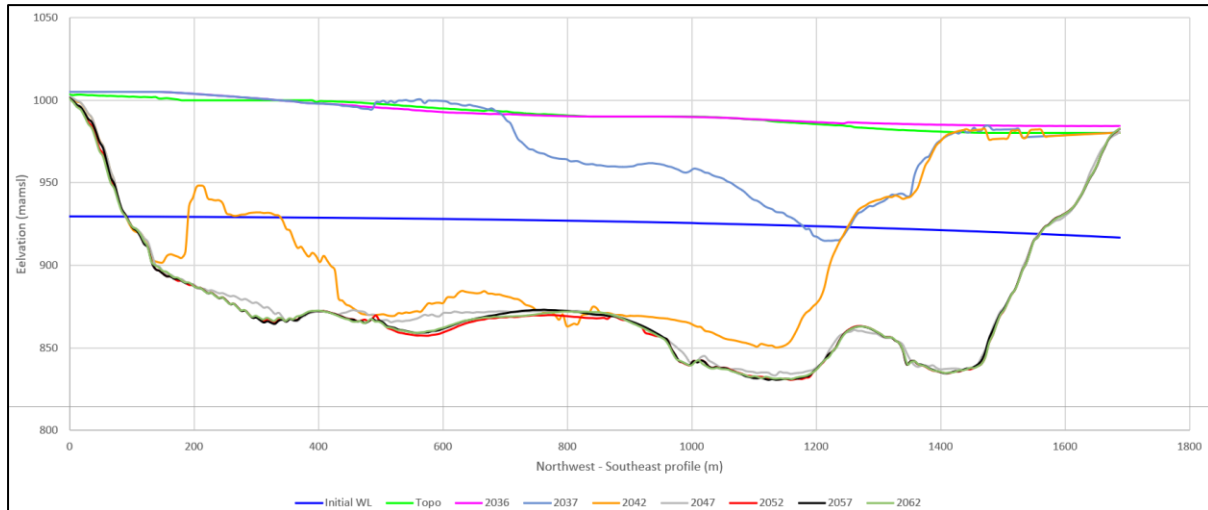


**Table 5-1: Life of mine of the Western Porphyry and Tanjeel Pits**

Year	Period	Western Porphyry Pit			Tanjeel Pit		
		Depth (mbgl)	Elevation (mamsl)	Pit Outline Area (m <sup>2</sup> )	Depth (mbgl)	Elevation (mamsl)	Pit Outline Area (m <sup>2</sup> )
1	2027	15	990	804 429			
2	2028	60	945	841 723			
3	2029	90	915	1 620 915			
4	2030	165	840	1 632 335			
5	2031	270	735	1 879 912			
6	2032	270	735	2 558 002			
7	2033	270	735	2 660 339			
8	2034	270	735	2 881 935			
9	2035	345	660	3 073 340			
10	2036	345	660	3 505 552			
11	2037	375	630	3 529 925	90	915	436 987
16	2042	480	525	4 457 516	150	855	1 018 176
21	2047	555	450	6 323 933	180	825	1 259 412
26	2052	645	360	7 145 411	180	825	1 259 412
31	2057	675	330	7 145 411	180	825	1 259 412
36	2062	825	180	7 145 411	180	825	1 259 412



**Figure 5-7: A north-south profile of the Western Porphyry Pit in relation to the water level**



**Figure 5-8: A northwest – southeast profile of the Tanjeel Pit in relation to the water level**

For any particular time, the pit lake water balance can be described as:

$$\Delta S = \text{inflow} - \text{outflow}$$

Where:

- $\Delta S$  is change in pit lake storage

The inflow consists of groundwater ingress, direct rainfall captured in the pit sump, and rainfall runoffs on the pit wall. The outflow occurs due to evaporation loss.

#### **5.4.1.1. Groundwater Ingress**

Due to the hydrostratigraphic heterogeneity in the Project Area, the inflow rates and radius of influence are not expected to be uniform. The shape and size of the pits will also contribute to the fluctuation of the inflow rates. The estimated groundwater ingress at various stages of the life of mine is listed in Table 5-2.

At the Western Porphyry Pit:

- Groundwater will be encountered as of Year 3, with an initial ingress rate of 89 m<sup>3</sup>/d (1 L/s).
- The ingress is expected to peak in Year 26 to a maximum of 798 m<sup>3</sup>/d (5.6 L/s).
- Thereafter, the ingress will decrease due to the depletion of the storage. At the end of the pit life (Year 36), inflow is estimated to be 381 m<sup>3</sup>/d (4.4 L/s).

At the Tanjeel pit:

- Groundwater will be encountered as of Year 11, with an initial ingress rate of 2 m<sup>3</sup>/d (0.02 L/s).
- The ingress will be maximum in Year 21 where it will reach 53 m<sup>3</sup>/d (0.6 L/s).

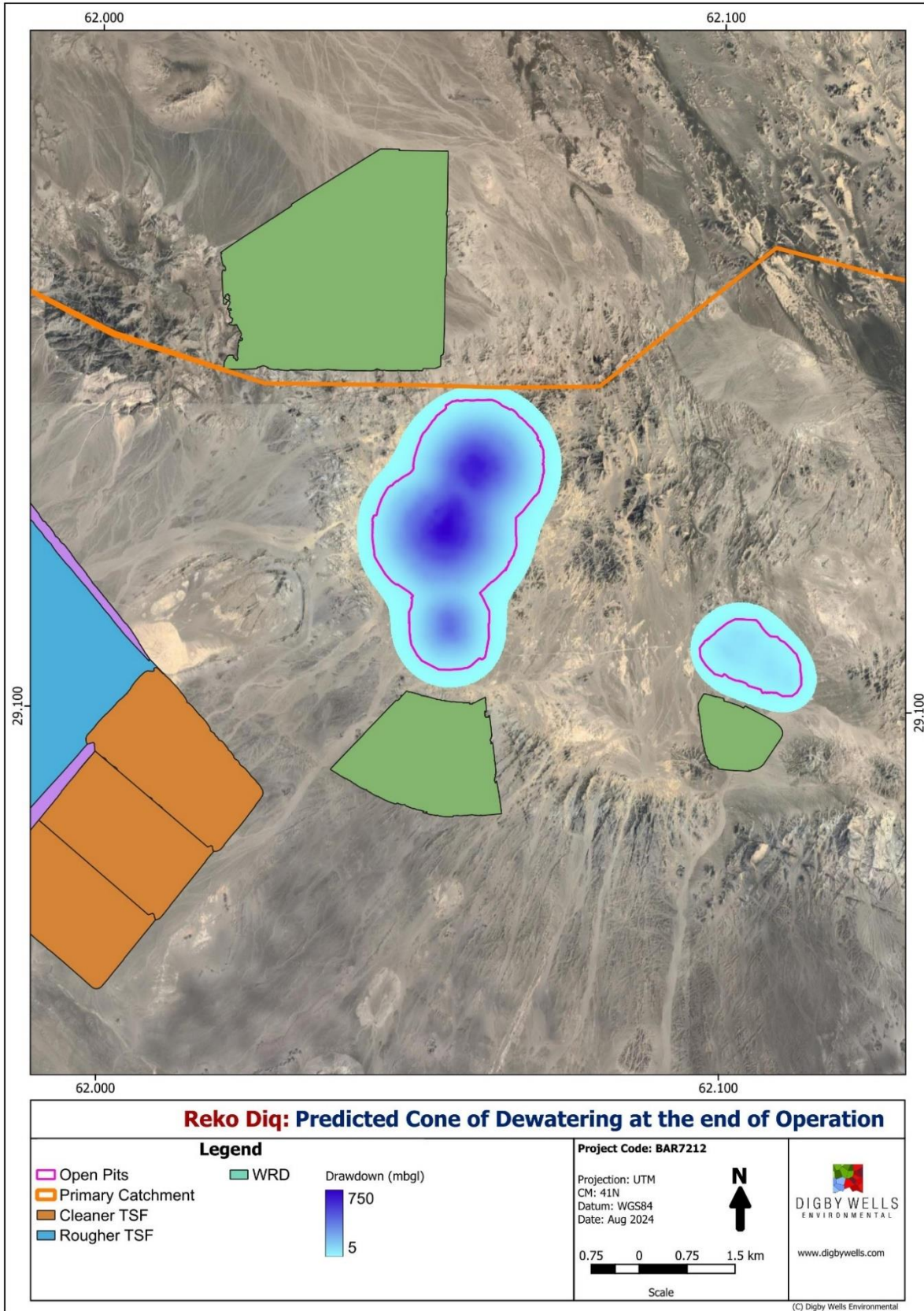
- The ingress will gradually decrease after Year 21 due to the storage depletion and will be at about 10 m<sup>3</sup>/d (0.1 L/s) after mine closure.

This estimated ingress value is what will seep passively to the sump. If horizontal drains are to be used, the ingress is likely to increase depending on how long the drains will be beyond the pit wall.

As the result of the groundwater ingress into the pits, a cone of depression will develop during the operational phase of the mine. The size of the cone of depression will be largest at the end of operation. This is displayed in Figure 5-9. The maximum radius of influence is estimated to be 350 m towards the north and the east, based on a 5 m drawdown depth interval. The cone of depression will not extend beyond the mine lease and no receptors will be impacted.

**Table 5-2: Estimated groundwater ingress into the Western Porphyry and Tanjeel Pits**

Year	Period	Western Porphyry Pit		Tanjeel Pit	
		Ingress (m <sup>3</sup> /d)	Ingress (L/s)	Ingress (m <sup>3</sup> /d)	Ingress (L/s)
1	2027	0	0		
2	2028	0	0		
3	2029	89	1.0		
4	2030	366	4.2		
5	2031	272	3.1		
6	2032	204	2.4		
7	2033	346	4.0		
8	2034	400	4.6		
9	2035	450	5.2		
10	2036	473	5.5		
11	2037	458	5.3	2	0.0
16	2042	434	5.0	41	0.5
21	2047	481	5.6	53	0.6
26	2052	798	9.2	25	0.3
31	2057	659	7.6	19	0.2
36	2062	381	4.4	15	0.2
136	2162 (100 years after closure)	125	1.4	10	0.1



**Figure 5-9: Estimated Cone of Dewatering at The End Of Operation**

#### **5.4.1.2. Direct Rainfall Contribution**

Direct rainfall contribution to a pit lake water balance is calculated as:

$$\Delta S_p = P \times A_s$$

Where:

- $\Delta S_p$  is change in pit storage due to direct precipitation
- P is the precipitation
- $A_s$  is the sump surface area during operation and pit lake area after closure. During this study, sump area is assumed to be 0.1% of the pit outline.

#### **5.4.1.3. Runoff Contributions**

Surface runoff contribution to a pit lake is calculated as:

$$\Delta S_R = P \times A_w \times R_f$$

Where:

- $\Delta S_R$  is change in pit lake storage due to surface runoff
- $A_w$  is the pit wall plan area. This is the space from the pit rim and the pit sump.
- $R_f$  is the runoff factor, which is assumed to be 80% during this study based on Hodgson et al. (1998).

#### **5.4.1.4. Evaporation Loss**

The loss due to evaporation is calculated as:

$$\Delta S_E = E \times A_s$$

Where:

- $\Delta S_E$  is change in pit lake storage due to evaporation
- E is the pit lake evaporation.

#### **5.4.1.5. Water Balance Results**

The water balance results are provided in Table 5-3. Effects of evaporation and precipitation are dependent on the sump area, which is assumed to be 0.1% of the pit outline area during this study. As the sump area increases, the contribution of direct rainfall increases as does the loss to evaporation.

The water balance calculation was used to determine the sump area where the inflow from groundwater ingress and precipitation equals the evaporation loss. Although both the precipitation and evaporation are proportional to the sump size, if the area gets too large, evaporation will be higher than the net inflows. The water balance calculation shows that the total inflow will equalise the evaporation loss if the sump area is 2.5% of the pit outline. This size may be too large and impractical to maintain due to the size within the working pit.

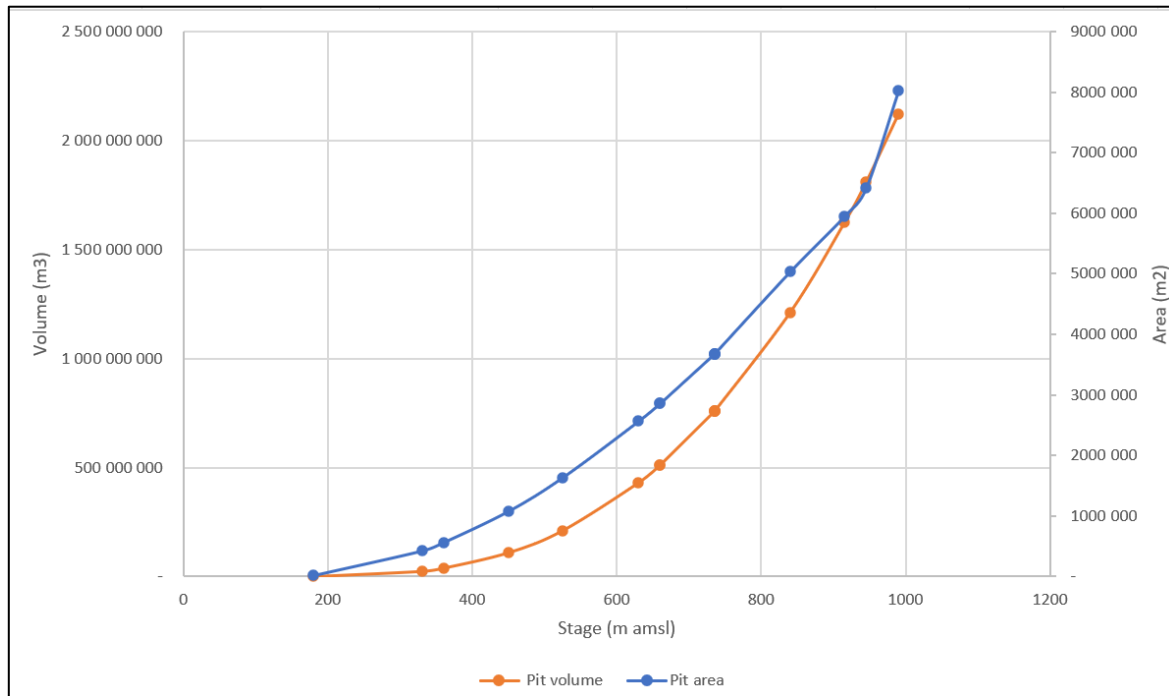
However, the calculation is conducted to merely determine the sump area where evaporation exceeds the precipitation. If the sump is less than 2.5% there will be more inflow than outflow, which will result in an accumulation of water in the pit and pumping will be required. And if, in anyway, the sump area is more than 2.5%, more water will be lost to evaporation than what is collected from rainfall and groundwater ingress, and the pit lake will be dry.

It should be noted that as the pit progresses there will most likely be a change in the amount of evaporation due to climate inside the pit (such as less sun and wind) which are not considered during this water balance calculation.



**Table 5-3: Western Porphyry and Tanjeel Pits Water Balance (in m<sup>3</sup>/d)**

Year	Period	Western Porphyry Pit						Tanjeel Pit					
		Precipitation	Runoff	GW ingress	Total inflow	Evaporation	Change in storage	Precipitation	Runoff	GW ingress	Total inflow	Evaporation	Change in storage
1	2027	0.1	56	0	56	6	51						
2	2028	0.1	59	0	59	6	53						
3	2029	0.1	114	89	203	11	192						
4	2030	0.1	114	366	480	11	469						
5	2031	0.2	132	272	403	13	390						
6	2032	0.2	179	204	384	18	366						
7	2033	0.2	186	346	533	18	515						
8	2034	0.3	202	400	602	20	582						
9	2035	0.3	215	450	666	21	645						
10	2036	0.3	246	473	719	24	695						
11	2037	0.3	247	458	706	24	681	0.0	31	2.0	32.7	3	29.70
16	2042	0.4	312	434	747	31	716	0.1	71	41.4	112.9	7	105.88
21	2047	0.6	443	481	925	43	881	0.1	88	52.9	141.2	9	132.59
26	2052	0.6	501	798	1 299	49	1 250	0.1	88	25.2	113.5	9	104.87
31	2057	0.6	501	659	1 160	49	1 111	0.1	88	19.2	107.6	9	98.95
36	2062	0.6	501	381	882	49	833	0.1	88	15.2	103.6	9	94.91
136	2162	7.2	495	125	628	564	64	0.1	88	10.0	98.4	9	89.71



**Figure 5-10: Western Porphyry Pit volume and surface area at various elevations**

### 5.4.2. Dewatering Management

The groundwater at both the Western Porphyry and Tanjeel deposits is held in discrete fractures of finite extent and with poor interconnection due to infilling by secondary minerals. The aquifer recharge is also limited (0.42 mm/year), with groundwater residence of ~15 000 years in the Western Porphyry area and ~13 000 years in the Tanjeel area (SMC, 2010).

Considering the poorly developed groundwater system, pit dewatering is unlikely to be successful from boreholes, except for discrete local areas of the Reko Diq Formation. The hydrogeology of the site is heterogenous, and groundwater flow is controlled by fractures and faults. It may not be practical to intersect all the small water bearing fractures using dewatering boreholes. Sub-horizontal weep holes as well as an in-pit sump is recommended.

The weep holes (also known as horizontal drain holes) could be drilled sub-horizontally to a length of about 100 m, drilled along benches to dewater isolated pockets of groundwater and alleviate pore pressure behind the slope. The holes should be aimed at structural features identified during the geotechnical inspection

In-pit sumps are important to capture drainage from micro-fractures and rock porosity that are not dewatered using the horizontal drains. The sump should be at in the lowest working area of the pit floor.

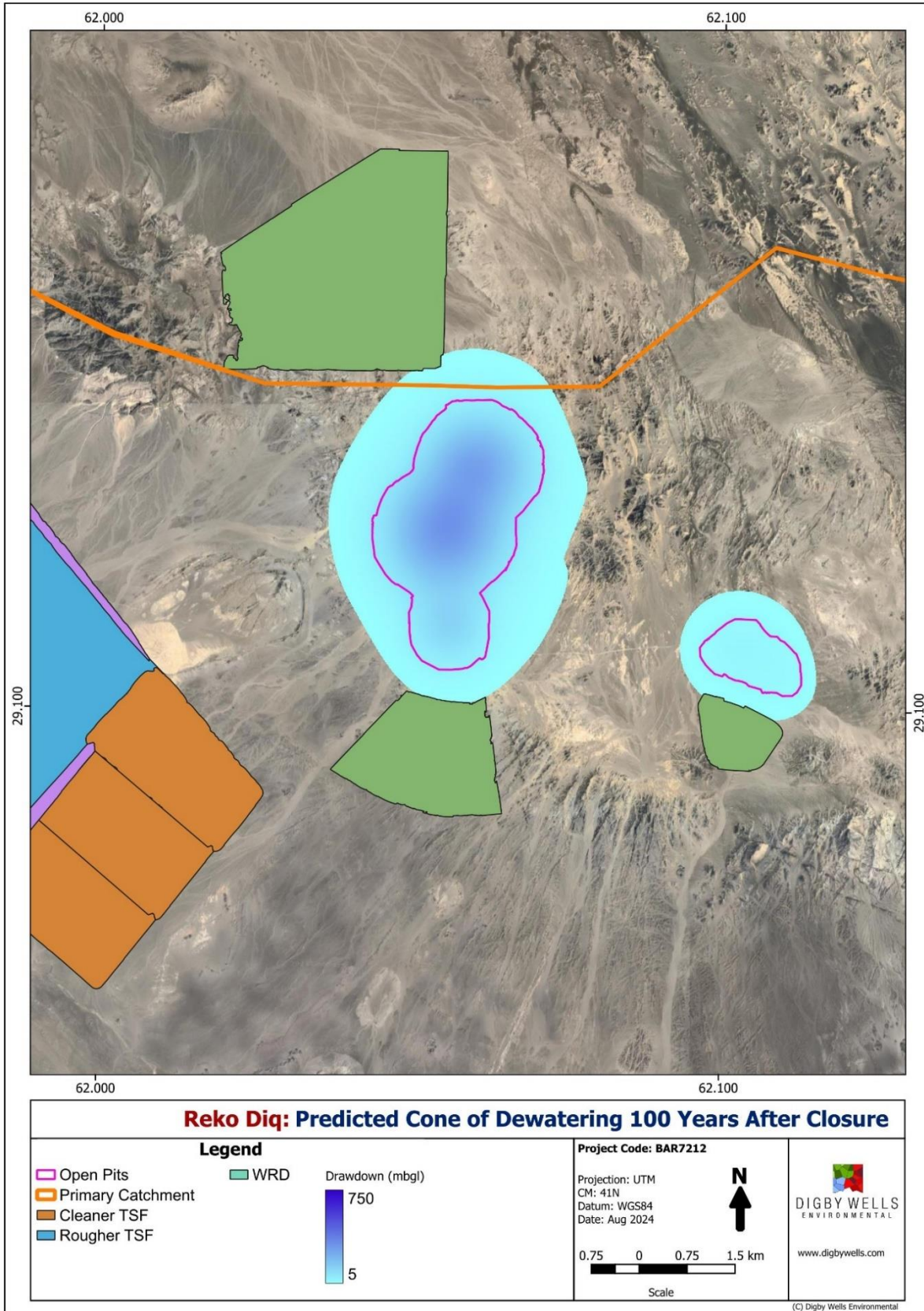
A sump and drainage system will be required to collect surface runoff during rainy seasons, even if weep holes are not used. Although not of significant quantity, water collected at the

sump should be incorporated with the process water system considering the water shortage at the project area.

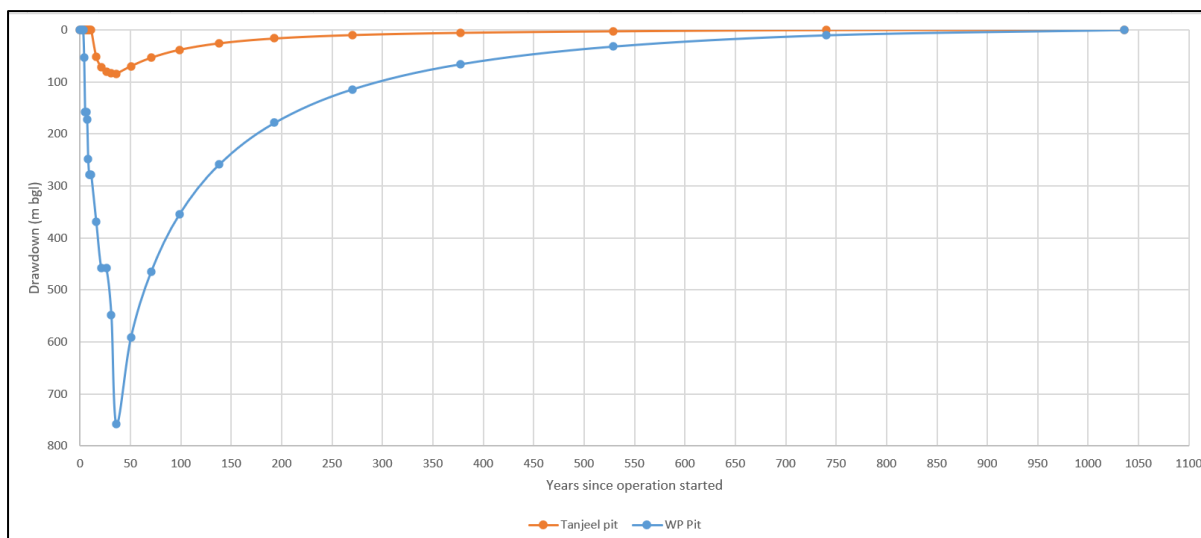
#### **5.4.3. Post-Closure Recovery Rate**

Due to limited groundwater recharge and high evaporation (Figure 5-12), the open pits will remain as hydraulic sinks for perpetuity (simulated up to 100 years). After 100 years from closure:

- The groundwater ingress is estimated to be 125 m<sup>3</sup>/d (1.5 L/s) at Western Porphyry and 10 m<sup>3</sup>/d (0.1 L/s) at Tanjeel; and
- The radius of influence will increase post closure as shown in Figure 5-11. At the end of operation, the cone of dewatering is expected increase from 350 m to 850 m by 100 years after closure. The radius of influence will not extend beyond the mine lease (100 years post closure) and no receptors will be impacted.



**Figure 5-11: Predicted Cone of Dewatering 100 Years After Closure**



**Figure 5-12: Groundwater Recovery Curves for the WP and Tanjeel Pits**

#### 5.4.4. Contamination from the WRD and TSF

As discussed in Section 4.6.2, the natural groundwater is saline. In the TSF area, the average TDS is 43 400 mg/L, but ranges between 15 600 mg/L and 180 000 mg/L. This is mainly consisted of Na and Cl anions, although other elements are also present.

Both Na and Cl are not expected to be released from the TSF and are not suitable to trace the potential TSF impact. During this study, sulphate has been used as an indicator of the TSF impact as it is the element that is relatively higher in the TSF seepage chemistry.

Sulphate is a conservative element; it flows almost at the same speed with the flow of the groundwater and shows the worst-case plume size and concentration. Sulphate flow is hardly retarded or slowed down by geochemical reactions or interactions with dissolved constituents and host rocks. This makes sulphate a preferable indicator for TSF impact on the aquifer. In the natural groundwater, sulphate concentration is 3700 mg/L, although it ranges between 996 mg/L and 9220 mg/L.

Geochemical assessment of the tailings material informed the design for the TSF, which separates the higher risk cleaner tailing from the lower risk rougher tailings. The cleaner tailings cells will be lined with a 1.5 mm HDPE liner and therefore seepage from the cleaner TSF is negligible. Only the pond area of the rougher tailings cells will be lined however underdrains will be installed to maximise seepage recovery. The seepage model, undertaken by Knight Piesold, indicates that ~1% of slurry water (or 13 L/s) could potentially seep to the groundwater.

Seepage quality from the cleaner TSF have a sulphate concentration of 2 340 mg/L whilst the rougher TSF could have a sulphate concentration of 2 120 mg/L. The baseline groundwater quality underlying the proposed TSF has a baseline average sulphate concentration of 3 700 mg/L.

The waste rock material is classified as potentially acid forming. Seepage from the WRD could have a sulphate concentration of 2 078 mg/L from the Western Porphyry Pit and 775 mg/L from the Tanjeel Pit. The baseline groundwater quality underlying the proposed northern WRD has a baseline sulphate concentration of 1 850 mg/L.

The seepage rate through the WRDs from rainfall percolation is assumed to be 15% of the MAP in line with the prediction provided by Hodgson et al., (1998). However, considering MAP of 32 mm only, insignificant seepage of 4.8 mm per annum is expected from the WRD as shown in Figure 5-13.

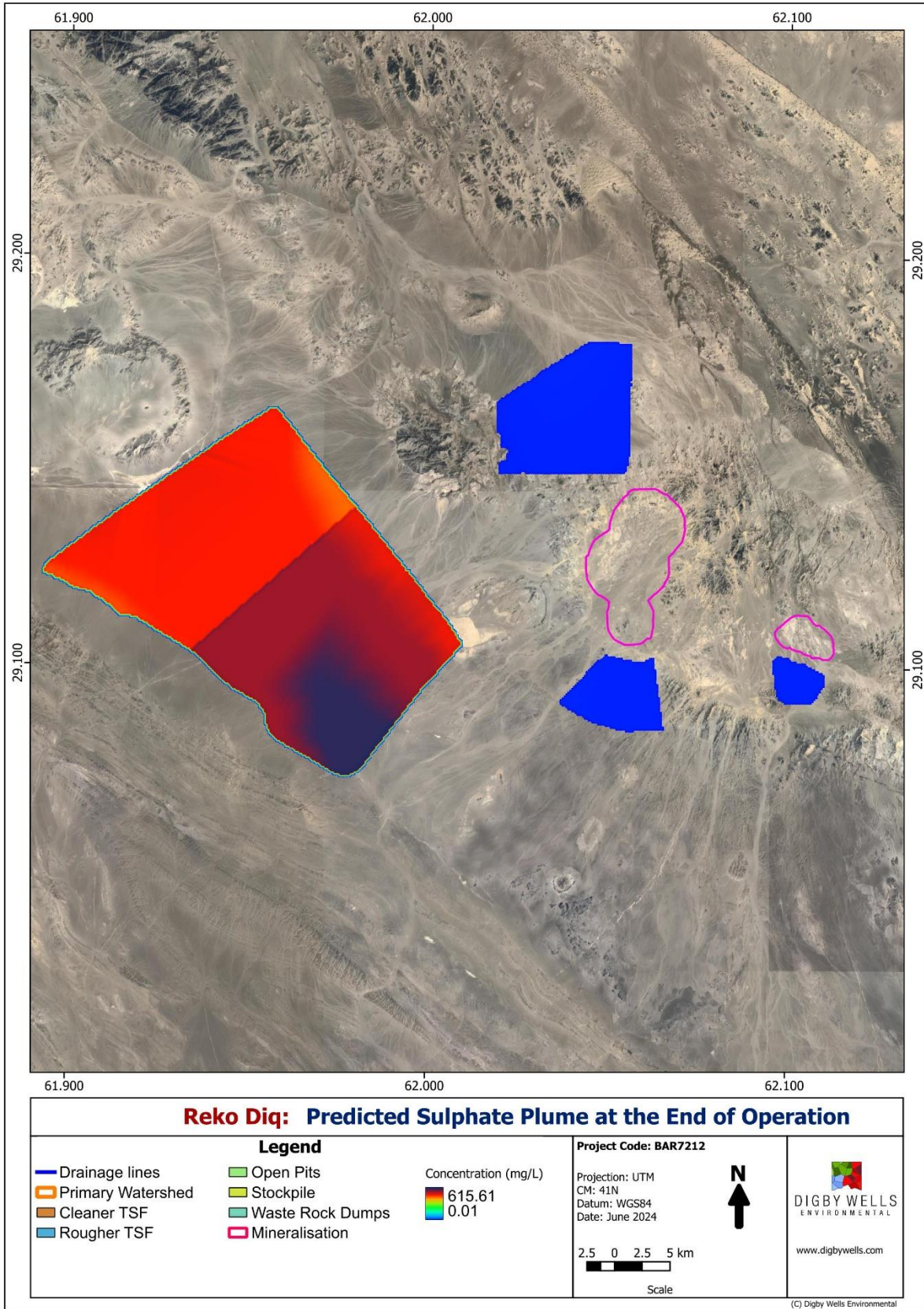


Figure 5-13: Predicted Sulphate Concentration at The End of Operation

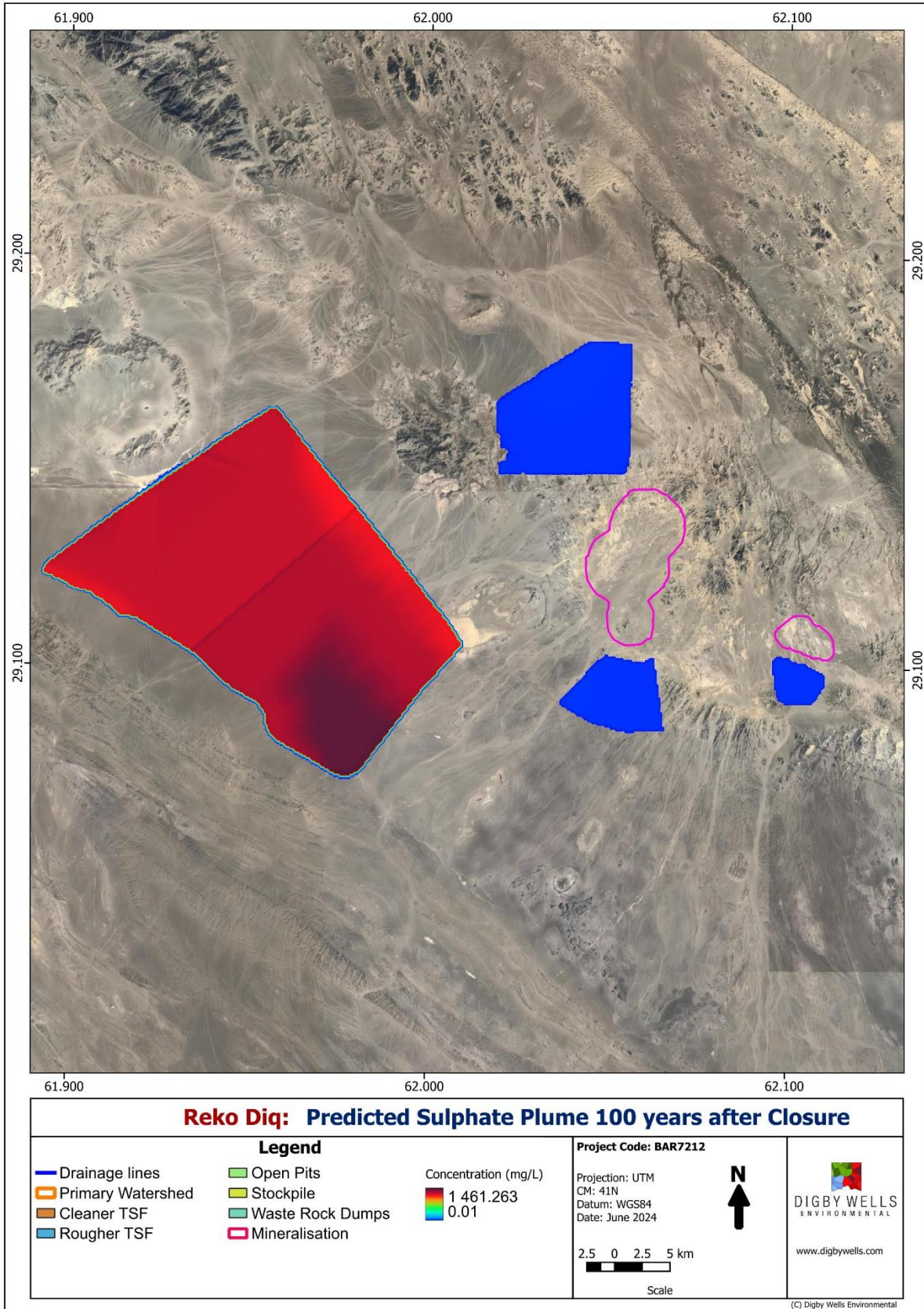


Figure 5-14: Predicted Sulphate Concentration 100 years after Closure

### 5.4.5. Climate Change Assessment

The projected climate changes for the Project include increased flooding, extreme heat, drought, and storm surge intensity risks. Analysis of the Coupled Model Intercomparison Project Phase 6 (CMIP6) global climate model indicates that the mean annual temperature for the Mine Site could increase by 2.86°C (SSP5-8.5) between 2041-2070 and by 5.11°C between 2071-2100. The mean annual precipitation could also increase by 30% between 2041-2070 and by 34% between 2071-2100. Flood events are also likely to increase by between 115% – 156%.

Increase in precipitation could increase the recharge potential to the groundwater system however the vulnerability of the groundwater resource to climate change will likely to be low given the increased potential for runoff (storm events) and high evaporation for the Project Area.

A flood event on the WRD and TSF, may cause additional seepage of contaminated water to the groundwater resource. The recharge is currently estimated to be 0.42 mm per year (1.8% of MAP). The higher risk TSF facilities are lined so seepage to the groundwater resource would be managed by the design.

## 6. Impact Assessment

### 6.1. Unplanned and Low Risk

The unplanned and low risk events are described in Table 6-1.

**Table 6-1: Unplanned and Low Risk Events**

Unplanned Risk	Mitigation Measures
<ul style="list-style-type: none"> <li>• Accidental spills (Hydrocarbons / Chemicals)</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement suitable spill response procedures;</li> <li>• Maintain vehicles at designated workshops or service bays which are designed to contain any spills of hydrocarbons or grease into oil separation traps;</li> <li>• Wash vehicles at designated wash bays which are designed to contain any oil and grease;</li> <li>• Spill containment kits must be located at workshops and hydrocarbon storage facilities. The spill kits must be maintained in good working order and stock replenished if used. The condition of the spill kits must be included in the annual audit checks;</li> <li>• Waste must be discarded in designated waste storage areas;</li> <li>• Hydrocarbons and chemicals must be stored in designated storage areas;</li> <li>• Hydrocarbon and chemical storage areas and facilities must be located on a hard standing (paved or concrete) impermeable area which is bunded to contain the volume and a half of the stored hydrocarbon or chemical substances;</li> </ul>



Unplanned Risk	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Drip trays or plastic sheeting must be used when vehicles break down outside of designated workshop or service areas;</li> <li>• Oil and grease collection traps need to be cleaned and emptied to prevent overflow and need to be maintained in good working order. The condition of the oil and grease collection traps must be included in the annual audit checks;</li> <li>• Chemical and hazardous waste must be disposed of at an appropriate waste facility designed to handle and storage the specific waste material being disposed of; and</li> <li>• Train mine personal and contractors to use the proper site methodology in reporting, handling and disposing of hydrocarbon and chemical waste according to the safety data sheets (SDS) guidelines.</li> </ul>

## 6.2. Climate Change Statement

Climate change has been assessed as part of the numerical model findings. The projected climate changes for the Project include increased flooding, extreme heat, drought, and storm surge intensity risks. Operational procedures and emergency response plans should be put in place at the Project to monitor weather forecasts in the short- to medium- term during the LoM and ensure adequate management and mitigation measures are put into place to sufficiently manage stormwater events.



## 7. Monitoring Programme

The groundwater monitoring network design should comply with the risk-based source-pathway-receptor principle, with the aim of:

- Monitoring the impact of open pit dewatering on the surrounding hydrostratigraphy;
- Monitoring the impact of seepage on the surrounding hydrostratigraphy;
- The rate of groundwater recovery post closure.

Groundwater monitoring must be undertaken according to the schedule presented in Table 7-1. The proposed monitoring network is provide in Figure 7-1. The co-ordinates and monitoring frequency are provided in Appendix A.

**Table 7-1: Proposed Monitoring Programme**

Monitoring Element	Frequency	Responsibility
Rainfall Quality	Annually (when available) during construction, operation and decommissioning phases.	Environmental Officer
Rainfall and evaporation rates	Daily during construction, operation and decommissioning phases and for at least five years post closure.	
Groundwater Levels	Monthly during construction, operation and decommissioning phases and for at least five years post closure, after which the frequency can be revised.	
Groundwater Quality	Annually during construction and operation phases.	

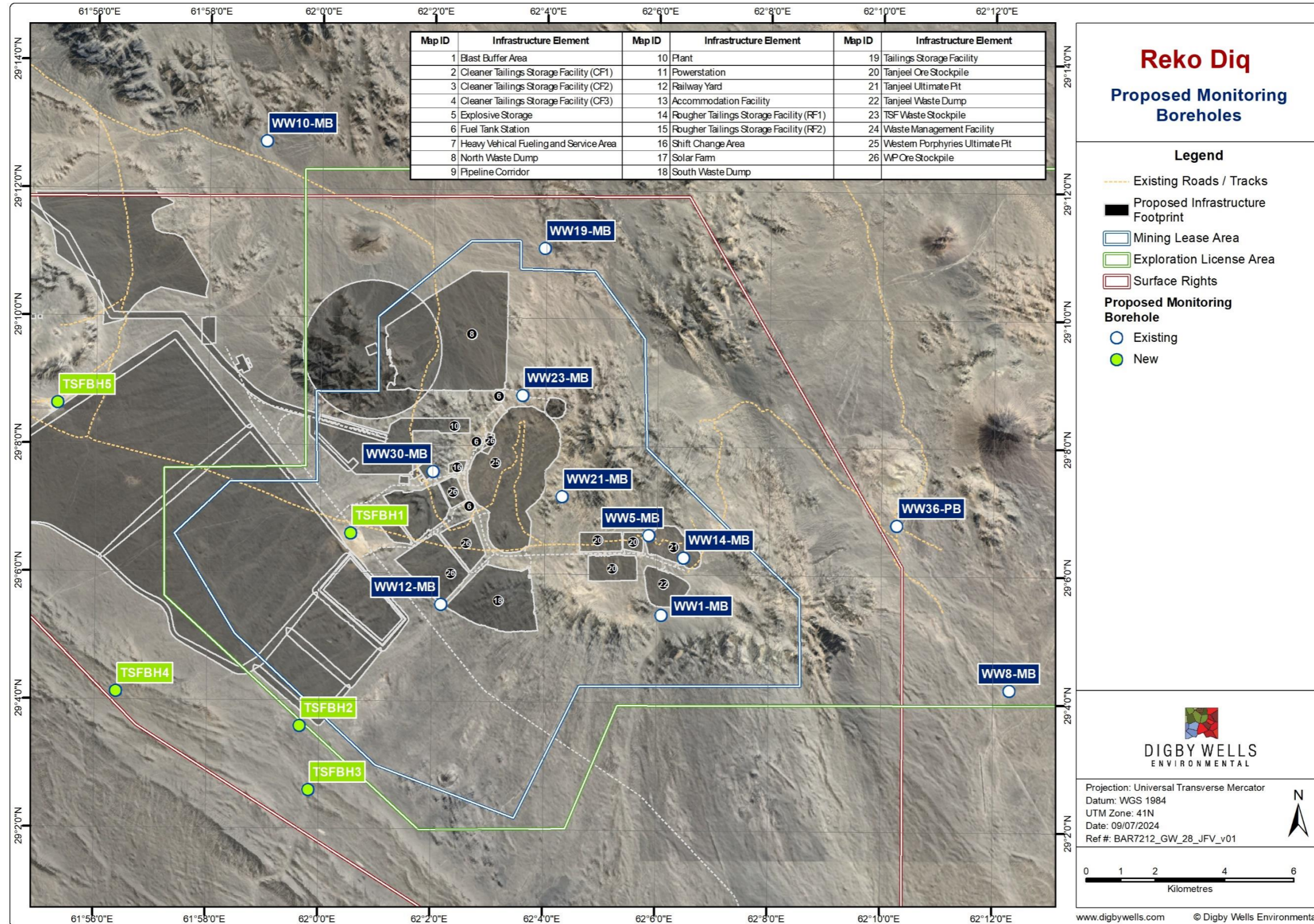


Figure 7-1: Proposed Monitoring Network



## 8. Conclusion and Recommendations

Barrick Gold Corporation (Barrick), through its subsidiary Reko Diq Mining Company (RDMC), is developing the Reko Diq Mining Project (the Project). The project will involve the mining of porphyry copper-gold deposits located at various mineralisation areas. The proposed mine site will consist of two main pits, waste rock dumps and a Tailings Storage Facility.

- The Project has a hot desert climate with low rainfall and high evaporation. The only source of recharge to groundwater is from rainfall. Radiocarbon dating confirmed that recharge to the hydrostratigraphy is insignificant as the ages range between ~13 00 and ~15 000 years old.
- The Project is located on a watershed separating the Sistan and Mashkel Basins. The watershed also represents a groundwater divide. The Sistan Basin drains to Gaud-i-Zirreh playa in Afghanistan, while the Mashkel Basin drains to the Hamun-i-Mashkel playa in Pakistan. The groundwater levels measured within the mine lease range between 0.3 and 64.3 mbgl, with an average of 22.5 mbgl.
- Streams are ephemeral, flowing temporarily during rare high rainfall events.
- The groundwater system comprise of porphyry intrusions emplaced into volcanic and sedimentary rocks. Significant structural deformation has occurred in the region and the deposits are highly fractured, however assessment of the piezometric surface indicates there is limited hydraulic connection between the deposits and the surrounding country rock. Hydraulic testing indicate the hydraulic conductivity ranges between  $6.9 \times 10^{-5}$  – 1.8 m/d. Hydraulic conductivities decrease with depth unless a high yielding fracture is intersected.
- Natural groundwater is saline, predominantly with a neutral pH (except at Tanjeel, which is influenced by the oxidation of sulphide) with high total dissolved solids (more than 10 000 mg/L). No change between groundwater levels, total dissolved solids or pH was measured between the historical data and the current data collected for the Project.
- No receptors have been identified within the vicinity of the Project. The nearest community to the site is Humai, which is approximately 20 km away.
- The groundwater impact assessment considers the source-pathway-receptor approach. No receptors exist within the vicinity of the mine site so even though the groundwater resource will be modified, no impacts on receptors are expected. Although no groundwater impacts have been identified for the Reko Diq Project, the groundwater resource will be depleted in the vicinity of the pits, which will remain hydraulic sinks for perpetuity.

The following recommendations are made:

Monitor the proposed groundwater network.

- Undertake numerical model updates.

## 9. References

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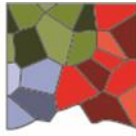
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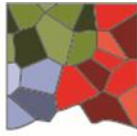
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## Appendix A: Monitoring Boreholes

Location	Easting	Northing	Status	Description	Monitoring Frequency
WW1-MB	412554	3218241	Existing	Rehabilitate / Redrill	Quarterly
WW10-MB	401182	3231943	Existing		Annually
WW12-MB	406193	3218557	Existing	Rehabilitate / Redrill	Quarterly
WW14-MB	413205	3219901	Existing	Rehabilitate / Redrill	Quarterly
WW19-MB	409210	3228838	Existing	Rehabilitate / Redrill	Annually
WW21-MB	409693	3221666	Existing	Rehabilitate / Redrill	Quarterly
WW23-MB	408559	3224590	Existing	Rehabilitate / Redrill	Quarterly
WW30-MB	405967	3222398	Existing	Rehabilitate / Redrill	Quarterly
WW5-MB	412203	3220549	Existing	Rehabilitate / Redrill	Quarterly
WW8-MB	422605	3216045	Existing		Annually
WW36-PB	419368	3220812	Existing		Annually
TSFBH1	403588	3220621	Proposed		Quarterly
TSFBH2	402102	3215070	Proposed		Quarterly
TSFBH3	402354	3213217	Proposed		Quarterly
TSFBH4	396801	3216079	Proposed		Quarterly
TSFBH5	395131	3224418	Proposed		Quarterly



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## Appendix B: Laboratory Certificates



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**Sadia Asghar**

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**Analytical Report Number : 23-36349**

Replaces Analytical Report Number: 23-36349, issue no. 3; Changed results for Chloride in sample 2694606; Added caveat for Chloride, Sulphate as SO<sub>4</sub>, Sodium, Calcium, Strontium, Lithium, Silicone

<b>Project / Site name:</b>	RKG	<b>Samples received on:</b>	30/05/2023
<b>Your job number:</b>		<b>Sample instructed on/ Analysis started on:</b>	31/05/2023
<b>Your order number:</b>	4429V3	<b>Analysis completed by:</b>	07/06/2023
<b>Report Issue Number:</b>	3	<b>Report issued on:</b>	11/09/2023
<b>Samples Analysed:</b>	29 water samples		

**i2 Analytical Limited Sp. z o.o.**  
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NIP: 2050000782

*Izabela Wójcik*  
Izabela Wójcik  
Specjalista Działu  
Analiz Raportów

**Signed:**

Izabela Wójcik  
Reporting Specialist  
**For & on behalf of i2 Analytical Ltd.**

Other office located at: 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS UK

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

Sampling and delivery by client.

Excel copies of reports are only valid when accompanied by this PDF certificate.

soils - 4 weeks from reporting  
leachates - 2 weeks from reporting  
waters - 2 weeks from reporting  
asbestos - 6 months from reporting



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694605	2694606	2694607
Sample Reference				FS16	FS20-PB	PVTBH12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				20/05/2023	20/05/2023	21/05/2023
Time Taken				1420	1250	0945
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	7.7	7.7	7.8
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	8200	5600	3900
Turbidity	NTU	1	NONE	10	1.6	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	1110000 \$\$	1250000	662000
Chloride	mg/l	0.15	ISO 17025	2000 \$\$	1600 \$\$	930
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	550	370	1500
Ammonium as NH4	µg/l	15	ISO 17025	37	16	110
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.04	1.49	1.05
Nitrate as N	mg/l	0.01	ISO 17025	1	8.72	4.31
Nitrite as N	µg/l	1	ISO 17025	< 1.0	10	3.2
Alkalinity	mg/l	3	ISO 17025	95	25	250
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	110	35	250
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	57	9	6
Total Dissolved Solids	mg/l	4	ISO 17025	6000	4100	2700
Hardness - Total	mgCaCO3/l	1	ISO 17025	1390	1120	514
Calcium Hardness	mg/l	0.03	NONE	1120	1040	334
Magnesium Hardness	mg/l	0.08	NONE	266	76.4	180

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0031	0.0026	0.0012
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.5	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.48	9.38	7.43
Barium (dissolved)	µg/l	0.06	ISO 17025	31	16	16
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.06	0.03	0.09
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.9	52	1.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3	2.4	3.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	120	63	300
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.48	6.4	0.33
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	15	14	18
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.7	0.8	0.8
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	6700 \$\$	9400 \$\$	12000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	8	16	3.9
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.5	24	19
Zinc (dissolved)	µg/l	0.5	ISO 17025	14	5.9	12
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694605	2694606	2694607
Sample Reference				FS16	FS20-PB	PVTBH12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				20/05/2023	20/05/2023	21/05/2023
Time Taken				1420	1250	0945
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	1.4
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	9900 \$\$	8400 \$\$	850
Rubidium (dissolved)	µg/l	5	NONE	1.9	1.04	8.3
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	2.9	2.5	< 1.0
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	450	420	130
Magnesium (dissolved)	mg/l	0.005	ISO 17025	65	19	44
Potassium (dissolved)	mg/l	0.025	ISO 17025	7.8	4	7.4
Sodium (dissolved)	mg/l	0.01	ISO 17025	1300 \$\$	1200	870
Phosphorus (dissolved)	µg/l	20	ISO 17025	251	279	275
Boron (dissolved)	µg/l	10	ISO 17025	2000	5800	1700
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	41	41	33
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	290	360	330



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694608			2694609	2694610
Sample Reference	PVTBH11			PVTBH13	PVTBH14
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	21/05/2023			21/05/2023	21/05/2023
Time Taken	1015			1040	1110
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

	pH Units	N/A	ISO 17025	8.1	7.5	7.6
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	4000	4300	4100
Turbidity	NTU	1	NONE	1.6	< 1.0	17
Sulphate as SO4	µg/l	45	ISO 17025	661000	736000	682000 \$\$
Chloride	mg/l	0.15	ISO 17025	970	1100 \$\$	1000
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	1500	1600	1500
Ammonium as NH4	µg/l	15	ISO 17025	61	75	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.05	1.09	1.23
Nitrate as N	mg/l	0.01	ISO 17025	4.09	3.43	4.26
Nitrite as N	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Alkalinity	mg/l	3	ISO 17025	260	280	260
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	250	310	280
Carbonate Alkalinity as CO3	mg/l	3	NONE	12	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	6	8	< 2.0
Total Dissolved Solids	mg/l	4	ISO 17025	2800	2900	2900
Hardness - Total	mgCaCO3/l	1	ISO 17025	526	518	580
Calcium Hardness	mg/l	0.03	NONE	342	335	372
Magnesium Hardness	mg/l	0.08	NONE	184	183	208

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0014	0.0012	0.0014
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.6	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	7.42	7.85	5.6
Barium (dissolved)	µg/l	0.06	ISO 17025	15	14	18
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04	0.06	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.1	0.6	1.7
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.4	2.4	3.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	330	400	360
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.97	84	0.93
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	18	20	16
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	0.5	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	13000 \$\$	11000 \$\$	9300 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	4.4	4.2	4.3
Vanadium (dissolved)	µg/l	0.2	ISO 17025	21	22	17
Zinc (dissolved)	µg/l	0.5	ISO 17025	8.7	8.1	4.6
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694608	2694609	2694610
Sample Reference				PVTBH11	PVTBH13	PVTBH14
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				21/05/2023	21/05/2023	21/05/2023
Time Taken				1015	1040	1110
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	1.5	1.4	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	870	820	1000
Rubidium (dissolved)	µg/l	5	NONE	8.6	9.8	8.6
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.48	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	140	130	150
Magnesium (dissolved)	mg/l	0.005	ISO 17025	45	44	51
Potassium (dissolved)	mg/l	0.025	ISO 17025	7.1	7.6	7.3
Sodium (dissolved)	mg/l	0.01	ISO 17025	940	1000	940
Phosphorus (dissolved)	µg/l	20	ISO 17025	279	303	277
Boron (dissolved)	µg/l	10	ISO 17025	1200	2000	1700
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	34	22	34
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	340	400	300



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694611			2694612	2694613
Sample Reference	SB-25			SB-30	FS8-PB
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	24/05/2023			24/05/2023	23/05/2023
Time Taken	1840			0710	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

Parameter	Units	Limit	Standard	2694611	2694612	2694613
pH	pH Units	N/A	ISO 17025	7.1	7.1	9.3
Electrical Conductivity	µS/cm	10	ISO 17025	23000	23000	7400
Turbidity	NTU	1	NONE	190	640	31
Sulphate as SO4	µg/l	45	ISO 17025	1610000 \$\$	1620000 \$\$	8220000 \$\$
Chloride	mg/l	0.15	ISO 17025	7000 \$\$	7300 \$\$	2000 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	330	370	580
Ammonium as NH4	µg/l	15	ISO 17025	170	200	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	U/S	U/S	3.45
Nitrate as N	mg/l	0.01	ISO 17025	0.37	0.21	4.15
Nitrite as N	µg/l	1	ISO 17025	1.1	< 1.0	9.3
Alkalinity	mg/l	3	ISO 17025	340	340	28
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	390	390	4
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	26
Total Suspended Solids	mg/l	2	ISO 17025	180	120	76
Total Dissolved Solids	mg/l	4	ISO 17025	17000	17000	5500
Hardness - Total	mgCaCO3/l	1	ISO 17025	5140	5270	990
Calcium Hardness	mg/l	0.03	NONE	3640	3730	904
Magnesium Hardness	mg/l	0.08	NONE	1500	1530	85.9

**Heavy Metals / Metalloids ICP-MS**

Element	Units	Limit	Standard	2694611	2694612	2694613
Aluminium (dissolved)	mg/l	0.001	ISO 17025	< 0.0010	0.002	0.0085
Antimony (dissolved)	µg/l	0.4	ISO 17025	1	1	0.7
Arsenic (dissolved)	µg/l	0.15	ISO 17025	5.59	5.46	2.28
Barium (dissolved)	µg/l	0.06	ISO 17025	30	30	22
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	8.1	8.8	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.2	0.3	4.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	11	11	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	31	33	3.2
Lead (dissolved)	µg/l	0.2	ISO 17025	1.4	1.5	< 0.2
Lithium (dissolved)	µg/l	1	NONE	5000 \$\$	4600 \$\$	150
Manganese (dissolved)	µg/l	0.05	ISO 17025	2100	3600	78
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	18	18	38
Nickel (dissolved)	µg/l	0.5	ISO 17025	8.7	8.8	2.9
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	21000 \$\$	19000 \$\$	18000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	6.2
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.9	0.9	29
Zinc (dissolved)	µg/l	0.5	ISO 17025	32	39	1.3
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694611	2694612	2694613
Sample Reference				SB-25	SB-30	FS8-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				24/05/2023	24/05/2023	23/05/2023
Time Taken				1840	0710	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	11
Strontium (dissolved)	µg/l	1	NONE	31000 \$\$	28000 \$\$	7200 \$\$
Rubidium (dissolved)	µg/l	5	NONE	11.4	12.7	3.3
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	2.6	2.9	2.8
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	1500\$\$	1500\$\$	360\$\$
Magnesium (dissolved)	mg/l	0.005	ISO 17025	360	370	21
Potassium (dissolved)	mg/l	0.025	ISO 17025	32	35	7.3
Sodium (dissolved)	mg/l	0.01	ISO 17025	4100 \$\$	4200 \$\$	1200 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	265	276	293
Boron (dissolved)	µg/l	10	ISO 17025	19000	19000	4300
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	64	79	32
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	-
Phosphorus (total)	µg/l	20	ISO 17025	330	330	330



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694614			2694615	2694616
Sample Reference	FS17			FS19	FS26
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	19/05/2023			19/05/2023	19/05/2023
Time Taken	1230			1300	1700
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

	pH Units	N/A	ISO 17025	7.3	7.6	7.9
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	9500	12000	9100
Turbidity	NTU	1	NONE	92	19	2.6
Sulphate as SO4	µg/l	45	ISO 17025	1300000 \$\$	1310000 \$\$	1300000 \$\$
Chloride	mg/l	0.15	ISO 17025	2200 \$\$	3100 \$\$	2000 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	140	97	< 62
Fluoride	µg/l	50	ISO 17025	290	110	400
Ammonium as NH4	µg/l	15	ISO 17025	8100	87	3400
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.78	U/S	6.46
Nitrate as N	mg/l	0.01	ISO 17025	9.76	1.78	4.22
Nitrite as N	µg/l	1	ISO 17025	1900	8.9	960
Alkalinity	mg/l	3	ISO 17025	86	170	21
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	100	190	27
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	28	90	7
Total Dissolved Solids	mg/l	4	ISO 17025	7500	8600	6700
Hardness - Total	mgCaCO3/l	1	ISO 17025	2230	2990	1920
Calcium Hardness	mg/l	0.03	NONE	1690	2290	1470
Magnesium Hardness	mg/l	0.08	NONE	547	699	447

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0023	0.0021	0.005
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.6	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.04	0.48	0.15
Barium (dissolved)	µg/l	0.06	ISO 17025	20	37	26
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.06	0.05	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	17	1.6	0.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	6.6	4.1	4.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.4	< 0.2
Lithium (dissolved)	µg/l	1	NONE	120	130	100
Manganese (dissolved)	µg/l	0.05	ISO 17025	40	2.4	410
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	5.6	3.2	5.8
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.7	3.8	0.7
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	11000 \$\$	22000 \$\$	3000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	32	3	17
Vanadium (dissolved)	µg/l	0.2	ISO 17025	8.4	2.7	0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	6.5	23	14
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694614	2694615	2694616
Sample Reference				FS17	FS19	FS26
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	19/05/2023	19/05/2023
Time Taken				1230	1300	1700
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	19000 \$\$	23000 \$\$	18000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	2.8	3.1	4.9
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	4.8	5.1	4.6
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	0.31

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	680\$\$	920\$\$	590
Magnesium (dissolved)	mg/l	0.005	ISO 17025	130	170	110
Potassium (dissolved)	mg/l	0.025	ISO 17025	15	15	18
Sodium (dissolved)	mg/l	0.01	ISO 17025	1300 \$\$	1600 \$\$	1400 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	352	312	315
Boron (dissolved)	µg/l	10	ISO 17025	2000	2400	2300
Iron (dissolved)	mg/l	0.004	ISO 17025	0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	50	51	40
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	390	340	320



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694617	2694618	2694619
Sample Reference				FS11	FS13	WW29
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	19/05/2023	24/05/2023
Time Taken				1115	1210	1410
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	7.4	7.7	7.5
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	12000	11000	24000
Turbidity	NTU	1	NONE	2.7	13	89
Sulphate as SO4	µg/l	45	ISO 17025	1430000 \$\$	1290000 \$\$	1850000 \$\$
Chloride	mg/l	0.15	ISO 17025	3300 \$\$	2400 \$\$	6800 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	320	310	730
Ammonium as NH4	µg/l	15	ISO 17025	120	< 15	130
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	U/S	U/S	U/S
Nitrate as N	mg/l	0.01	ISO 17025	5.48	13.4	18.2
Nitrite as N	µg/l	1	ISO 17025	2.5	< 1.0	46
Alkalinity	mg/l	3	ISO 17025	26	38	53
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	38	38	89
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	26	45	170
Total Dissolved Solids	mg/l	4	ISO 17025	8700	8000	16000
Hardness - Total	mgCaCO3/l	1	ISO 17025	3340	2680	2990
Calcium Hardness	mg/l	0.03	NONE	2570	1980	2550
Magnesium Hardness	mg/l	0.08	NONE	774	690	436

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0017	0.002	0.0055
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.8	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.59	0.62	6.58
Barium (dissolved)	µg/l	0.06	ISO 17025	29	15	20
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.08	0.11	0.18
Chromium (dissolved)	µg/l	0.2	ISO 17025	12	28	44
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	4.5	1.6	1.6
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	210	140	290
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.81	2.5	36
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	10	5.9	26
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.5	2.8	1.3
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	12000 \$\$	9800 \$\$	10000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	9.6	30	34
Vanadium (dissolved)	µg/l	0.2	ISO 17025	4.3	2.7	9.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	19	8.2	5.8
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694617	2694618	2694619
Sample Reference				FS11	FS13	WW29
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	19/05/2023	24/05/2023
Time Taken				1115	1210	1410
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	27000 \$\$	18000 \$\$	19000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	2.7	1.4	2.5
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	6.3	4.8	2.8
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	1000	790	1000
Magnesium (dissolved)	mg/l	0.005	ISO 17025	190	170	110
Potassium (dissolved)	mg/l	0.025	ISO 17025	15	12	14
Sodium (dissolved)	mg/l	0.01	ISO 17025	1200 \$\$	1300 \$\$	5200 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	270	308	256
Boron (dissolved)	µg/l	10	ISO 17025	3700	2500	3400
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	63	55	57
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	270	390	310



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694620	2694621	2694622
Sample Reference				Tung Catcaw	Natizai	kirtaka
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	22/05/2023	22/05/2023
Time Taken				1305	1210	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	8.5	8.3	7.7
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	910	2700	5000
Turbidity	NTU	1	NONE	4.6	5.2	13
Sulphate as SO4	µg/l	45	ISO 17025	188000	607000	1120000
Chloride	mg/l	0.15	ISO 17025	78	520	1200 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	67	64
Fluoride	µg/l	50	ISO 17025	490	1100	520
Ammonium as NH4	µg/l	15	ISO 17025	< 15	34	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.27	1.5	6.97
Nitrate as N	mg/l	0.01	ISO 17025	4.99	4.9	0.09
Nitrite as N	µg/l	1	ISO 17025	1.7	1.9	370
Alkalinity	mg/l	3	ISO 17025	130	160	41
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	120	150	50
Carbonate Alkalinity as CO3	mg/l	3	NONE	5.8	6.2	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0	< 2.0	35
Total Dissolved Solids	mg/l	4	ISO 17025	720	1800	3600
Hardness - Total	mgCaCO3/l	1	ISO 17025	79.3	365	1080
Calcium Hardness	mg/l	0.03	NONE	63.4	270	1050
Magnesium Hardness	mg/l	0.08	NONE	15.9	94.8	31.3

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0037	0.0026	0.0027
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	1.1	0.8	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	8.78	20.1	347
Barium (dissolved)	µg/l	0.06	ISO 17025	6.2	58	20
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.03	0.08
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.5	3.6	0.3
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	6.7	4.3	4.1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	16	100	140
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.61	0.92	16
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	14	29	23
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	4600 \$\$	5300 \$\$	12000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	18	5.1	4
Vanadium (dissolved)	µg/l	0.2	ISO 17025	19	6.8	3.7
Zinc (dissolved)	µg/l	0.5	ISO 17025	6.3	11	8.3
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694620	2694621	2694622
Sample Reference				Tung Catcaw	Natizai	kirtaka
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	22/05/2023	22/05/2023
Time Taken				1305	1210	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	260	1100	6200 \$\$
Rubidium (dissolved)	µg/l	5	NONE	0.9	2.1	2.0
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	< 1.0	1.3	2.5
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	25	110	420
Magnesium (dissolved)	mg/l	0.005	ISO 17025	3.9	23	7.6
Potassium (dissolved)	mg/l	0.025	ISO 17025	1.4	8.2	4.5
Sodium (dissolved)	mg/l	0.01	ISO 17025	190	590	930
Phosphorus (dissolved)	µg/l	20	ISO 17025	367	356	327
Boron (dissolved)	µg/l	10	ISO 17025	680	2200	12000
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	47	42	45
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	370	390	350



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694623			2694624	2694625
Sample Reference	Bore Chan			Maskin	WW6-PB
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	22/05/2023			23/05/2023	24/05/2023
Time Taken	1410			1325	0810
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

	pH Units	N/A	ISO 17025	8.1	8.4	7.5
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	3000	3100	24000
Turbidity	NTU	1	NONE	2.6	2.6	3.6
Sulphate as SO4	µg/l	45	ISO 17025	1110000	714000	2100000 \$\$
Chloride	mg/l	0.15	ISO 17025	430	580	6300 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	560	1800	190
Ammonium as NH4	µg/l	15	ISO 17025	< 15	< 15	300
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.05	1.29	U/S
Nitrate as N	mg/l	0.01	ISO 17025	1.03	5.62	1.62
Nitrite as N	µg/l	1	ISO 17025	< 1.0	5	26
Alkalinity	mg/l	3	ISO 17025	88	150	910
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	79	130	920
Carbonate Alkalinity as CO3	mg/l	3	NONE	9.1	14	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0	13	20
Total Dissolved Solids	mg/l	4	ISO 17025	2400	2100	16000
Hardness - Total	mgCaCO3/l	1	ISO 17025	818	485	4080
Calcium Hardness	mg/l	0.03	NONE	690	360	1250
Magnesium Hardness	mg/l	0.08	NONE	129	126	2830

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0037	0.0023	0.0031
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.63	7.86	69.8
Barium (dissolved)	µg/l	0.06	ISO 17025	16	14	36
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.05	< 0.02	0.11
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.4	1.4	1
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	0.5
Copper (dissolved)	µg/l	0.5	ISO 17025	3.2	2.2	25
Lead (dissolved)	µg/l	0.2	ISO 17025	0.2	< 0.2	0.3
Lithium (dissolved)	µg/l	1	NONE	66	85	5600 \$\$
Manganese (dissolved)	µg/l	0.05	ISO 17025	7.9	0.53	150
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	16	35	5.9
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	6.6
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	5600 \$\$	5400 \$\$	65000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	8.2	7.1	< 4.0
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.8	2.3	33
Zinc (dissolved)	µg/l	0.5	ISO 17025	9.6	4.7	25
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694623	2694624	2694625
Sample Reference				Bore Chan	Maskin	WW6-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	23/05/2023	24/05/2023
Time Taken				1410	1325	0810
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	1100	1700	16000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	1.4	1.8	13.2
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	1.2	1.8	2.4
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.32	0.32

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	280	140	500\$\$
Magnesium (dissolved)	mg/l	0.005	ISO 17025	31	30	690
Potassium (dissolved)	mg/l	0.025	ISO 17025	2.6	4.2	38
Sodium (dissolved)	mg/l	0.01	ISO 17025	560	670	4500 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	316	309	321
Boron (dissolved)	µg/l	10	ISO 17025	13000	1800	16000
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	0.008
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	38	36	33
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	< 4.0
Phosphorus (total)	µg/l	20	ISO 17025	340	320	330



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694626	2694627	2694628
Sample Reference				Beeduk	WW15	FS4-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				23/05/2023	24/05/2023	19/05/2023
Time Taken				1135	1120	1630
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

Parameter	Units	Limit of detection	Accreditation Status	2694626	2694627	2694628
pH	pH Units	N/A	ISO 17025	7.9	6.7	8.1
Electrical Conductivity	µS/cm	10	ISO 17025	1600	290000	8700
Turbidity	NTU	1	NONE	< 1.0	140	7.7
Sulphate as SO4	µg/l	45	ISO 17025	388000	996000	1230000\$\$
Chloride	mg/l	0.15	ISO 17025	280	120000 \$\$	2300 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	900	93	410
Ammonium as NH4	µg/l	15	ISO 17025	< 15	5600	3600
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.1	U/S	2.82
Nitrate as N	mg/l	0.01	ISO 17025	6.01	18.5	3.75
Nitrite as N	µg/l	1	ISO 17025	< 1.0	21	830
Alkalinity	mg/l	3	ISO 17025	160	U/S	32
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	150	27	28
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0	260	19
Total Dissolved Solids	mg/l	4	ISO 17025	1300	180000	8600
Hardness - Total	mgCaCO3/l	1	ISO 17025	312	46400	1720
Calcium Hardness	mg/l	0.03	NONE	231	41500	1320
Magnesium Hardness	mg/l	0.08	NONE	80.8	4900	400

**Heavy Metals / Metalloids ICP-MS**

Parameter	Units	Limit of detection	Accreditation Status	2694626	2694627	2694628
Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0019	0.0026	0.0066
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.8	0.8	0.7
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.18	8.53	0.17
Barium (dissolved)	µg/l	0.06	ISO 17025	24	440	26
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	38	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	3	3.2	0.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.8	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.6	63	2.8
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	66	< 0.2
Lithium (dissolved)	µg/l	1	NONE	47	120	130
Manganese (dissolved)	µg/l	0.05	ISO 17025	2	840	38
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	0.57	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	20	32	6.1
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	2.3	0.6
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	65.7	< 0.05
Silicon (dissolved)	µg/l	50	NONE	4800 \$\$	2800 \$\$	2900 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	6	590	18
Vanadium (dissolved)	µg/l	0.2	ISO 17025	3.2	2	0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.7	30	13
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694626	2694627	2694628
Sample Reference				Beeduk	WW15	FS4-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				23/05/2023	24/05/2023	19/05/2023
Time Taken				1135	1120	1630
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	830	370000 \$\$	18000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	1.3	0.2	7.9
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	1.1	< 1.0	7.6
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.97	0.34

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	92	17000\$\$	530
Magnesium (dissolved)	mg/l	0.005	ISO 17025	20	1200	97
Potassium (dissolved)	mg/l	0.025	ISO 17025	3.4	110	18
Sodium (dissolved)	mg/l	0.01	ISO 17025	290	39000 \$\$	1400 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	311	204	300
Boron (dissolved)	µg/l	10	ISO 17025	990	1900	2300
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	0.007	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	36	219	46
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	360	400	530



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694629	2694630	2694631
Sample Reference				FS5	Multiple Spring	PVBTH15
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	22/05/2023	21/05/2023
Time Taken				1510	1540	0910
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

Parameter	Units	Limit of detection	Accreditation Status	2694629	2694630	2694631
pH	pH Units	N/A	ISO 17025	10	7.8	7.9
Electrical Conductivity	µS/cm	10	ISO 17025	8200	4900	3800
Turbidity	NTU	1	NONE	100	4.7	1.7
Sulphate as SO4	µg/l	45	ISO 17025	1220000	1390000	610000
Chloride	mg/l	0.15	ISO 17025	2400 \$\$	1100 \$\$	930
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	580	340	1500
Ammonium as NH4	µg/l	15	ISO 17025	4500	< 15	32
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	5.12	1.28	0.98
Nitrate as N	mg/l	0.01	ISO 17025	0.11	0.13	7.27
Nitrite as N	µg/l	1	ISO 17025	9.9	< 1.0	15
Alkalinity	mg/l	3	ISO 17025	32	76	180
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	< 3.0	85	190
Carbonate Alkalinity as CO3	mg/l	3	NONE	22	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	120	5	< 2.0
Total Dissolved Solids	mg/l	4	ISO 17025	6000	4100	2600
Hardness - Total	mgCaCO3/l	1	ISO 17025	1100	1550	454
Calcium Hardness	mg/l	0.03	NONE	1070	1340	264
Magnesium Hardness	mg/l	0.08	NONE	22	206	190

**Heavy Metals / Metalloids ICP-MS**

Parameter	Units	Limit of detection	Accreditation Status	2694629	2694630	2694631
Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0321	0.002	0.001
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.9	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.72	1.17	4.17
Barium (dissolved)	µg/l	0.06	ISO 17025	32	10	21
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.04	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.6	0.3	6.9
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	1.8	3.8	3.2
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	86	110	110
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.64	0.62	4.6
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	24	13	16
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.5	< 0.5	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	2600 \$\$	4200 \$\$	8100 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	2	6.5	4.5
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6	0.4	15
Zinc (dissolved)	µg/l	0.5	ISO 17025	7	5.4	100
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694629	2694630	2694631
Sample Reference				FS5	Multiple Spring	PVBTH15
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	22/05/2023	21/05/2023
Time Taken				1510	1540	0910
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	12000 \$\$	1900	780
Rubidium (dissolved)	µg/l	5	NONE	5.5	3.5	7.4
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	5.9	2.6	1.2
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	0.59	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	430	540	110
Magnesium (dissolved)	mg/l	0.005	ISO 17025	5.3	50	46
Potassium (dissolved)	mg/l	0.025	ISO 17025	12	4.2	7.3
Sodium (dissolved)	mg/l	0.01	ISO 17025	1300 \$\$	630 \$\$	860 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	375	267	269
Boron (dissolved)	µg/l	10	ISO 17025	3000	14000	1300
Iron (dissolved)	mg/l	0.004	ISO 17025	0.055	0.005	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	37	48	36
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	410	320	300



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

<b>Lab Sample Number</b>				2694632	2694633
<b>Sample Reference</b>				WW8	Humai Well
<b>Sample Number</b>				None Supplied	None Supplied
<b>Depth (m)</b>				None Supplied	None Supplied
<b>Date Sampled</b>				21/05/2023	21/05/2023
<b>Time Taken</b>				1355	1300
<b>Analytical Parameter (Water Analysis)</b>	<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>		

**General Inorganics**

pH	pH Units	N/A	ISO 17025	7.6	7.6
Electrical Conductivity	µS/cm	10	ISO 17025	57000	4400
Turbidity	NTU	1	NONE	2.5	5.6
Sulphate as SO4	µg/l	45	ISO 17025	808000 \$\$	803000
Chloride	mg/l	0.15	ISO 17025	24000 \$\$	1100 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62
Fluoride	µg/l	50	ISO 17025	1200	1200
Ammonium as NH4	µg/l	15	ISO 17025	440	71
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	U/S	1.64
Nitrate as N	mg/l	0.01	ISO 17025	4.03	2.12
Nitrite as N	µg/l	1	ISO 17025	38	6.3
Alkalinity	mg/l	3	ISO 17025	U/S	190
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	36	200
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	31	3
Total Dissolved Solids	mg/l	4	ISO 17025	37000	3500
Hardness - Total	mgCaCO3/l	1	ISO 17025	14200	650
Calcium Hardness	mg/l	0.03	NONE	13800	429
Magnesium Hardness	mg/l	0.08	NONE	429	221

**Heavy Metals / Metalloids ICP-MS**

Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0014	0.0036
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	3.75	8.96
Barium (dissolved)	µg/l	0.06	ISO 17025	100	20
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.07	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3	1.5
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.2	3
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	0.2
Lithium (dissolved)	µg/l	1	NONE	1600	280
Manganese (dissolved)	µg/l	0.05	ISO 17025	460	2.8
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	98	9.4
Nickel (dissolved)	µg/l	0.5	ISO 17025	42	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	9700 \$\$	6300 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	2.9
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5	5.7
Zinc (dissolved)	µg/l	0.5	ISO 17025	7.8	12
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694632	2694633
Sample Reference				WW8	Humai Well
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				21/05/2023	21/05/2023
Time Taken				1355	1300
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	100000 \$\$	1200
Rubidium (dissolved)	µg/l	5	NONE	< 5	17.02
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	1.7	1.9
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	5500 \$\$	170
Magnesium (dissolved)	mg/l	0.005	ISO 17025	100	54
Potassium (dissolved)	mg/l	0.025	ISO 17025	23	12
Sodium (dissolved)	mg/l	0.01	ISO 17025	8100 \$\$	930
Phosphorus (dissolved)	µg/l	20	ISO 17025	217	350
Boron (dissolved)	µg/l	10	ISO 17025	36000	2300
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	206	37
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	42	-
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	-
Phosphorus (total)	µg/l	20	ISO 17025	220	360



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Environmental Science

Analytical Report Number : 23-36349

Project / Site name: RKG

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (total)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW (Al, Fe, Cu, Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Total Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices: SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Calcium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE



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Environmental Science

Analytical Report Number : 23-36349

Project / Site name: RKG

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Magnesium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Turbidity of in water	Determination of sample turbidity by colorimeter and comparison with standard reference samples.	In-house method based on Standard Method 8237	L083-PL	W	NONE
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

\$\$ - Result was reported from high dilution. The result should be interpreted with caution.



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Environmental Science

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**Analytical Report Number : 23-36349**

Replaces Analytical Report Number: 23-36349, issue no. 3; Changed results for Chloride in sample 2694606; Added caveat for Chloride, Sulphate as SO<sub>4</sub>, Sodium, Calcium, Strontium, Lithium, Silicone

<b>Project / Site name:</b>	RKG	<b>Samples received on:</b>	30/05/2023
<b>Your job number:</b>		<b>Sample instructed on/ Analysis started on:</b>	31/05/2023
<b>Your order number:</b>	4429V3	<b>Analysis completed by:</b>	07/06/2023
<b>Report Issue Number:</b>	3	<b>Report issued on:</b>	11/09/2023
<b>Samples Analysed:</b>	29 water samples		

**i2 Analytical Limited Sp. z o.o.**  
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**Signed:**

Izabela Wójcik  
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Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

Sampling and delivery by client.

Excel copies of reports are only valid when accompanied by this PDF certificate.

soils - 4 weeks from reporting  
leachates - 2 weeks from reporting  
waters - 2 weeks from reporting  
asbestos - 6 months from reporting



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694605			2694606	2694607
Sample Reference	FS16			FS20-PB	PVTBH12
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	20/05/2023			20/05/2023	21/05/2023
Time Taken	1420			1250	0945
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

Parameter	Units	Limit of detection	Accreditation Status	2694605	2694606	2694607
pH	pH Units	N/A	ISO 17025	7.7	7.7	7.8
Electrical Conductivity	µS/cm	10	ISO 17025	8200	5600	3900
Turbidity	NTU	1	NONE	10	1.6	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	1110000 \$\$	1250000	662000
Chloride	mg/l	0.15	ISO 17025	2000 \$\$	1600 \$\$	930
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	550	370	1500
Ammonium as NH4	µg/l	15	ISO 17025	37	16	110
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.04	1.49	1.05
Nitrate as N	mg/l	0.01	ISO 17025	1	8.72	4.31
Nitrite as N	µg/l	1	ISO 17025	< 1.0	10	3.2
Alkalinity	mg/l	3	ISO 17025	95	25	250
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	110	35	250
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	57	9	6
Total Dissolved Solids	mg/l	4	ISO 17025	6000	4100	2700
Hardness - Total	mgCaCO3/l	1	ISO 17025	1390	1120	514
Calcium Hardness	mg/l	0.03	NONE	1120	1040	334
Magnesium Hardness	mg/l	0.08	NONE	266	76.4	180

**Heavy Metals / Metalloids ICP-MS**

Parameter	Units	Limit of detection	Accreditation Status	2694605	2694606	2694607
Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0031	0.0026	0.0012
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.5	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.48	9.38	7.43
Barium (dissolved)	µg/l	0.06	ISO 17025	31	16	16
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.06	0.03	0.09
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.9	52	1.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3	2.4	3.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	120	63	300
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.48	6.4	0.33
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	15	14	18
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.7	0.8	0.8
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	6700 \$\$	9400 \$\$	12000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	8	16	3.9
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.5	24	19
Zinc (dissolved)	µg/l	0.5	ISO 17025	14	5.9	12
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694605	2694606	2694607
Sample Reference				FS16	FS20-PB	PVTBH12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				20/05/2023	20/05/2023	21/05/2023
Time Taken				1420	1250	0945
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	1.4
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	9900 \$\$	8400 \$\$	850
Rubidium (dissolved)	µg/l	5	NONE	1.9	1.04	8.3
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	2.9	2.5	< 1.0
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	450	420	130
Magnesium (dissolved)	mg/l	0.005	ISO 17025	65	19	44
Potassium (dissolved)	mg/l	0.025	ISO 17025	7.8	4	7.4
Sodium (dissolved)	mg/l	0.01	ISO 17025	1300 \$\$	1200	870
Phosphorus (dissolved)	µg/l	20	ISO 17025	251	279	275
Boron (dissolved)	µg/l	10	ISO 17025	2000	5800	1700
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	41	41	33
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	290	360	330



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694608	2694609	2694610
Sample Reference				PVTBH11	PVTBH13	PVTBH14
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				21/05/2023	21/05/2023	21/05/2023
Time Taken				1015	1040	1110
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	8.1	7.5	7.6
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	4000	4300	4100
Turbidity	NTU	1	NONE	1.6	< 1.0	17
Sulphate as SO4	µg/l	45	ISO 17025	661000	736000	682000 \$\$
Chloride	mg/l	0.15	ISO 17025	970	1100 \$\$	1000
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	1500	1600	1500
Ammonium as NH4	µg/l	15	ISO 17025	61	75	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.05	1.09	1.23
Nitrate as N	mg/l	0.01	ISO 17025	4.09	3.43	4.26
Nitrite as N	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Alkalinity	mg/l	3	ISO 17025	260	280	260
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	250	310	280
Carbonate Alkalinity as CO3	mg/l	3	NONE	12	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	6	8	< 2.0
Total Dissolved Solids	mg/l	4	ISO 17025	2800	2900	2900
Hardness - Total	mgCaCO3/l	1	ISO 17025	526	518	580
Calcium Hardness	mg/l	0.03	NONE	342	335	372
Magnesium Hardness	mg/l	0.08	NONE	184	183	208

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0014	0.0012	0.0014
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.6	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	7.42	7.85	5.6
Barium (dissolved)	µg/l	0.06	ISO 17025	15	14	18
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04	0.06	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.1	0.6	1.7
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.4	2.4	3.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	330	400	360
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.97	84	0.93
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	18	20	16
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	0.5	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	13000 \$\$	11000 \$\$	9300 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	4.4	4.2	4.3
Vanadium (dissolved)	µg/l	0.2	ISO 17025	21	22	17
Zinc (dissolved)	µg/l	0.5	ISO 17025	8.7	8.1	4.6
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694608	2694609	2694610
Sample Reference				PVTBH11	PVTBH13	PVTBH14
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				21/05/2023	21/05/2023	21/05/2023
Time Taken				1015	1040	1110
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	1.5	1.4	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	870	820	1000
Rubidium (dissolved)	µg/l	5	NONE	8.6	9.8	8.6
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.48	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	140	130	150
Magnesium (dissolved)	mg/l	0.005	ISO 17025	45	44	51
Potassium (dissolved)	mg/l	0.025	ISO 17025	7.1	7.6	7.3
Sodium (dissolved)	mg/l	0.01	ISO 17025	940	1000	940
Phosphorus (dissolved)	µg/l	20	ISO 17025	279	303	277
Boron (dissolved)	µg/l	10	ISO 17025	1200	2000	1700
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	34	22	34
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	340	400	300



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694611			2694612	2694613
Sample Reference	SB-25			SB-30	FS8-PB
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	24/05/2023			24/05/2023	23/05/2023
Time Taken	1840			0710	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

	pH Units	N/A	ISO 17025	7.1	7.1	9.3
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	23000	23000	7400
Turbidity	NTU	1	NONE	190	640	31
Sulphate as SO4	µg/l	45	ISO 17025	1610000 \$\$	1620000 \$\$	8220000 \$\$
Chloride	mg/l	0.15	ISO 17025	7000 \$\$	7300 \$\$	2000 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	330	370	580
Ammonium as NH4	µg/l	15	ISO 17025	170	200	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	U/S	U/S	3.45
Nitrate as N	mg/l	0.01	ISO 17025	0.37	0.21	4.15
Nitrite as N	µg/l	1	ISO 17025	1.1	< 1.0	9.3
Alkalinity	mg/l	3	ISO 17025	340	340	28
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	390	390	4
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	26
Total Suspended Solids	mg/l	2	ISO 17025	180	120	76
Total Dissolved Solids	mg/l	4	ISO 17025	17000	17000	5500
Hardness - Total	mgCaCO3/l	1	ISO 17025	5140	5270	990
Calcium Hardness	mg/l	0.03	NONE	3640	3730	904
Magnesium Hardness	mg/l	0.08	NONE	1500	1530	85.9

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	< 0.0010	0.002	0.0085
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	1	1	0.7
Arsenic (dissolved)	µg/l	0.15	ISO 17025	5.59	5.46	2.28
Barium (dissolved)	µg/l	0.06	ISO 17025	30	30	22
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	8.1	8.8	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.2	0.3	4.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	11	11	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	31	33	3.2
Lead (dissolved)	µg/l	0.2	ISO 17025	1.4	1.5	< 0.2
Lithium (dissolved)	µg/l	1	NONE	5000 \$\$	4600 \$\$	150
Manganese (dissolved)	µg/l	0.05	ISO 17025	2100	3600	78
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	18	18	38
Nickel (dissolved)	µg/l	0.5	ISO 17025	8.7	8.8	2.9
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	21000 \$\$	19000 \$\$	18000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	6.2
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.9	0.9	29
Zinc (dissolved)	µg/l	0.5	ISO 17025	32	39	1.3
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694611	2694612	2694613
Sample Reference				SB-25	SB-30	FS8-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				24/05/2023	24/05/2023	23/05/2023
Time Taken				1840	0710	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	11
Strontium (dissolved)	µg/l	1	NONE	31000 \$\$	28000 \$\$	7200 \$\$
Rubidium (dissolved)	µg/l	5	NONE	11.4	12.7	3.3
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	2.6	2.9	2.8
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	1500\$\$	1500\$\$	360\$\$
Magnesium (dissolved)	mg/l	0.005	ISO 17025	360	370	21
Potassium (dissolved)	mg/l	0.025	ISO 17025	32	35	7.3
Sodium (dissolved)	mg/l	0.01	ISO 17025	4100 \$\$	4200 \$\$	1200 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	265	276	293
Boron (dissolved)	µg/l	10	ISO 17025	19000	19000	4300
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	64	79	32
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	-
Phosphorus (total)	µg/l	20	ISO 17025	330	330	330



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694614			2694615	2694616
Sample Reference	FS17			FS19	FS26
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	19/05/2023			19/05/2023	19/05/2023
Time Taken	1230			1300	1700
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

	pH Units	N/A	ISO 17025	7.3	7.6	7.9
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	9500	12000	9100
Turbidity	NTU	1	NONE	92	19	2.6
Sulphate as SO4	µg/l	45	ISO 17025	1300000 \$\$	1310000 \$\$	1300000 \$\$
Chloride	mg/l	0.15	ISO 17025	2200 \$\$	3100 \$\$	2000 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	140	97	< 62
Fluoride	µg/l	50	ISO 17025	290	110	400
Ammonium as NH4	µg/l	15	ISO 17025	8100	87	3400
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.78	U/S	6.46
Nitrate as N	mg/l	0.01	ISO 17025	9.76	1.78	4.22
Nitrite as N	µg/l	1	ISO 17025	1900	8.9	960
Alkalinity	mg/l	3	ISO 17025	86	170	21
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	100	190	27
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	28	90	7
Total Dissolved Solids	mg/l	4	ISO 17025	7500	8600	6700
Hardness - Total	mgCaCO3/l	1	ISO 17025	2230	2990	1920
Calcium Hardness	mg/l	0.03	NONE	1690	2290	1470
Magnesium Hardness	mg/l	0.08	NONE	547	699	447

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0023	0.0021	0.005
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.6	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.04	0.48	0.15
Barium (dissolved)	µg/l	0.06	ISO 17025	20	37	26
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.06	0.05	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	17	1.6	0.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	6.6	4.1	4.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.4	< 0.2
Lithium (dissolved)	µg/l	1	NONE	120	130	100
Manganese (dissolved)	µg/l	0.05	ISO 17025	40	2.4	410
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	5.6	3.2	5.8
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.7	3.8	0.7
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	11000 \$\$	22000 \$\$	3000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	32	3	17
Vanadium (dissolved)	µg/l	0.2	ISO 17025	8.4	2.7	0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	6.5	23	14
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694614	2694615	2694616
Sample Reference				FS17	FS19	FS26
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	19/05/2023	19/05/2023
Time Taken				1230	1300	1700
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	19000 \$\$	23000 \$\$	18000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	2.8	3.1	4.9
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	4.8	5.1	4.6
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	0.31

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	680\$\$	920\$\$	590
Magnesium (dissolved)	mg/l	0.005	ISO 17025	130	170	110
Potassium (dissolved)	mg/l	0.025	ISO 17025	15	15	18
Sodium (dissolved)	mg/l	0.01	ISO 17025	1300 \$\$	1600 \$\$	1400 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	352	312	315
Boron (dissolved)	µg/l	10	ISO 17025	2000	2400	2300
Iron (dissolved)	mg/l	0.004	ISO 17025	0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	50	51	40
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	390	340	320



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694617	2694618	2694619
Sample Reference				FS11	FS13	WW29
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	19/05/2023	24/05/2023
Time Taken				1115	1210	1410
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	7.4	7.7	7.5
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	12000	11000	24000
Turbidity	NTU	1	NONE	2.7	13	89
Sulphate as SO4	µg/l	45	ISO 17025	1430000 \$\$	1290000 \$\$	1850000 \$\$
Chloride	mg/l	0.15	ISO 17025	3300 \$\$	2400 \$\$	6800 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	320	310	730
Ammonium as NH4	µg/l	15	ISO 17025	120	< 15	130
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	U/S	U/S	U/S
Nitrate as N	mg/l	0.01	ISO 17025	5.48	13.4	18.2
Nitrite as N	µg/l	1	ISO 17025	2.5	< 1.0	46
Alkalinity	mg/l	3	ISO 17025	26	38	53
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	38	38	89
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	26	45	170
Total Dissolved Solids	mg/l	4	ISO 17025	8700	8000	16000
Hardness - Total	mgCaCO3/l	1	ISO 17025	3340	2680	2990
Calcium Hardness	mg/l	0.03	NONE	2570	1980	2550
Magnesium Hardness	mg/l	0.08	NONE	774	690	436

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0017	0.002	0.0055
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.8	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.59	0.62	6.58
Barium (dissolved)	µg/l	0.06	ISO 17025	29	15	20
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.08	0.11	0.18
Chromium (dissolved)	µg/l	0.2	ISO 17025	12	28	44
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	4.5	1.6	1.6
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	210	140	290
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.81	2.5	36
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	10	5.9	26
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.5	2.8	1.3
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	12000 \$\$	9800 \$\$	10000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	9.6	30	34
Vanadium (dissolved)	µg/l	0.2	ISO 17025	4.3	2.7	9.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	19	8.2	5.8
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694617	2694618	2694619
Sample Reference				FS11	FS13	WW29
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	19/05/2023	24/05/2023
Time Taken				1115	1210	1410
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	27000 \$\$	18000 \$\$	19000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	2.7	1.4	2.5
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	6.3	4.8	2.8
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	1000	790	1000
Magnesium (dissolved)	mg/l	0.005	ISO 17025	190	170	110
Potassium (dissolved)	mg/l	0.025	ISO 17025	15	12	14
Sodium (dissolved)	mg/l	0.01	ISO 17025	1200 \$\$	1300 \$\$	5200 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	270	308	256
Boron (dissolved)	µg/l	10	ISO 17025	3700	2500	3400
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	63	55	57
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	270	390	310



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694620	2694621	2694622
Sample Reference				Tung Catcaw	Natizai	kirtaka
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	22/05/2023	22/05/2023
Time Taken				1305	1210	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	8.5	8.3	7.7
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	910	2700	5000
Turbidity	NTU	1	NONE	4.6	5.2	13
Sulphate as SO4	µg/l	45	ISO 17025	188000	607000	1120000
Chloride	mg/l	0.15	ISO 17025	78	520	1200 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	67	64
Fluoride	µg/l	50	ISO 17025	490	1100	520
Ammonium as NH4	µg/l	15	ISO 17025	< 15	34	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.27	1.5	6.97
Nitrate as N	mg/l	0.01	ISO 17025	4.99	4.9	0.09
Nitrite as N	µg/l	1	ISO 17025	1.7	1.9	370
Alkalinity	mg/l	3	ISO 17025	130	160	41
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	120	150	50
Carbonate Alkalinity as CO3	mg/l	3	NONE	5.8	6.2	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0	< 2.0	35
Total Dissolved Solids	mg/l	4	ISO 17025	720	1800	3600
Hardness - Total	mgCaCO3/l	1	ISO 17025	79.3	365	1080
Calcium Hardness	mg/l	0.03	NONE	63.4	270	1050
Magnesium Hardness	mg/l	0.08	NONE	15.9	94.8	31.3

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0037	0.0026	0.0027
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	1.1	0.8	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	8.78	20.1	347
Barium (dissolved)	µg/l	0.06	ISO 17025	6.2	58	20
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.03	0.08
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.5	3.6	0.3
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	6.7	4.3	4.1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	16	100	140
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.61	0.92	16
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	14	29	23
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	4600 \$\$	5300 \$\$	12000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	18	5.1	4
Vanadium (dissolved)	µg/l	0.2	ISO 17025	19	6.8	3.7
Zinc (dissolved)	µg/l	0.5	ISO 17025	6.3	11	8.3
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694620	2694621	2694622
Sample Reference				Tung Catcaw	Natizai	kirtaka
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	22/05/2023	22/05/2023
Time Taken				1305	1210	1625
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	260	1100	6200 \$\$
Rubidium (dissolved)	µg/l	5	NONE	0.9	2.1	2.0
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	< 1.0	1.3	2.5
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	25	110	420
Magnesium (dissolved)	mg/l	0.005	ISO 17025	3.9	23	7.6
Potassium (dissolved)	mg/l	0.025	ISO 17025	1.4	8.2	4.5
Sodium (dissolved)	mg/l	0.01	ISO 17025	190	590	930
Phosphorus (dissolved)	µg/l	20	ISO 17025	367	356	327
Boron (dissolved)	µg/l	10	ISO 17025	680	2200	12000
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	47	42	45
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	370	390	350



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number	2694623			2694624	2694625
Sample Reference	Bore Chan			Maskin	WW6-PB
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	None Supplied			None Supplied	None Supplied
Date Sampled	22/05/2023			23/05/2023	24/05/2023
Time Taken	1410			1325	0810
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

**General Inorganics**

	pH Units	N/A	ISO 17025	8.1	8.4	7.5
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	3000	3100	24000
Turbidity	NTU	1	NONE	2.6	2.6	3.6
Sulphate as SO4	µg/l	45	ISO 17025	1110000	714000	2100000 \$\$
Chloride	mg/l	0.15	ISO 17025	430	580	6300 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	560	1800	190
Ammonium as NH4	µg/l	15	ISO 17025	< 15	< 15	300
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.05	1.29	U/S
Nitrate as N	mg/l	0.01	ISO 17025	1.03	5.62	1.62
Nitrite as N	µg/l	1	ISO 17025	< 1.0	5	26
Alkalinity	mg/l	3	ISO 17025	88	150	910
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	79	130	920
Carbonate Alkalinity as CO3	mg/l	3	NONE	9.1	14	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0	13	20
Total Dissolved Solids	mg/l	4	ISO 17025	2400	2100	16000
Hardness - Total	mgCaCO3/l	1	ISO 17025	818	485	4080
Calcium Hardness	mg/l	0.03	NONE	690	360	1250
Magnesium Hardness	mg/l	0.08	NONE	129	126	2830

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0037	0.0023	0.0031
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.63	7.86	69.8
Barium (dissolved)	µg/l	0.06	ISO 17025	16	14	36
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.05	< 0.02	0.11
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.4	1.4	1
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	0.5
Copper (dissolved)	µg/l	0.5	ISO 17025	3.2	2.2	25
Lead (dissolved)	µg/l	0.2	ISO 17025	0.2	< 0.2	0.3
Lithium (dissolved)	µg/l	1	NONE	66	85	5600 \$\$
Manganese (dissolved)	µg/l	0.05	ISO 17025	7.9	0.53	150
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	16	35	5.9
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	6.6
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	5600 \$\$	5400 \$\$	65000 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	8.2	7.1	< 4.0
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.8	2.3	33
Zinc (dissolved)	µg/l	0.5	ISO 17025	9.6	4.7	25
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694623	2694624	2694625
Sample Reference				Bore Chan	Maskin	WW6-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	23/05/2023	24/05/2023
Time Taken				1410	1325	0810
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	1100	1700	16000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	1.4	1.8	13.2
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	1.2	1.8	2.4
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.32	0.32

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	280	140	500\$\$
Magnesium (dissolved)	mg/l	0.005	ISO 17025	31	30	690
Potassium (dissolved)	mg/l	0.025	ISO 17025	2.6	4.2	38
Sodium (dissolved)	mg/l	0.01	ISO 17025	560	670	4500 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	316	309	321
Boron (dissolved)	µg/l	10	ISO 17025	13000	1800	16000
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	0.008
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	38	36	33
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	< 4.0
Phosphorus (total)	µg/l	20	ISO 17025	340	320	330



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694626	2694627	2694628
Sample Reference				Beeduk	WW15	FS4-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				23/05/2023	24/05/2023	19/05/2023
Time Taken				1135	1120	1630
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	pH Units	N/A	ISO 17025	7.9	6.7	8.1
pH						
Electrical Conductivity	µS/cm	10	ISO 17025	1600	290000	8700
Turbidity	NTU	1	NONE	< 1.0	140	7.7
Sulphate as SO4	µg/l	45	ISO 17025	388000	996000	1230000\$\$
Chloride	mg/l	0.15	ISO 17025	280	120000 \$\$	2300 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	900	93	410
Ammonium as NH4	µg/l	15	ISO 17025	< 15	5600	3600
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.1	U/S	2.82
Nitrate as N	mg/l	0.01	ISO 17025	6.01	18.5	3.75
Nitrite as N	µg/l	1	ISO 17025	< 1.0	21	830
Alkalinity	mg/l	3	ISO 17025	160	U/S	32
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	150	27	28
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0	260	19
Total Dissolved Solids	mg/l	4	ISO 17025	1300	180000	8600
Hardness - Total	mgCaCO3/l	1	ISO 17025	312	46400	1720
Calcium Hardness	mg/l	0.03	NONE	231	41500	1320
Magnesium Hardness	mg/l	0.08	NONE	80.8	4900	400

**Heavy Metals / Metalloids ICP-MS**

	mg/l	0.001	ISO 17025	0.0019	0.0026	0.0066
Aluminium (dissolved)						
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.8	0.8	0.7
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.18	8.53	0.17
Barium (dissolved)	µg/l	0.06	ISO 17025	24	440	26
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	38	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	3	3.2	0.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.8	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.6	63	2.8
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	66	< 0.2
Lithium (dissolved)	µg/l	1	NONE	47	120	130
Manganese (dissolved)	µg/l	0.05	ISO 17025	2	840	38
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	0.57	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	20	32	6.1
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	2.3	0.6
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	65.7	< 0.05
Silicon (dissolved)	µg/l	50	NONE	4800 \$\$	2800 \$\$	2900 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	6	590	18
Vanadium (dissolved)	µg/l	0.2	ISO 17025	3.2	2	0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.7	30	13
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694626	2694627	2694628
Sample Reference				Beeduk	WW15	FS4-PB
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				23/05/2023	24/05/2023	19/05/2023
Time Taken				1135	1120	1630
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	830	370000 \$\$	18000 \$\$
Rubidium (dissolved)	µg/l	5	NONE	1.3	0.2	7.9
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	1.1	< 1.0	7.6
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	0.97	0.34

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	92	17000\$\$	530
Magnesium (dissolved)	mg/l	0.005	ISO 17025	20	1200	97
Potassium (dissolved)	mg/l	0.025	ISO 17025	3.4	110	18
Sodium (dissolved)	mg/l	0.01	ISO 17025	290	39000 \$\$	1400 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	311	204	300
Boron (dissolved)	µg/l	10	ISO 17025	990	1900	2300
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	0.007	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	36	219	46
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	360	400	530



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694629	2694630	2694631
Sample Reference				FS5	Multiple Spring	PVBTH15
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	22/05/2023	21/05/2023
Time Taken				1510	1540	0910
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

Parameter	Units	Limit of detection	Accreditation Status	2694629	2694630	2694631
pH	pH Units	N/A	ISO 17025	10	7.8	7.9
Electrical Conductivity	µS/cm	10	ISO 17025	8200	4900	3800
Turbidity	NTU	1	NONE	100	4.7	1.7
Sulphate as SO4	µg/l	45	ISO 17025	1220000	1390000	610000
Chloride	mg/l	0.15	ISO 17025	2400 \$\$	1100 \$\$	930
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	580	340	1500
Ammonium as NH4	µg/l	15	ISO 17025	4500	< 15	32
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	5.12	1.28	0.98
Nitrate as N	mg/l	0.01	ISO 17025	0.11	0.13	7.27
Nitrite as N	µg/l	1	ISO 17025	9.9	< 1.0	15
Alkalinity	mg/l	3	ISO 17025	32	76	180
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	< 3.0	85	190
Carbonate Alkalinity as CO3	mg/l	3	NONE	22	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	120	5	< 2.0
Total Dissolved Solids	mg/l	4	ISO 17025	6000	4100	2600
Hardness - Total	mgCaCO3/l	1	ISO 17025	1100	1550	454
Calcium Hardness	mg/l	0.03	NONE	1070	1340	264
Magnesium Hardness	mg/l	0.08	NONE	22	206	190

**Heavy Metals / Metalloids ICP-MS**

Parameter	Units	Limit of detection	Accreditation Status	2694629	2694630	2694631
Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0321	0.002	0.001
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.9	0.6	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.72	1.17	4.17
Barium (dissolved)	µg/l	0.06	ISO 17025	32	10	21
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.04	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.6	0.3	6.9
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	1.8	3.8	3.2
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	86	110	110
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.64	0.62	4.6
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	24	13	16
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.5	< 0.5	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	2600 \$\$	4200 \$\$	8100 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	2	6.5	4.5
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6	0.4	15
Zinc (dissolved)	µg/l	0.5	ISO 17025	7	5.4	100
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694629	2694630	2694631
Sample Reference				FS5	Multiple Spring	PVBTH15
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				19/05/2023	22/05/2023	21/05/2023
Time Taken				1510	1540	0910
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	12000 \$\$	1900	780
Rubidium (dissolved)	µg/l	5	NONE	5.5	3.5	7.4
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	5.9	2.6	1.2
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	0.59	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	430	540	110
Magnesium (dissolved)	mg/l	0.005	ISO 17025	5.3	50	46
Potassium (dissolved)	mg/l	0.025	ISO 17025	12	4.2	7.3
Sodium (dissolved)	mg/l	0.01	ISO 17025	1300 \$\$	630 \$\$	860 \$\$
Phosphorus (dissolved)	µg/l	20	ISO 17025	375	267	269
Boron (dissolved)	µg/l	10	ISO 17025	3000	14000	1300
Iron (dissolved)	mg/l	0.004	ISO 17025	0.055	0.005	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	37	48	36
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-
Phosphorus (total)	µg/l	20	ISO 17025	410	320	300



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

<b>Lab Sample Number</b>				2694632	2694633
<b>Sample Reference</b>				WW8	Humai Well
<b>Sample Number</b>				None Supplied	None Supplied
<b>Depth (m)</b>				None Supplied	None Supplied
<b>Date Sampled</b>				21/05/2023	21/05/2023
<b>Time Taken</b>				1355	1300
<b>Analytical Parameter (Water Analysis)</b>	<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>		

**General Inorganics**

pH	pH Units	N/A	ISO 17025	7.6	7.6
Electrical Conductivity	µS/cm	10	ISO 17025	57000	4400
Turbidity	NTU	1	NONE	2.5	5.6
Sulphate as SO4	µg/l	45	ISO 17025	808000 \$\$	803000
Chloride	mg/l	0.15	ISO 17025	24000 \$\$	1100 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62
Fluoride	µg/l	50	ISO 17025	1200	1200
Ammonium as NH4	µg/l	15	ISO 17025	440	71
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	U/S	1.64
Nitrate as N	mg/l	0.01	ISO 17025	4.03	2.12
Nitrite as N	µg/l	1	ISO 17025	38	6.3
Alkalinity	mg/l	3	ISO 17025	U/S	190
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	36	200
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	< 3.0
Total Suspended Solids	mg/l	2	ISO 17025	31	3
Total Dissolved Solids	mg/l	4	ISO 17025	37000	3500
Hardness - Total	mgCaCO3/l	1	ISO 17025	14200	650
Calcium Hardness	mg/l	0.03	NONE	13800	429
Magnesium Hardness	mg/l	0.08	NONE	429	221

**Heavy Metals / Metalloids ICP-MS**

Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0014	0.0036
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	3.75	8.96
Barium (dissolved)	µg/l	0.06	ISO 17025	100	20
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.07	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3	1.5
Cobalt (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.2	3
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	0.2
Lithium (dissolved)	µg/l	1	NONE	1600	280
Manganese (dissolved)	µg/l	0.05	ISO 17025	460	2.8
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	98	9.4
Nickel (dissolved)	µg/l	0.5	ISO 17025	42	< 0.5
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	9700 \$\$	6300 \$\$
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	2.9
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5	5.7
Zinc (dissolved)	µg/l	0.5	ISO 17025	7.8	12
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-36349

Project / Site name: RKG

Your Order No: 4429V3

Lab Sample Number				2694632	2694633
Sample Reference				WW8	Humai Well
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				21/05/2023	21/05/2023
Time Taken				1355	1300
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		
Titanium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Strontium (dissolved)	µg/l	1	NONE	100000 \$\$	1200
Rubidium (dissolved)	µg/l	5	NONE	< 5	17.02
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Palladium (dissolved)	µg/l	1	NONE	1.7	1.9
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20

**Heavy Metals / Metalloids ICP-OES**

Calcium (dissolved)	mg/l	0.012	ISO 17025	5500 \$\$	170
Magnesium (dissolved)	mg/l	0.005	ISO 17025	100	54
Potassium (dissolved)	mg/l	0.025	ISO 17025	23	12
Sodium (dissolved)	mg/l	0.01	ISO 17025	8100 \$\$	930
Phosphorus (dissolved)	µg/l	20	ISO 17025	217	350
Boron (dissolved)	µg/l	10	ISO 17025	36000	2300
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004
Gold (dissolved)	µg/l	50	NONE	< 50	< 50
Indium (dissolved)	µg/l	5	NONE	206	37
Uranium (dissolved)	µg/l	50	NONE	< 50	< 50
Gallium (dissolved)	µg/l	5	NONE	< 5	< 5
Germanium (dissolved)	µg/l	5	NONE	< 5	< 5
Neodymium (dissolved)	µg/l	5	NONE	< 5	< 5
Scandium (dissolved)	µg/l	5	NONE	< 5	< 5
Samarium (dissolved)	µg/l	5	NONE	< 5	< 5
Yttrium (dissolved)	µg/l	5	NONE	< 5	< 5
Nickel (dissolved)	µg/l	0.3	ISO 17025	42	-
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	-
Phosphorus (total)	µg/l	20	ISO 17025	220	360



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Environmental Science

Analytical Report Number : 23-36349

Project / Site name: RKG

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (total)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW (Al, Fe, Cu, Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Total Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices: SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Calcium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE



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Environmental Science

Analytical Report Number : 23-36349

Project / Site name: RKG

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Magnesium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Turbidity of in water	Determination of sample turbidity by colorimeter and comparison with standard reference samples.	In-house method based on Standard Method 8237	L083-PL	W	NONE
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

\$\$ - Result was reported from high dilution. The result should be interpreted with caution.



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Environmental Science

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**Analytical Report Number : 23-38842**

Replaces Analytical Report Number: 23-38842, issue no. 1; Added caveat for Sodium, Chloride, Silicon

<b>Project / Site name:</b>	RKG	<b>Samples received on:</b>	13/06/2023
<b>Your job number:</b>		<b>Sample instructed on/ Analysis started on:</b>	13/06/2023
<b>Your order number:</b>		<b>Analysis completed by:</b>	21/06/2023
<b>Report Issue Number:</b>	2	<b>Report issued on:</b>	11/09/2023
<b>Samples Analysed:</b>	3 water samples		

**i2 Analytical Limited Sp. z o.o.**  
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**Signed:**

Izabela Wójcik  
Reporting Specialist  
**For & on behalf of i2 Analytical Ltd.**

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Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

Sampling and delivery by client.

Excel copies of reports are only valid when accompanied by this PDF certificate.

soils - 4 weeks from reporting  
leachates - 2 weeks from reporting  
waters - 2 weeks from reporting  
asbestos - 6 months from reporting



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Environmental Science

Analytical Report Number: 23-38842

Project / Site name: RKG

Lab Sample Number				2710900	2710901	2710902
Sample Reference				NK-F1	NK-RHC	NK-OFFICE
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				01/06/2023	01/06/2023	02/06/2023
Time Taken				1800	1600	1950
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

**General Inorganics**

	Units		ISO 17025	2710900	2710901	2710902
pH	pH Units	N/A	ISO 17025	7.7	7.4	7.6
Electrical Conductivity	µS/cm	10	ISO 17025	12000	7600	9000
Turbidity	NTU	1	NONE	12	< 1.0	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	1740000	1530000	2460000
Chloride	mg/l	0.15	ISO 17025	3900 \$\$	1800 \$\$	2000 \$\$
Phosphate as PO4	µg/l	62	ISO 17025	< 62	< 62	84
Fluoride	µg/l	50	ISO 17025	910	500	130
Ammonium as NH4	µg/l	15	ISO 17025	130	< 15	< 15
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.7	0.33	0.37
Total Organic Carbon (TOC)	mg/l	0.01	ISO 17025	0.06	0.18	20.4
Nitrite as N	µg/l	1	ISO 17025	3.7	3.1	19
Alkalinity	mg/l	3	ISO 17025	110	U/S	67
Total Suspended Solids	mg/l	2	ISO 17025	89	< 2.0	12
Total Dissolved Solids	mg/l	4	ISO 17025	8500	6100	7100
Bicarbonate Alkalinity (as CaCO3)	mg/l	3	NONE	120	180	75
Carbonate Alkalinity as CO3	mg/l	3	NONE	< 3.0	18	< 3.0
Calcium Hardness	mg/l	0.03	NONE	1060	1150	1340
Magnesium Hardness	mg/l	0.08	NONE	363	623	529
Hardness - Total	mgCaCO3/l	1	ISO 17025	1420	1780	1870

**Heavy Metals / Metalloids**

	Units		ISO 17025	2710900	2710901	2710902
Aluminium (dissolved)	mg/l	0.001	ISO 17025	0.0016	< 0.0010	< 0.0010
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7	0.7	0.6
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.69	38.6	22.7
Barium (dissolved)	µg/l	0.06	ISO 17025	38	15	17
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1
Boron (dissolved)	µg/l	10	ISO 17025	6300	4700	5400
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.03	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	5.5	4.8
Cobalt (dissolved)	µg/l	0.2	ISO 17025	0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	0.9	2.9	1.1
Iridium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Iron (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004	< 0.004
Gallium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Lithium (dissolved)	µg/l	1	NONE	570	300	490
Manganese (dissolved)	µg/l	0.05	ISO 17025	66	0.56	1.7
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	14	50	40
Neodymium (dissolved)	µg/l	8	NONE	< 8.0	< 8.0	< 8.0
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.7	1	< 0.5
Osmium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-38842

Project / Site name: RKG

Lab Sample Number				2710900	2710901	2710902
Sample Reference				NK-F1	NK-RHC	NK-OFFICE
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				01/06/2023	01/06/2023	02/06/2023
Time Taken				1800	1600	1950
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Palladium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Phosphorus (dissolved)	µg/l	20	ISO 17025	506	526	689
Rubidium (dissolved)	µg/l	8	NONE	< 8.0	< 8.0	< 8.0
Ruthenium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Samarium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Scandium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Silicon (dissolved)	µg/l	50	NONE	2100	16000 \$\$	17000 \$\$
Selenium (dissolved)	µg/l	0.6	ISO 17025	7.4	12	17
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.1	180	79
Zinc (dissolved)	µg/l	0.5	ISO 17025	1100	7.4	6.2
Platinum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Zirconium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Bismuth (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Nobium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50
Germanium (dissolved)	µg/l	20	NONE	< 20	< 20	< 20
Indium (dissolved)	µg/l	5	NONE	< 5	< 5	< 5
Thallium (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Titanium (dissolved)	µg/l	1	NONE	< 1.0	1.3	1
Uranium (dissolved)	µg/l	8	NONE	< 8.0	< 8.0	< 8.0
Tungsten (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Yttrium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Strontium (dissolved)	µg/l	1	NONE	4400	2400	3400
Tin (dissolved)	µg/l	0.2	ISO 17025	10	0.3	< 0.20
Calcium (dissolved)	mg/l	0.012	ISO 17025	420	460	540
Magnesium (dissolved)	mg/l	0.005	ISO 17025	88	150	130
Potassium (dissolved)	mg/l	0.025	ISO 17025	30	21	72
Sodium (dissolved)	mg/l	0.01	ISO 17025	2000 \$\$	1400 \$\$	1900 \$\$
Phosphorus (total)	µg/l	20	ISO 17025	570	620	710



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Environmental Science

Analytical Report Number : 23-38842

Project / Site name: RKG

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (total)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW (Al, Fe, Cu, Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Total Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices: SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Calcium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE



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Environmental Science

Analytical Report Number : 23-38842

Project / Site name: RKG

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Magnesium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L025-PL	W	NONE
Turbidity of in water	Determination of sample turbidity by colorimeter and comparison with standard reference samples.	In-house method based on Standard Method 8237	L083-PL	W	NONE
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.**

**For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.**

**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**

\$\$ - Result was reported from high dilution. The result should be interpreted with caution.



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Environmental Science

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## **Analytical Report Number : 24-024258**

Replaces Analytical Report Number: 24-024258, issue no. 1; Added NO<sub>2</sub>, NO<sub>3</sub>, SO<sub>4</sub> to all samples

<b>Project / Site name:</b>	Reko Diq	<b>Samples received on:</b>	10/06/2024
<b>Your job number:</b>	TAILING STORAGE FACILITY	<b>Sample instructed on/ Analysis started on:</b>	10/06/2024
<b>Your order number:</b>		<b>Analysis completed by:</b>	05/07/2024
<b>Report Issue Number:</b>	2	<b>Report issued on:</b>	08/07/2024
<b>Samples Analysed:</b>	5 water samples		

**i2 Analytical Limited Sp. z o.o.**  
Oddział w Polsce  
ul. Pionierów 39  
41-711 Ruda Śląska  
NIP: 2050000782

Joanna Wawrzeczko  
*Joanna Wawrzeczko*  
Starszy Specjalista  
Działu Analiz Raportów

**Signed:** \_\_\_\_\_

Joanna Wawrzeczko  
Senior Reporting Specialist  
**For & on behalf of i2 Analytical Ltd.**

Head office located at 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS UK.  
Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.  
Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

Sampling and delivery by client.

Excel copies of reports are only valid when accompanied by this PDF certificate.

soils - 4 weeks from reporting  
leachates - 2 weeks from reporting  
waters - 2 weeks from reporting  
asbestos - 6 months from reporting



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Environmental Science

Analytical Report Number: 24-024258

Project / Site name: Reko Diq

Lab Sample Number	222926	222927	222928	222929
Sample Reference	TSF-BH-04	TSF-BH-06	TSF-BH-11	TSF-BH-16
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	17.96	16.62	6.68	24.18
Date Sampled	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Time Taken	1053	1156	1010	0900
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

## General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	222926	222927	222928	222929
pH (L099)	pH Units	N/A	ISO 17025	7.3	6.7	7.3	6.9
Electrical Conductivity at 20°C	µS/cm	10	ISO 17025	88000	100000	76000	34000
Turbidity	NTU	1	NONE	4.1	2.4	2.1	8.9
Sulphate as SO <sub>4</sub>	mg/l	0.045	ISO 17025	7710	1910	9220	3850
Chloride	mg/l	0.15	ISO 17025	27000 <sup>55</sup>	38000 <sup>55</sup>	23000 <sup>55</sup>	9500 <sup>55</sup>
Total Phosphate as PO <sub>4</sub>	µg/l	62	ISO 17025	< 62	< 62	< 62	< 62
Fluoride	µg/l	50	ISO 17025	160	96	210	230
Ammoniacal Nitrogen as NH <sub>4</sub> <sup>+</sup>	µg/l	15	ISO 17025	1200	77	110	2500
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	6.21	0.29	0.3	10.5
Nitrate as NO <sub>3</sub>	mg/l	0.05	ISO 17025	1270	1570	119	325
Nitrite as NO <sub>2</sub>	µg/l	5	ISO 17025	10000	210	150	1900
Alkalinity as CaCO <sub>3</sub>	mgCaCO <sub>3</sub> /l	3	ISO 17025	500	U/S <sup>u/s</sup>	490	840
Total Oxidised Nitrogen (TON)	mg/l	0.02	NONE	291	354	26.8	73.9
Total Suspended Solids (L004B)	mg/l	2	ISO 17025	490	190	180	38
Total Dissolved Solids (Gravimetric) (L004B)	mg/l	4	ISO 17025	56000	68000	50000	23000
Calcium Hardness	mg/l	0.03	NONE	2590	13600	1840	2340
Magnesium Hardness	mg/l	0.08	NONE	3480	2560	4050	1860
Hardness - Total	mgCaCO <sub>3</sub> /l	1	ISO 17025	6070	16100	5890	4200
Bicarbonate Alkalinity (as CaCO <sub>3</sub> )	mgCaCO <sub>3</sub> /l	3	NONE	490	180	480	820
Carbonate Alkalinity as CO <sub>3</sub>	mgCO <sub>3</sub> /l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0
Dissolved Oxygen	mg/l	1	NONE	5.2	6.1	4.8	1.3

Phenolphthalein Alkalinity as CaCO <sub>3</sub> (titration)	mgCaCO <sub>3</sub> /l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0
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## Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	222926	222927	222928	222929
Tantalum (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.1	0.11	0.034	0.62
Antimony (dissolved)	µg/l	1.7	ISO 17025	3.3	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	5.1	2.3	6.9	8.2
Barium (dissolved)	µg/l	0.05	ISO 17025	64	170	32	66
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2
Bismuth (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Boron (dissolved)	µg/l	10	ISO 17025	35000	10000	20000	19000
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	0.32	< 0.08	0.11
Calcium (dissolved)	mg/l	0.012	ISO 17025	1000	5400	740	940
Caesium (dissolved)	µg/l	40	NONE	< 40	< 40	< 40	63
Chromium (dissolved)	µg/l	0.4	ISO 17025	100	310	5	5.3
Cobalt (dissolved)	µg/l	0.3	ISO 17025	0.3	< 0.3	0.4	0.9
Copper (dissolved)	µg/l	0.7	ISO 17025	3.7	< 0.7	< 0.7	5
Gallium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Germanium (dissolved)	µg/l	20	NONE	< 20	< 20	< 20	< 20
Gold (dissolved)	µg/l	50	NONE	< 50	< 50	< 50	< 50
Indium (total)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Iridium (dissolved)	µg/l	50	NONE	< 50.0	< 50.0	< 50.0	< 50.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.006	0.005	0.009	0.59
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Lithium (dissolved)	µg/l	1	NONE	7100	3900	4700	3600



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Environmental Science

Analytical Report Number: 24-024258

Project / Site name: Reko Diq

Lab Sample Number	222926			222927	222928	222929	
Sample Reference	TSF-BH-04			TSF-BH-06	TSF-BH-11	TSF-BH-16	
Sample Number	None Supplied			None Supplied	None Supplied	None Supplied	
Depth (m)	17.96			16.62	6.68	24.18	
Date Sampled	05/06/2024			05/06/2024	05/06/2024	05/06/2024	
Time Taken	1053			1156	1010	0900	
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	840	620	980	450
Manganese (dissolved)	µg/l	0.06	ISO 17025	190	150	30	970
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	0.7	< 0.5
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	140	5.6	8.4	31
Neodymium (dissolved)	µg/l	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
Nickel (dissolved)	µg/l	0.3	ISO 17025	4.5	4.1	3.2	10
Niobium (dissolved)	µg/l	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
Osmium (dissolved)	µg/l	50	NONE	< 50.0	< 50.0	< 50.0	< 50.0
Palladium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50	< 50
Phosphorus (dissolved)	µg/l	20	ISO 17025	181	132	151	92.4
Platinum (dissolved)	µg/l	50	NONE	< 50.0	< 50.0	< 50.0	< 50.0
Potassium (dissolved)	mg/l	0.025	ISO 17025	140	96	170	81
Rubidium (dissolved)	µg/l	8	NONE	110	< 8.0	130	120
Ruthenium (dissolved)	µg/l	50	NONE	< 50.0	< 50.0	< 50.0	< 50.0
Samarium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Scandium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Selenium (dissolved)	µg/l	4	ISO 17025	99	120	20	33
Silicon (dissolved)	µg/l	50	NONE	8200	10000	11000	21000
Silver (dissolved)	µg/l	1	NONE	9	40	5.5	< 1.0
Sodium (dissolved)	mg/l	0.01	ISO 17025	18000 <sup>SS</sup>	19000 <sup>SS</sup>	19000 <sup>SS</sup>	7000 <sup>SS</sup>
Strontium (dissolved)	µg/l	50	NONE	16000	130000 <sup>SS</sup>	20000	26000
Tellurium (dissolved)	µg/l	10	NONE	< 10	< 10	< 10	< 10
Thallium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Tin (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	4.3
Titanium (dissolved)	µg/l	50	NONE	< 50	< 50	< 50	< 50
Tungsten (dissolved)	µg/l	10	NONE	200	46	< 10	12
Uranium (dissolved)	µg/l	50	NONE	52.92	59.24	< 50.00	< 50.00
Vanadium (dissolved)	µg/l	1.7	ISO 17025	22	6.7	1.9	3.1
Yttrium (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	27	47	17	55
Zirconium (dissolved)	µg/l	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number: 24-024258

Project / Site name: Reko Diq

<b>Lab Sample Number</b>				222930
<b>Sample Reference</b>				TSF-BH-19
<b>Sample Number</b>				None Supplied
<b>Depth (m)</b>				30.45
<b>Date Sampled</b>				05/06/2024
<b>Time Taken</b>				0920
<b>Analytical Parameter (Water Analysis)</b>	<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>	

**General Inorganics**

pH (L099)	pH Units	N/A	ISO 17025	7.5
Electrical Conductivity at 20°C	µS/cm	10	ISO 17025	29000
Turbidity	NTU	1	NONE	53
Sulphate as SO <sub>4</sub>	mg/l	0.045	ISO 17025	4230
Chloride	mg/l	0.15	ISO 17025	7300 <sup>55</sup>
Total Phosphate as PO <sub>4</sub>	µg/l	62	ISO 17025	< 62
Fluoride	µg/l	50	ISO 17025	150
Ammoniacal Nitrogen as NH <sub>4</sub> <sup>+</sup>	µg/l	15	ISO 17025	8000
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	390
Nitrate as NO <sub>3</sub>	mg/l	0.05	ISO 17025	9.79
Nitrite as NO <sub>2</sub>	µg/l	5	ISO 17025	120
Alkalinity as CaCO <sub>3</sub>	mgCaCO <sub>3</sub> /l	3	ISO 17025	1000
Total Oxidised Nitrogen (TON)	mg/l	0.02	NONE	2.25
Total Suspended Solids (L004B)	mg/l	2	ISO 17025	300
Total Dissolved Solids (Gravimetric) (L004B)	mg/l	4	ISO 17025	20000
Calcium Hardness	mg/l	0.03	NONE	1940
Magnesium Hardness	mg/l	0.08	NONE	2350
Hardness - Total	mgCaCO <sub>3</sub> /l	1	ISO 17025	4290
Bicarbonate Alkalinity (as CaCO <sub>3</sub> )	mgCaCO <sub>3</sub> /l	3	NONE	1100
Carbonate Alkalinity as CO <sub>3</sub>	mgCO <sub>3</sub> /l	3	NONE	< 3.0
Dissolved Oxygen	mg/l	1	NONE	2.2

Phenolphthalein Alkalinity as CaCO <sub>3</sub> (titration)	mgCaCO <sub>3</sub> /l	3	NONE	< 3.0
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**Heavy Metals / Metalloids**

Tantalum (dissolved)	µg/l	1	NONE	< 1.0
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Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.061
Antimony (dissolved)	µg/l	1.7	ISO 17025	2.4
Arsenic (dissolved)	µg/l	1	ISO 17025	29
Barium (dissolved)	µg/l	0.05	ISO 17025	39
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Bismuth (dissolved)	µg/l	5	NONE	< 5.0
Boron (dissolved)	µg/l	10	ISO 17025	29000
Cadmium (dissolved)	µg/l	0.08	ISO 17025	1.7
Calcium (dissolved)	mg/l	0.012	ISO 17025	780
Caesium (dissolved)	µg/l	40	NONE	< 40
Chromium (dissolved)	µg/l	0.4	ISO 17025	8.5
Cobalt (dissolved)	µg/l	0.3	ISO 17025	47
Copper (dissolved)	µg/l	0.7	ISO 17025	220
Gallium (dissolved)	µg/l	5	NONE	< 5.0
Germanium (dissolved)	µg/l	20	NONE	< 20
Gold (dissolved)	µg/l	50	NONE	< 50
Indium (total)	µg/l	5	NONE	< 5.0
Iridium (dissolved)	µg/l	50	NONE	< 50.0
Iron (dissolved)	mg/l	0.004	ISO 17025	10
Lead (dissolved)	µg/l	1	ISO 17025	48
Lithium (dissolved)	µg/l	1	NONE	5300



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Environmental Science

Analytical Report Number: 24-024258

Project / Site name: Reko Diq

<b>Lab Sample Number</b>				222930
<b>Sample Reference</b>				TSF-BH-19
<b>Sample Number</b>				None Supplied
<b>Depth (m)</b>				30.45
<b>Date Sampled</b>				05/06/2024
<b>Time Taken</b>				0920
<b>Analytical Parameter (Water Analysis)</b>	<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>	
Magnesium (dissolved)	mg/l	0.005	ISO 17025	570
Manganese (dissolved)	µg/l	0.06	ISO 17025	800
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	70
Neodymium (dissolved)	µg/l	8	NONE	< 8.0
Nickel (dissolved)	µg/l	0.3	ISO 17025	110
Niobium (dissolved)	µg/l	8	NONE	< 8.0
Osmium (dissolved)	µg/l	50	NONE	< 50.0
Palladium (dissolved)	µg/l	50	NONE	< 50
Phosphorus (dissolved)	µg/l	20	ISO 17025	187
Platinum (dissolved)	µg/l	50	NONE	< 50.0
Potassium (dissolved)	mg/l	0.025	ISO 17025	51
Rubidium (dissolved)	µg/l	8	NONE	< 8.0
Ruthenium (dissolved)	µg/l	50	NONE	< 50.0
Samarium (dissolved)	µg/l	5	NONE	< 5.0
Scandium (dissolved)	µg/l	5	NONE	< 5.0
Selenium (dissolved)	µg/l	4	ISO 17025	9.9
Silicon (dissolved)	µg/l	50	NONE	23000
Silver (dissolved)	µg/l	1	NONE	< 1.0
Sodium (dissolved)	mg/l	0.01	ISO 17025	5700 <sup>§§</sup>
Strontium (dissolved)	µg/l	50	NONE	15000
Tellurium (dissolved)	µg/l	10	NONE	< 10
Thallium (dissolved)	µg/l	5	NONE	< 5.0
Tin (dissolved)	µg/l	1	ISO 17025	5.7
Titanium (dissolved)	µg/l	50	NONE	< 50
Tungsten (dissolved)	µg/l	10	NONE	20
Uranium (dissolved)	µg/l	50	NONE	< 50.00
Vanadium (dissolved)	µg/l	1.7	ISO 17025	2.1
Yttrium (dissolved)	µg/l	5	NONE	< 5.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	860
Zirconium (dissolved)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number : 24-024258

Project / Site name: Reko Diq

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry	In-house method based on BSEN 15216:2007	L004B	W	ISO 17025
Suspended Solids in water	Determined gravimetrically with GFC filtration papers	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004B	W	ISO 17025
Exotic metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	NONE
Electrical conductivity at 20°C of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031B	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW PW, GW	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Total organic carbon in water	Determination of total organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Exotic metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	NONE
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Calcium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	NONE
Magnesium Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	NONE
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08	L078	W	ISO 17025
Total oxidised nitrogen in water	Calculation from nitrate and nitrite	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton & Polish Standard Method PN-82/C-04579.08	L078/L082B	W	NONE
Alkalinity in water (by discreet analyser)	Determination of Alkalinity by discrete analyser (colorimetry). Accredited matrices: SW,PW, GW,FSE,LL	In-house method based on MEWAM & USEPA Method 310.2	L082B	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW,PW, GW,FSE,LL	L082B	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	ISO 17025



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Environmental Science

Analytical Report Number : 24-024258

Project / Site name: Reko Diq

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	ISO 17025
Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices: SW, PW, GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discrete analyser	L082B	W	ISO 17025
Turbidity of in water	Determination of sample turbidity by colorimeter and comparison with standard reference samples	In-house method based on Standard Method 8237	L083B	W	NONE
Dissolved Oxygen in water	Determination of dissolved oxygen	In-house method	L086B	W	NONE
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW, LL	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Alkalinity in water (by titration)	Determination of Alkalinity by titration	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L025	W	NONE
Exotic metals in water by ICP-OES (total)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW, PW, GW, PrW (Al, Fe, Cu, Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution

\$\$ - Result was reported from high dilution. The result should be interpreted with caution.

\*U/S - Unsuitable for analysis due to sample matrix.



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## Sample Deviation Report



Environmental Science

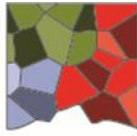
Analytical Report Number : 24-024258

Project / Site name: Reko Diq

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TSF-BH-04	N/A	W	222926	c	Ammonium as NH4 in water	L082B	c
TSF-BH-04	N/A	W	222926	c	Dissolved Oxygen in water	L086B	c
TSF-BH-04	N/A	W	222926	c	Electrical conductivity at 20°C of water	L031B	c
TSF-BH-04	N/A	W	222926	c	Total dissolved solids in water (Gravimetric)	L004B	c
TSF-BH-04	N/A	W	222926	c	Turbidity of in water	L083B	c
TSF-BH-04	N/A	W	222926	c	pH at 20°C in water (automated)	L099	c
TSF-BH-06	N/A	W	222927	c	Ammonium as NH4 in water	L082B	c
TSF-BH-06	N/A	W	222927	c	Dissolved Oxygen in water	L086B	c
TSF-BH-06	N/A	W	222927	c	Electrical conductivity at 20°C of water	L031B	c
TSF-BH-06	N/A	W	222927	c	Total dissolved solids in water (Gravimetric)	L004B	c
TSF-BH-06	N/A	W	222927	c	Turbidity of in water	L083B	c
TSF-BH-06	N/A	W	222927	c	pH at 20°C in water (automated)	L099	c
TSF-BH-11	N/A	W	222928	c	Ammonium as NH4 in water	L082B	c
TSF-BH-11	N/A	W	222928	c	Dissolved Oxygen in water	L086B	c
TSF-BH-11	N/A	W	222928	c	Electrical conductivity at 20°C of water	L031B	c
TSF-BH-11	N/A	W	222928	c	Total dissolved solids in water (Gravimetric)	L004B	c
TSF-BH-11	N/A	W	222928	c	Turbidity of in water	L083B	c
TSF-BH-11	N/A	W	222928	c	pH at 20°C in water (automated)	L099	c
TSF-BH-16	N/A	W	222929	c	Ammonium as NH4 in water	L082B	c
TSF-BH-16	N/A	W	222929	c	Dissolved Oxygen in water	L086B	c
TSF-BH-16	N/A	W	222929	c	Electrical conductivity at 20°C of water	L031B	c
TSF-BH-16	N/A	W	222929	c	Total dissolved solids in water (Gravimetric)	L004B	c
TSF-BH-16	N/A	W	222929	c	Turbidity of in water	L083B	c
TSF-BH-16	N/A	W	222929	c	pH at 20°C in water (automated)	L099	c
TSF-BH-19	N/A	W	222930	c	Ammonium as NH4 in water	L082B	c
TSF-BH-19	N/A	W	222930	c	Dissolved Oxygen in water	L086B	c
TSF-BH-19	N/A	W	222930	c	Electrical conductivity at 20°C of water	L031B	c
TSF-BH-19	N/A	W	222930	c	Total dissolved solids in water (Gravimetric)	L004B	c
TSF-BH-19	N/A	W	222930	c	Turbidity of in water	L083B	c
TSF-BH-19	N/A	W	222930	c	pH at 20°C in water (automated)	L099	c



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## Appendix C: Knight Piesold Packer Tests and Geology Logs

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	<b>GRAVEL</b> , sandy, with silt, black and grey, very dense. Non Plastic fines. Gravel particles are medium to coarse. Sand particles are fine to medium.			0.0-1.5m: Core loss		
0.8					1						
					2				1.5-2.7m: Core loss	HB/120mm, -, - N =Ref.	
0.82					2.3m	<b>SILTSTONE/TUFF</b> , red brown to pink brown. Very stiff.		XW-HW			
					3					25, 39, 30/70mm N =Ref.	
1.5					4						
					5					30/80mm, HB, - N =Ref.	
1.5					6						
0.7					7						
2.4					8						
					8.8m	<b>SILTSTONE/TUFF</b> , pink brown, Fine grained, amorphous, massive.	LS	HW-MW			
3.1	61	57			9						

DRAFT

**NOTES:**

- Hole size PQ from surface, then HQ from 5.7m depth
- Hole terminated at 25m

 Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES\_GEL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : COMACCHIO CXT 15  
LOGGED BY : VIRAJ  
CHECKED BY :

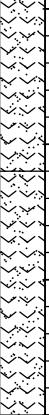
DATE STARTED : 16/04/2024  
DATE PROFILED : 16/04/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3224808  
EASTING : 399746  
INCLINATION: -90  
ELEVATION : 915

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
3.1	100	74	>10		11						
					12				12.14m: Jo, sub-horizontal, Ro, Pl, Cl 12.51-13.54m: Broken zone		
					13				13.25m: Jo, vertical, Ro, Pl, Cn 13.54m: Broken tone		
					14				14.04m: Jo, horizontal, Ro, Pl, Cn		
					15				15.19m: Jo, horizontal, Ro, Pl, Ct 15.27m: Jo, horizontal, Ro, Pl, Ct		
3.1	100	91	2		16.4m	<b>ANDESITE</b> , fine grained, amorphous, massive. Pale grey to black	LS	MW			
					17						
					18.4m	<b>SILTSTONE / TUFF</b> , pink brown, fine grained, amorphous, massive.	MS	MW	18.37m: Jo, horizontal, Ro, Pl, Cn (transition from Andesite to siltstone/tuff)		
					19						
3.1	100	100	2		20						
					20.8m	<b>ANDESITE</b> , pink brown, fine grained, amorphous, massive.	MS	MW	20.83m: Jo, horizontal, Ro, Pl, Cn ( Transition from siltstone/tuff to Andesite)		
					21.2m	<b>SILTSTONE / TUFF</b> , pink brown, fine grained, amorphous, massive.	MS	MW			
					21.5m	<b>ANDESITE</b> , pink brown, fine grained, amorphous, massive.	MS	MW			

DRAFT

KP\_BH\_2013\_REV\_0\_USEBOREHOLES.GBL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
3.1	100	88	2		22						
					23	23.2m ANDESITE, pink brown, fine grained, amorphous, massive.	MS	MW	23.17m: Jo, sub-horizontal, Ro, Ir, Cn  23.75m: Jo, horizontal, Ro, Pl, Ct (XW material, 5 mm thick)		
0.7	100	100			24						
					25	Borehole TSF-BH-01 terminated at 25 m depth.					
					26						
					27						
					28						
					29						
					30						
					31						
					32						
					33						

DRAFT

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	SAND, silty, trace gravel, non-plastic fines, pale grey to dark grey, very dense.					
100					0.8m	SILTSTONE/SHALE, fine grained, amorphous, massive, pink brown.	VLS/LS	HW			
100					2						
100	80	73			4				3.73-5.0m: Shrinkage cracks can be seen		
100	100	100			5.7m	SANDSTONE, Fine to coarse grained, grey and pink brown, amorphous, massive.  Intrusion of some pebbles.	LS	MW	5.74m: Jo, horizontal, Ro, Pl, Ct (transition from Siltstone/Shale to Sandstone)		
100	100	100			8						
					8.3m	CONGLOMERATE, fine to coarse grained with some pebbles. Granular. Massive, mixed colour.	LS	HW/MW			
					9.7m	SANDSTONE, fine to coarse grained with some pebbles. Granular. Massive, pink brown.	LS	MW			

DRAFT

**NOTES:**

- Hole size PQ from surface, then HQ from 3m.
- Hole terminated at 25m
- Groundwater recorded at 7.1m on 16/04/24

▼ Water Level Indicator


KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT 25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : COMACCHIO CXT 15  
  
LOGGED BY : VIRAJ  
CHECKED BY :

DATE STARTED : 15/04/2024  
DATE PROFILED : 15/04/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3223004 INCLINATION: -90  
EASTING : 396996  
ELEVATION : 887

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	98	94			11m	<b>CONGLOMERATE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
					11.5m	<b>SANDSTONE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
					12.3m	<b>CONGLOMERATE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
					12.8m	<b>SANDSTONE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
100	90	88			14.3m	<b>CONGLOMERATE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
					14.5m	<b>SANDSTONE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
					15.5m	<b>CONGLOMERATE</b> , fine to coarse grained with some pebbles, Granular. Massive, pink brown.	LS	MW			
					15.7m	<b>ANDESITE</b> , fine to medium grained. Amorphous. Massive, pale grey, black and white.	MS	MW			
100	97	93			17						
					19						
100	100	100			20						
					21						

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100			22						
					23						
					24				24.04m: J, horizontal, Ro, Pl, Ct		
					25	Borehole TSF-BH-02 terminated at 25 m depth.					
					26						
					27						
					28						
					29						
					30						
					31						
					32						
					33						

DRAFT

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
0					0m	<b>GRAVEL</b> , sandy, with silt, non-plastic fines, grey and brown, very dense.  Weakly cemented Conglomerate.	VD		0.0-1.5m: Core loss		
					1.5m				1.5-2.0m: Core loss		
73					1.8m	<b>CONGLOMERATE</b> , fine to coarse grained with pebbles. Porphyritic, Massive, multi coloured.	VLS	HW			13, 50/130, HB N =Ref.
					2m						
					3m						
100					4m						
					5m						
100	100	100			6m						
					7m						
					8m						
100	100	100			8m						
					8.7m	<b>ANDESITE</b> , fine to medium grained. Amorphous. Massive, pale grey.	LS	MW			
					9m						
					9.1m	<b>CONGLOMERATE</b> , fine to coarse grained with pebbles. Porphyritic, moderately cemented, multi coloured.	VLS	MW/HW			
					9.55-9.68m				9.55-9.68m: Broken zone		

DRAFT

**NOTES:**

- Hole size PQ from surface. Then HQ from 3m
- Hole terminated at 25m
- Groundwater recorded at 5.1m on 15/04/24

▼ Water Level Indicator

⊠ Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : COMACCHIO CXT 15

DATE STARTED : 13/04/2024

NORTHING : 3220845

INCLINATION: -90


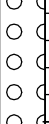











LOGGED BY : VIRAJ  
CHECKED BY :

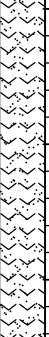
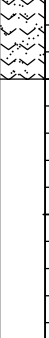
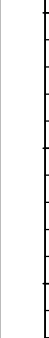
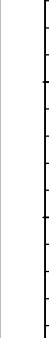
DATE PROFILED : 15/04/2024

EASTING : 393787

HOLE SIZE : PQ / HQ

ELEVATION : 922

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	65	55	>10						10.43-10.84m: Broken zone		
					11						
100	96	88	1		11.8m	<b>ANDESITE</b> , fine grained. Amorphous. Massive, pale grey.	LS	MW	11.76m: Jo, horizontal, Ro, Ir, Ct (transition from Conglomerate to Siltstone)		
					12						
					13						
100	100	100	1		14						
					15	15.1m <b>SILTSTONE</b> , fine grained. Amorphous. Massive, pink brown.	MS	MW	15.1m: Jo, horizontal, Ro, Ir, Ct (transition from Andesite to Siltstone)		
					16						
100	100	100	1		17						
					18	18.2m <b>ANDESITE</b> , fine grained. Amorphous. Massive, pale grey.	MS	MW	18.19m: Jo, sub-vertical, Ro, Ir, Ct (transition from Siltstone to Andesite)		
					19						
100	100	90	5		20	19.7m <b>SILTSTONE</b> , fine grained. Amorphous. Massive, pink brown.	MS	MW	19.73m: Jo, sub-horizontal, Ro, PL, Ct (transition from Andesite to Siltstone) 19.81m: Jo, sub-horizontal, Ro, PL, Ct		
					21	20.5m <b>ANDESITE</b> , fine grained, intrusion of pebbles. Massive, pale grey.	MS	MW	19.94m: Jo, sub-vertical, Ro, Ir, Ct (transition from Andesite to Siltstone) 20.5m: Jo, sub-horizontal, Ro, Ir, Ct (transition from Siltstone to Andesite)		

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100			22						
100	100	100			23						
100	100	100			24						
100	100	100			25	Borehole TSF-BH-03 terminated at 25 m depth.					
					26						
					27						
					28						
					29						
					30						
					31						
					32						
					33						


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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	<b>GRAVEL</b> , sandy, with silt, non-plastic fines, dark grey and brown, very dense.  Weakly cemented Conglomerate	VD				
100					1						
					1.77m				1.77-2.87m: Core loss		20, 32/120, HB N =Ref.
27					2						
					2.87m						
100					3						
					4						
50					4.75m				4.75-5.0m: Core loss		
					5						
					5m						
43					5.3m				5.3-5.4m: Core loss		
					5.4m						
					5.7m				5.7-6.1m: Core loss		
					6						
40					6.1m						
					6.45m	<b>SILTSTONE / ANDESITE</b> , fine to medium grained, amorphous, massive, pink brown.	VLS-LS	MW			
					6.7m				6.7-7.1m: Core loss		
83					7						
					7.1m						
					7.3m				7.3-7.6m: Core Loss		
					7.6m						
					8						
100	86	86			9						

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**NOTES:**

- Hole size PQ from surface. Then HQ from 5.7m
- Hole terminated at 25m

 Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES\_GEL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : RIG145  
  
LOGGED BY : VIRAJ  
CHECKED BY :

DATE STARTED : 12/04/2024  
DATE PROFILED : 13/04/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3220845  
EASTING : 393787  
ELEVATION : 900  
INCLINATION: -90



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	94	2	XXXXXXXXXXXXXXXXXXXX	22				22.61m: Jo, sub-horizontal, Pl, Ro, Ct		
				XXXXXXXXXXXXXXXXXXXX	23				22.7m: Jo, sub-vertical, Pl, Ro, Ct		
				XXXXXXXXXXXXXXXXXXXX	24				24.1m: J, Pl, Ro, Ct, 3mm with soil and affected by gypsum		
100	91	85	2	XXXXXXXXXXXXXXXXXXXX	25	Borehole TSF-BH-04 terminated at 25 m depth.			24.4m: Jo, sub-vertical, Pl, Ro, Ct		
				XXXXXXXXXXXXXXXXXXXX	25				24.5m: Jo, sub-horizontal, Pl, Ro, Ct		
				XXXXXXXXXXXXXXXXXXXX	26				24.63m: Jo, 45°, Pl, Ro, Ct		
				XXXXXXXXXXXXXXXXXXXX	27						
				XXXXXXXXXXXXXXXXXXXX	28						
				XXXXXXXXXXXXXXXXXXXX	29						
				XXXXXXXXXXXXXXXXXXXX	30						
				XXXXXXXXXXXXXXXXXXXX	31						
				XXXXXXXXXXXXXXXXXXXX	32						
				XXXXXXXXXXXXXXXXXXXX	33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	SAND, gravelly, with silt, non-plastic fines, pale grey, medium dense.			0.0-0.26m: Core Loss		
87	58	39	2		0.4m	Sand particles are fine to coarse. Gravel particles are fine to coarse.	LS	HW-MW	0.54-0.66m: J, sub-vertical, Ro, Pl, Ct		
					1	ANDESITE, fine to medium grained. Amorphous. Massive, pale grey and pale brown.			1.19-1.24m: J, sub-vertical, Ro, Pl, Ct		
100	96	89	-		2						
					3				2.9-3.28m: extremely weathered seam		
					4				3.26-3.97m: J, sub-vertical, Ro, Pl, Ct		
100	90	77	3		5						
					6				5.43-5.6m: J, vertical, Ro, Pl, Ct		
					7				6.0-6.1m: Highly fractured seam		
					8				6.69-6.88m: J, sub-vertical, Ro, Pl, Ct		
100	90	90	>10		9				7.65-7.85m: J, sub-vertical, Ro, Pl, Ct		

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**NOTES:**


- Hole size PQ from surface. Then HQ from 3m
- Hole terminated at 25m

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : RIG145  
LOGGED BY : VIRAJ  
CHECKED BY :

DATE STARTED : 9/04/2024  
DATE PROFILED : 12/04/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3222251 INCLINATION: -90  
EASTING : 398057  
ELEVATION : 889

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)	
100	100	92	3		10.3m	<b>VOLCANIC BRECCIA</b> , fine to coarse grained. Pyroclastic texture. Massive, pale grey.	MS	MW	10.18-10.33m: J, sub-vertical, Ro, Pl, Ct			
					10.7m	<b>ANDESITE</b> , fine to medium grained. Amorphous. Massive, pale pink brown and grey.	MS	MW	11.21-11.38m: J, sub-vertical, Ro, Pl, Ct 11.8m: J, horizontal, Ro, Pl, Ct			
										12.81m: J, 45°, Ro, Pl, Ct		
100	98	95	2							13.95m: J, horizontal, Pl, Ro, Ct		
						14.3m	<b>VOLCANIC BRECCIA / CONGLOMERATE</b> , fine to medium grained. Pyroclastic / Porphyritic, pale pink and brown.	LS/MS	MW			
										15.55m: J, horizontal, Ro, Ir, Ct (extremely weathered seam) 15.6-15.8m: Core Loss 15.73-15.83m: J, horizontal, Vro, Ir, Cn		
93	93	75	3									
100	109	94	1			18.6m	<b>SILTSTONE</b> fine grained, amorphous, massive, pale pink brown.	MS	MW	18.47m: J, sub-horizontal, Ro, Ir, Cn		
100	100	100			20							
					21							



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	SAND, silty, with gravel, non-plastic fines, grey and black, very dense.					
					1.1m	ANDESITE, fine to medium grained, Amorphous, massive, pale grey	VLS-LS	HW-MW			
					1.5m	ANDESITE, fine to medium grained, Amorphous, massive, red/brown	LS	HW			
					2.8m	ANDESITE, fine to medium grained, Amorphous/Pyroclastic, massive, red/brown, grey and brown.	MS	MW	2.9m: J, sub-vertical, Ro, Pl, Ct 3.3m: J, sub-vertical, Ro, Pl, Ct 3.93m: J, sub-vertical, Ro, Pl, Ct 4.14m: J, sub-vertical, Ro, Pl, Ct		
100	86	70	5								
100	100	100									
100	100	100									

**NOTES:**

- Hole size PQ from surface. Then HQ from 3m
- Hole terminated at 24.4m

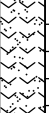

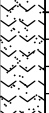

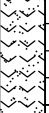
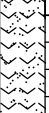
KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GBL\_KP\_DATATEMPLATE\_BH\_2013.GDI\_25/7/24

 CONTRACTOR : Capital Drilling  
 MACHINE : RIG145  
 LOGGED BY : VIRAJ  
 CHECKED BY :

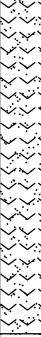
 DATE STARTED : 7/04/2024  
 DATE PROFILED : 9/04/2024  
 HOLE SIZE : PQ / HQ

 NORTHING : 3223193  
 EASTING : 399495  
 INCLINATION: -90  
 ELEVATION : 902

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATA\TEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100			11						
100	100	100	1		14				14.38m: J, 45°, Ro, Pl, Cn		
100	100	100	2		17				17m: J, horizontal, Ro, Pl, Cn		
100	100	100			17.6m	<b>ANDESITE</b> , fine grained, Amorphous, massive, pink, brown.	MS	MW-SW	17.64m: J, sub-horizontal, Ro, Pl, Ct		
100	100	100			20						
					21						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)	
100	100	100			22	Borehole TSF-BH-06 terminated at 24.4 m depth.						
					23							
					24							
					25							
					26							
					27							
					28							
					29							
					30							
					31							
					32							
					33							

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	<b>SAND</b> , silty, with gravel and cobbles, non-plastic fines, dry, very dense. Pale Grey Sand and Silt. Black gravel.			0.0-0.3m: Core loss		
80					0.3m	Sand particles are fine to coarse. Gravel particles are fine to coarse.					
					1						
100					2						
73					2m	<b>ANDESITE</b> , fine grained, Porphyritic, massive. Pale grey	MS	MW			
					2.6m	<b>ANDESITE</b> , fine grained, Porphyritic, massive. Pale grey	LS	XW-HW			
					3						
133	55	33	6		3.4m	<b>VOLCANIC BRECCIA</b> , fine grained, Pyroclastic texture, grey. Ground matrix and black fragments.	LS	MW	3.1, 3.15, 3.21m: J, 45°, Ro, Pl, Ct		
					3.6m	<b>VOLCANIC BRECCIA</b> , fine grained, Pyroclastic texture, grey. Matrix, black and white fragments.	VLS-LS	HW-MW	3.43m: J, 45°, Ro, Ir, Ct 3.54m: J, sub-horizontal, Ro, Ir, Ct 3.6m: J, 45°, Pl, Ro, Ct		
					4				4.25m: J, sub-vertical, Ro, Ir, Ct 4.41m: J, sub-horizontal, Ro, Cv, Ct 4.45m: J, sub-vertical, Ro, Pl, extremely weathered infill seam 4.6m: J, sub-vertical, Ro, Pl, extremely weathered infill seam 4.95m: J, sub-horizontal, Ro, Ir, extremely weathered infill seam 5.1m: J, sub-horizontal, Ro, Ir, extremely weathered infill seam 5.4m: J, sub-vertical, Ro, Pl, Ct 5.5-5.6m: Core Loss		
95	66	48	8		5.5m				5.6-5.7m: extremely weathered seam 5.78m: J, sub-vertical, Ro, Pl, Ct 6m: J, 45°, Ro, Pl, Ct 6.13m: J, 45°, Ir, Ro, Ct 6.33m: J, sub-horizontal, Ro, Ir, extremely weathered infill seam 6.85m: J, sub-vertical, Ir, Ct, Ro 6.99m: J, sub-vertical, Ir, Ct, extremely weathered infill seam 7.04m: J, horizontal, Ro, Ir, extremely weathered infill seam 7.18m: J, 45°, Ro, Pl, extremely weathered infill seam 7.4m: extremely weathered seam. Recovered as soil. 7.45-7.5m: Core Loss 7.5m: extremely weathered		
					5.6m						
					6						
100	52	44			7						
					7.45m						
					7.5m						
					8						
					9						
100	88	86					MS	MW			

**NOTES:**

- Hole size PQ from surface. Then HQ from 3.0m
- Hole terminated at 24.6m
- Polymer drilling fluid used

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : RIG145

DATE STARTED : 5/04/2024

NORTHING : 3223103

INCLINATION: -90

LOGGED BY : VIRAJ  
CHECKED BY :

DATE PROFILED : 7/04/2024

EASTING : 401141

HOLE SIZE : PQ / HQ

ELEVATION : 917





TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	GRAVEL, silty and sandy, non-plastic fines, dark brown, very dense.					
100	39	40			0.6m	SILTSTONE, fine grained, Amorphous, Massive, red brown.	VLS/LS	HW/MW			
					1						
					2				2.43m: Jo, sub-horizontal, Ro, Ir, Ct		
100	95	86			3						
					4				3.68m: Jo, horizontal, Sm, Pl, Cn		
100	100	100			5				4.49m: Jo, horizontal, Ro, Pl, Ct		
					5.9m	ANDESITE, fine grained, Amorphous. Massive, pale grey and black.	MS/LS	MW/HW	5.9m: Jo, horizontal, Ro, Pl, Cn (Transition from Siltstone to Andesite)		
					6.2m	SILTSTONE, fine grained, Amorphous, Massive, red brown.	VLS	HW	6.23m: Jo, horizontal, Ro, Pl, Ct (5mm), extremely weathered seam, Transition from Andesite to siltstone, 6.23-8.01m: Highly fractured/ Broken zone		
100	97	95			7						
					8m	ANDESITE/SILTSTONE, fine grained, interbedded. Amorphous, Flow banded, Massive, pale grey and red brown, mixed.	LS	HW/MW	8.01-9.55m: Fractured zone		
					9.5m	ANDESITE, Fine grained, Amorphous. Massive, pale grey and black	MS	MW/SW	9.55m: Jo, sub-horizontal, Ro, Ir, Cn, Transition from Andesite Siltstone mixed zone to		

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▼ Water Level Indicator

- NOTES:**
- Hole size PQ from surface. Then HQ from 2.9m
  - Hole terminated at 25m
  - Groundwater recorded at 3.5m on 19/04/24

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES\_GBL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling	DATE STARTED : 17/04/2024	NORTHING : 3220999	INCLINATION: -90
MACHINE : COMACCHIO CXT 15	DATE PROFILED : 19/04/2024	EASTING : 398706	
LOGGED BY : VIRAJ	HOLE SIZE : PQ / HQ	ELEVATION : 886	
CHECKED BY :			

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100			11				andesite.		
					12				12.03m: Jo, sub-vertical, Pl, Ro, Ct (2mm)		
					13				12.58m: vertical Joint, Ct (3mm), not open		
100	110	96			14				13.4m: Jo, sub-vertical, Ir, Ro, Ct		
					15				13.87m: Jo, sub-horizontal, Pl, Ro, Cn 13.87-14.54m: Quartz seam		
					16				14.54m: Jo, horizontal, Ir, Ro, Cn 14.86m: Jo, sub-horizontal, Ir, Ro, Ct		
100	99	99			16.3m	<b>CONGLOMERATE</b> , fine to coarse grained with pebbles. Rounded pebbles/phenoclasts scattered over finer grained matrix. Irregularly mixed colour, massive.	MS	MW	16.33m: Jo, sub-horizontal, Ir, Ro, Cn		
					16.7m	<b>SILTSTONE / TUFF</b> , fine grained, Amorphous. Massive, red/pink brown	MS/HS	MW/SW	16.72m: Jo, horizontal, Ir, Ro, Cn (Transition from Andesite to Siltstone/Tuff)		
					17				17.1m: Jo, sub-horizontal, Pl, Ro, Ct		
					18				17.38m: Jo, sub-horizontal, Pl, Ro, Ct		
					19				17.87m: Jo, 45°, Pl, Ro, Ct		
100	100	100			20				18.99m: Jo, sub-horizontal, Ro, Ir, Cn		
					21				19.81m: Jo, sub-horizontal, Ro, Ir, Cn 20.03m: Jo, sub-horizontal, Ro, Ir, Cn 20.11m: Jo, horizontal, Ro, Ir, Cn 20.45m: Jo, sub-horizontal, Ro, Ir, Cn 20.73m: Jo, horizontal, Ro, Ir, Cn 21.1m: Jo, horizontal, Ro, Ir, Cn		

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KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GBL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100		XXXXXXXXXXXXXXXXXXXX	22				21.68m: Jo, sub-horizontal, Ro, Ir, Cn		
				XXXXXXXXXXXXXXXXXXXX	23						
				XXXXXXXXXXXXXXXXXXXX	24						
100	100	100		XXXXXXXXXXXXXXXXXXXX	25	Borehole TSF-BH-08 terminated at 25 m depth.			24.56m: Jo, sub-horizontal, Ro, Ir, Ct		
				XXXXXXXXXXXXXXXXXXXX	26						
				XXXXXXXXXXXXXXXXXXXX	27						
				XXXXXXXXXXXXXXXXXXXX	28						
				XXXXXXXXXXXXXXXXXXXX	29						
				XXXXXXXXXXXXXXXXXXXX	30						
				XXXXXXXXXXXXXXXXXXXX	31						
				XXXXXXXXXXXXXXXXXXXX	32						
				XXXXXXXXXXXXXXXXXXXX	33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
73					0m	<b>GRAVEL</b> , sandy, with silt, trace cobbles, very dense, dark brown to red brown.  Gravel particles fine to coarse. Sand particles fine to coarse.	VD				
100	100	71	2		2.1m	<b>CONGLOMERATE</b> Ground Matrix fine to medium grained, pebbles medium to coarse grained, granular, massive, mixed colour	VLS	HW			
					2.6m	<b>SILTSTONE</b> , fine grained, amorphous, massive, pink brown to red brown.	LS	HW-MW	3.2m: Jo, 45°, Ro, Ir, Cn  3.74m: Jo, sub-vertical, Ir, Ro, Ct (1mm) 3.81-4.09m: Broken zone  4.78m: Jo, horizontal, Ir, Ro, Cn 5.06m: Jo, sub-horizontal, Ir, Ro, Po 5.44m: Jo, sub-horizontal, Ir, Ro, Cn 5.69m: Jo, horizontal, Ir, Ro, Ct, (extremely weathered Siltstone) 5.78m: Jo, horizontal, Ir, Ro, Ct (extremely weathered siltstone)		25, 30/70mm (HB), N=Ref.
100	100	79	-		7.2m	<b>CONGLOMERATE</b> , fine grained with pebbles, mix colour mainly red brown, strongly cemented.	MS	HW-MW			
100	100	97	1		8.6m	<b>SILTSTONE</b> , fine grained, amorphous, massive pink brown to red brown.	MS	MW	8.61m: Jo, horizontal, Ir, Ro, Ct (transitioning from Conglomerate to Siltstone)  9.71m: Jo, sub-vertical, Pl, Ro,		

**NOTES:**

- Hole size PQ from surface. Then HQ from 2.9m
- Hole terminated at 25m
- Groundwater recorded at 3.0m on 22/04/24

Water Level Indicator

Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

**CONTRACTOR :** Capital Drilling  
**MACHINE :** COMACCHIO CXT 15  
**LOGGED BY :** VIRAJ  
**CHECKED BY :**

**DATE STARTED :** 21/04/2024  
**DATE PROFILED :** 22/04/2024  
**HOLE SIZE :** PQ / HQ

**NORTHING :** 3219488  
**EASTING :** 396678  
**ELEVATION :** 904  
**INCLINATION:** -90





TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
40	27	20			0m	<b>SAND</b> , gravelly, with silt, non-plastic, medium dense, pale grey.  Sand fine to coarse. Gravel fine to coarse	MD		0.0-0.9m: Core loss		
					0.9m 0.95m	<b>SILTSTONE</b> , fine grained, amorphous, massive, pale brown.	LS	HW	1.5-1.6m: core loss		
100	96	93	3		1.5m 1.6m			2.08m: Jo, horizontal, Ro, Pl, Ct (2mm) 2.41m: Jo, 45°, Ro, Pl, Ct (1mm) 2.66m: Jo, sub-vertical, Ro, Pl, Cn 2.9-3.14m: Core sample has broken during drilling 3.28m: Jo, 45°, Ro, Ir, Cn			
100	93	83	>10		3.75m	<b>SILTSTONE</b> , red brown.	MS	MW	3.65m: Jo, sub-horizontal, Sm, Po 3.95m: Jo, 45°, Ro, Pl, Cn		
					5.8m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	VLS	HW-XW	5.17m: Jo, sub-horizontal, Ir, Ro, Cn 5.5m: Jo, sub-vertical, Pl, Ro, Cn		
100	62	55	>10		6m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	LS-MS	MW-HW	5.8-6.0m: extremely weathered seam 6.0-6.24m: broken zone 6.3m: Jo, sub-vertical, Pl, Sm, Po 6.7m: Jo, 45°, Pl, Ro, Cn		
					7.7m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	LS	HW	7.61-7.66m: Jo, horizontal, Ir, Ro, extremely weathered seam 7.71-7.94m: broken zone		
					8.1m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	VLS	HW-XW	8.1-8.4m: extremely weathered seam		
					8.4m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	MS	MW	8.81m: Jo, sub-vertical, Ir, Ro, Cn 8.92m: Jo, 45°, Ir, Ro, Ct (extremely weathered material) 9.68m: Jo, sub-vertical, Ro, Ir, Ct (extremely weathered)		

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▼ Water Level Indicator

- NOTES:**
- Hole size PQ from surface. Then HQ from 2.9m
  - Hole terminated at 25m

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES\_GBL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling	DATE STARTED : 23/04/2024	NORTHING : 3217954	INCLINATION: -90
MACHINE : COMACCHIO CXT 15	DATE PROFILED : 23/04/2024	EASTING : 397626	
LOGGED BY : VIRAJ	HOLE SIZE : PQ / HQ	ELEVATION : 910	
CHECKED BY :			

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	84	79		XXXXXXXXXXXXXXXXXXXX	11				material) 10.05m: Jo, sub-vertical, Sm, Pl, Po 10.17m: Jo, 45°, Sm, Pl, Po 10.3-10.42m: broken zone 10.64-10.68m: Jo, sub-horizontal, Ir, Ro, Ct (extremely weathered material) 11.0-11.11m: Jo, sub-vertical, Ir, Ro, Cn 11.17-11.24m: broken zone		
100	100	100		XXXXXXXXXXXXXXXXXXXX	12				12.23m: Jo, horizontal, Pl, Sm, Po		
100	82	74		XXXXXXXXXXXXXXXXXXXX	13				12.94m: Jo, sub-vertical, Ir, Sm, Po 13.04m: Jo, sub-horizontal, Pl, Sm, Po 13.47m: Jo, sub-horizontal, Pl, Ro, Ct (2mm) 13.96-15.0m: broken zone		
				XXXXXXXXXXXXXXXXXXXX	14						
				XXXXXXXXXXXXXXXXXXXX	15						
				XXXXXXXXXXXXXXXXXXXX	16				15.73-15.99m: broken zone		
100	71	65		XXXXXXXXXXXXXXXXXXXX	17				16.72-17.21m: broken zone		
				XXXXXXXXXXXXXXXXXXXX	18	17.6m SILTSTONE, fine grained, amorphous, massive, cream and red brown.	VLS	HW-XW	17.64-18.5m: extremely weathered material 17.85m: Jo, sub-horizontal, Ir, Ro, Cn		
				XXXXXXXXXXXXXXXXXXXX	19	18.5m SILTSTONE, fine grained, amorphous, massive, red brown.	LS-MS	MW	18.75-19.01m: Jo, sub-vertical, Pl, Sm, Po		
100	44	40		XXXXXXXXXXXXXXXXXXXX	20				19.36-23m: broken zone		
				XXXXXXXXXXXXXXXXXXXX	21						
100	54	48		XXXXXXXXXXXXXXXXXXXX							

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
				XXXXXXXXXX	22						
				XXXXXXXXXX	23						
100	94	91		XXXXXXXXXX	24				23.63m: Jo, 45°, Pl, Sm, Cn		
				XXXXXXXXXX	25	Borehole TSF-BH-10 terminated at 25 m depth.			24.38m: Jo, 45°, Sm, Pl, Po		
				XXXXXXXXXX	26						
				XXXXXXXXXX	27						
				XXXXXXXXXX	28						
				XXXXXXXXXX	29						
				XXXXXXXXXX	30						
				XXXXXXXXXX	31						
				XXXXXXXXXX	32						
				XXXXXXXXXX	33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100					0m	<b>GRAVEL</b> , sandy, with silt, non-plastic fines, dark grey, very dense. Sand particles are fine to coarse Gravel particles are fine to medium.	VD				
100	64	57	>10		0.6m	<b>SILTSTONE</b> , fine grained. Amorphous, Massive, dark red brown.	VLS	HW			
100	66	66	2		2				2.5m: Jo, horizontal, Pl, Ro, Ct 2.8-3.2m: Broken zone		
					3.1m	<b>ANDESITE (BANDED WITH SILTSTONE)</b> , fine grained. Amorphous, Massive, pale grey and dark red brown.	VLS/LS	HW/MW			
100	54	48	>10		3.9m	<b>SILTSTONE</b> , fine grained. Amorphous, Massive, red brown.	VLS/LS	HW/MW	3.83m: Jo, horizontal, Pl, Ro, Cn 3.9m: Jo, horizontal, Pl, Ro, Ct 4.09m: Jo, horizontal, Pl, Ro, Ct 4.34m: Jo, horizontal, Pl, Ro, Ct 4.63m: Jo, horizontal, Ir, Ro, Ct 4.69m: Jo, sub-horizontal, Ir, Ro, Ct 4.95m: Jo, sub-horizontal, Ir, Ro, Ct 4.95-5.03m: Jo, vertical, Pl, Sm, Cn 5.03-5.9m: Broken zone 5.35m: Jo, horizontal, Pl, Ro, Ct (extremely weathered Siltstone) 6.47m: Jo, sub-horizontal, Ir, Ro, Ct (extremely weathered Siltstone) 6.59m: Jo, sub-vertical, Ir, Ro, Ct 6.66m: Jo, sub-vertical, Ir, Ro, Ct (extremely weathered Siltstone) 6.87m: Jo, sub-horizontal, Ir, Ro, Ct 7.04-7.38m: Broken zone 7.78-8.13m: Broken zone 8.67-8.9m: Broken zone		
100	59	53	>10		8.9m	<b>SILTSTONE</b> , fine grained. Amorphous, Massive, red brown.	MS	MW	9.28m: Jo, horizontal, Pl, Ro, Ct		

**NOTES:**

- Hole size PQ from surface. Then HQ from 2.8m
- Hole terminated at 25m
- Groundwater recorded at 2.4m on 21/04/24

 Water Level Indicator

 CONTRACTOR : Capital Drilling  
 MACHINE : COMACCHIO CXT 15

DATE STARTED : 20/04/2024

NORTHING : 3219756

INCLINATION: -90

 LOGGED BY : VIRAJ  
 CHECKED BY :

DATE PROFILED : 21/04/2024

EASTING : 399751

HOLE SIZE : PQ / HQ

ELEVATION : 885

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	94	90	>10		10.8m	<b>SILTSTONE</b> , fine grained. Amorphous, Massive, red brown.	VLS/LS	HW/MW	10.07m: Jo, sub-horizontal, Pl, Ro, Cn 10.87m: Jo, sub-vertical, Pl, Ro, Ct		
					11.7m	<b>ANDESITE</b> , fine grained. Amorphous. Massive, pale grey and black.	MS	MW	11.26m: Jo, sub-horizontal, Ir, Ro, Ct (extremely weathered material) 11.54m: Jo, horizontal, Ir, Ro, Ct 11.7m: Broken zone		
100	100	100	4		13.65m	<b>CONGLOMERATE</b> , fine to coarse grained (intrusion of pebbles). Amorphous. Massive, multi coloured.	MS	MW	12.72m: Jo, horizontal, Ir, Ro, Ct 12.95m: Jo, horizontal, Ir, Ro, Sn		
					14.25m	<b>SILTSTONE</b> , fine grained. Amorphous, Massive, dark red brown.	LS/VLS	MW/HW	14.25m: Jo, horizontal, Ir, Ro, Ct (extremely weathered Siltstone >10mm) 14.92m: Jo, horizontal, Pl, Sm, Cn		
100	97	89	6		15.37m		MS	MW	15.37m: Jo, horizontal, Ir, Ro, Ct (extremely weathered Siltstone) 15.54m: Jo, horizontal, Pl, Sm, Sn 15.78m: Jo, horizontal, Ir, Ro, Ct (extremely weathered Siltstone)		
					16m				16m: Jo, horizontal, Pl, Sm, Sn 16.18m: Jo, horizontal, Ir, Ro, Ct (extremely weathered Siltstone) 16.65m: Jo, horizontal, Pl, Ro, Ct		
100	96	88	7		18.88m		LS	HW	18.88m: Highly weathered seam		
					20.17m		MS	MW	20.17m: Jo, horizontal, Ir, Ro, Sn 20.19m: Jo, sub-vertical, Ir, Ro, Cn 20.41m: Jo, sub-vertical, Pl, Ro, Cn 20.48m: Jo, sub-vertical, Ir, Ro, Ct (2mm) 21.51m: Jo, horizontal, Pl, Ro, Cn		

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
				XXXXXXXXXX	22				21.89m: Jo, horizontal, Pl, Ro, Cn		
100	100	100	4	XXXXXXXXXX	23						
				XXXXXXXXXX	24				23.95m: Jo, horizontal, Ir, Ro, Ct (3mm)		
100	90	75	>10	XXXXXXXXXX	25	Borehole TSF-BH-11 terminated at 25 m depth.	MS/LS	MW/HW	24.4m: Jo, sub-vertical, Ir, Ro, Ct (3mm) 24.71m: Highly weathered broken zone.		
				XXXXXXXXXX	26						
				XXXXXXXXXX	27						
				XXXXXXXXXX	28						
				XXXXXXXXXX	29						
				XXXXXXXXXX	30						
				XXXXXXXXXX	31						
				XXXXXXXXXX	32						
				XXXXXXXXXX	33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
90					0m	<b>GRAVEL</b> , sandy, with silt, non-plastic fines, pale grey and red, medium dense. Sand particles are fine to coarse. Gravel particles are fine to coarse.	MD				
SPT					1						6, 10, 22 N=32
SPT					2						4, 8, 16 N=24
SPT					3						13, 20, 30 N=50
100	100	100			3.55m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	MS	MW			7, 22, 31 N=53
100	100	100			4						
100	81	81			5						
100	100	100	1		6				6.49m: J, sub-horizontal, Ro, Ct, Pl		
					7						
100	93	91	1		8				7.54m: J, sub-horizontal, Ro, Ir, Ct (extremely weathered material), Ir		
					9				8.39m: J, sub-vertical, Ro, Pl, Ct		

**NOTES:**

- Hole size PQ from surface. Then HQ from 6.0m
- Hole terminated at 24.6m

Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : RIG145  
LOGGED BY : VIRAJ  
CHECKED BY :

DATE STARTED : 3/04/2024  
DATE PROFILED : 5/04/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3221823  
EASTING : 402160  
ELEVATION : 911

INCLINATION: -90





TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
93	63	59	>10		0m 0.1m	GRAVEL, sandy, with silt, very dense, pale grey, dry. Sand particles fine to medium. Gravel particles fine to coarse.	VLS MS	HW MW	0.0-0.1m: Core loss		
					1	ANDESITE, fine grained, porphyritic, massive, pale grey.			0.66m: Jo, sub-horizontal, Ro, Ir, Ct (XW seam) 0.8m: Jo, sub-horizontal, Ro, Ir, XW seam 0.93m: Jo, 45°, Ro, Ir, XW seam 0.99m: Jo, sub-vertical, Ir, Ro, XW seam 1.72m: Jo, sub-horizontal, Ro, Ir, Ct, XW seam 1.85m: Jo, sub-vertical, Ro, Ir, Cn 2.23m: Jo, sub-horizontal, Ro, Ir, Ct 2.56m: Jo, 45°, Ro, Pl, Cn 2.72m: Jo, 45°, Sm, Pl, Ve		
100	77	73	5		2						
100	94	50	1		3						
					4				3.8m: Jo, vertical, Un, Ro, Ve		
					5						
100	100	72	1		6		HS	SW	4.7m: Jo, vertical, Un, Ro, Ve		
					7						
100	100	100	-		8						
					9						

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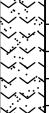

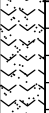
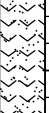

- NOTES:**  
 1. Hole size PQ from surface. Then HQ from 3.0m  
 2. Hole terminated at 25.1m

▼ Water Level Indicator

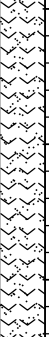

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling	DATE STARTED : 27/04/2024	NORTHING : 3220242	INCLINATION: -90
MACHINE : COMACCHIO CXT 15	DATE PROFILED : 27/04/2024	EASTING : 403456.1	
LOGGED BY : VIRAJ	HOLE SIZE : PQ / HQ	ELEVATION : 924	
CHECKED BY :			

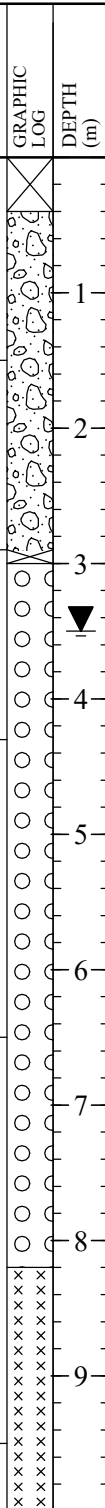
KP\_BH\_2013\_REV\_0\_TSEBOREHOLES.GPJ\_KP\_DATA\TEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	-		11						
100	100	100	1		14				14.09m: Jo, sub-horizontal, Ro, Pl, Ve		
100	100	100	1		17				16.9m: Jo, horizontal, Sm, Pl, Ct (2mm)		
99	98	94	3		20				18.86m: Jo, horizontal, Pl, Ro, Ve 20.05m: Jo, sub-vertical, Ir, Sm, Ct (2mm)		
					21				20.8m: Jo, horizontal, Ir, Ro, Ve 21.3m: Jo, horizontal, Pl, Un, Ct (3mm)		

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
101	101	101	4		22				22.52m: Jo, horizontal, Pl, Ro, Ve 22.77m: Jo, horizontal, Pl, Ro, Ve 23.21m: Jo, horizontal, Pl, Ro, Ve		
100	100	100	-		25	Borehole TSF-BH-13 terminated at 25 m depth.					
					26						
					27						
					28						
					29						
					30						
					31						
					32						
					33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)	
73	21	6			0m	<b>SAND</b> , gravelly, with silt, medium dense, non-plastic, pale grey and black, <u>dry</u> .	MD		0.0-0.4m: Core loss			
					0.4m	Sand particles fine to coarse, rounded to sub-rounded. Gravel particles fine to coarse and angular.	VD					
					1m	<b>GRAVEL</b> , sandy, with cobbles, trace silt, very dense, non plastic, grey, brown, black, <u>dry</u> .						
100	44				2m	Gravel particles fine to coarse, sand particles fine to coarse, cobbles angular. Gravel angular. Sand rounded to sub-rounded.						
93	157	36	>10		2.9m	<b>CONGLOMERATE</b> , ground matrix fine, phenoplast pebbles, fine to coarse, massive, multi coloured.	MS	MW	2.9-3.0m: Core loss			
					3m							
					4m				4.08-4.3m: broken zone			
100	132	141	5		5m				4.99m: Jo, horizontal, Ro, Ir, Cn			
					6m				5.03m: Jo, horizontal, Ro, Ir Cn			
					7m				5.42m: Jo, sub-horizontal, Ir, Ro, Ct (20mm extremely weathered seam)			
					8m				5.54m: Jo, sub-horizontal, Ro, Ir, Ct (5mm extremely weathered seam)			
					9m				6.35m: Jo, sub-horizontal, Ro, Ir Cn			
					10m				6.55m: Jo, horizontal, Ro, Pl, Cn			
					11m				6.98m: Jo, horizontal, Ro, Ir, Cn			
100	96	38	3		8.2m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	LS-MS	MW	8.24m: Jo, sub-horizontal, Ro, Ir Cn (transition from Conglomerate to Siltstone)			
					9m							
					10m							
					11m				9.75m: Jo, horizontal, Ro, Ir,			

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▼ Water Level Indicator

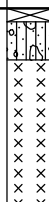



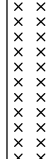
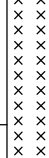


- NOTES:**
- Hole size PQ from surface. Then HQ from 2.9m
  - Hole terminated at 25m
  - Drilling not supervised

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013\_GDI\_25/7/24

CONTRACTOR : Capital Drilling	DATE STARTED : 24/04/2024	NORTHING : 3217410	INCLINATION: -90
MACHINE : COMACCHIO CXT 15	DATE PROFILED : 24/04/2024	EASTING : 398854	
LOGGED BY : VIRAJ	HOLE SIZE : PQ / HQ	ELEVATION : 896	
CHECKED BY :			





TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
93	87	78	-		0m	<b>SAND</b> , silty, with gravel, loose, pale grey, non plastic.	VSt	XW	0.0-0.1m: Core loss		
					0.1m	Sand particles fine to coarse.					
					0.38m	Gravel particles fine to coarse.	VLS	HW			
					1	<b>SILT</b> , trace sand and gravel, high plasticity, red, brown, <u>dry</u>					
					1.5m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown			1.5-1.6m: Core Loss		
100	29	29	>10		1.6m				1.6m: Broken zone		
					2.9m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown	LS	MW	2.61m: Broken zone		
					3				3.33m: Jo, sub-horizontal, Sm, Pl, Cn		
100	88	84	>10		4			4.3m: Jo, 45°, Po, Pl, Ct (2mm)			
					5				5.13m: Jo, sub-vertical, Ro, Pl, Cn		
					6			5.21-6.51m: Broken zone			
100	63	61	>10		6.6m	<b>CLAY</b> , trace sand, high plasticity, cream, <u>moist</u> . Residual, Sand particles fine grained.	VSt	XW	6.51m: Jo, 45°, Po, Pl, Ct (3mm)		
					7.6m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown	VLS	HW	7.6m: Jo, vertical, Ro, Ir, Cn		
58	11	6	1		8				7.72-9.66m: XW zone		
					9.7m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown	MS	MW			
					9.9m						

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▼ Water Level Indicator

- NOTES:**
- Hole size PQ from surface. Then HQ from 2.9m
  - Hole terminated at 25m

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
 MACHINE : COMACCHIO CXT 15  
 LOGGED BY : VIRAJ  
 CHECKED BY :

DATE STARTED : 24/04/2024  
 DATE PROFILED : 24/04/2024  
 HOLE SIZE : PQ / HQ

NORTHING : 3216178  
 EASTING : 400132  
 INCLINATION: -90  
 ELEVATION : 888



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
				XXXXXXXXXX	22				21.79-22.4m: Broken zone		
				XXXXXXXXXX	22.4m	SILTSTONE, fine grained, amorphous, massive, red brown	HS	MW			
				XXXXXXXXXX	23						
100	100	95	1	XXXXXXXXXX	24				24.23m: Jo, sub-horizontal, Po, Pl, Ct (3mm)		
				XXXXXXXXXX	25	Borehole TSF-BH-15 terminated at 25 m depth.					
100	100	100	-	XXXXXXXXXX	25						
				XXXXXXXXXX	26						
				XXXXXXXXXX	27						
				XXXXXXXXXX	28						
				XXXXXXXXXX	29						
				XXXXXXXXXX	30						
				XXXXXXXXXX	31						
				XXXXXXXXXX	32						
				XXXXXXXXXX	33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	SAND, with gravel and silt, loose, pale grey, <u>dry</u> .	L		0.0-0.3m: Core loss		
					0.3m	Sand particles fine to medium. Gravel particles fine to coarse	VD	XW			
80					1.05m	SAND, gravelly, with silt, cream and pale grey, <u>dry</u> , very dense. EXTREMELY WEATHERED VOLCANIC BRECCIA/ CONGLOMERATE	LS	HW	1.5-2.17m: Broken zone		
					2.2m	Sand particles fine to coarse. Gravel fine to coarse.  CONGLOMERATE/VOLCANIC BRECCIA, ground matrix fine grained, angular fragment and 5mm to 35mm porphytic, massive, multi colour (pyroclastic origin). VOLCANIC BRECCIA/CONGLOMERATE, fine grained, ground mass, round and angular pebbles, amorphous, multi colour.	MS	MW	2.59-2.7m: Jo, vertical, Ro, Ir, Ve 2.87m: Jo, horizontal, Ro, Ir, Cn 3.18m: Jo, sub-horizontal, Ir, Ro, Ve 3.22m: Jo, sub-horizontal, Ir, Ro, Ve  4.35-4.43m: Crushed seam 4.56-4.79m: Jo, vertical, Ir, Ro, Ve  5.28-5.31m: Crushed seam  6.15m: Jo, sub-horizontal, Ir, Ro, Cn 6.48m: Jo, horizontal, Ir, Ro, Ct (5mm thick extremely weathered material) 6.59m: Jo, sub-horizontal, Ir, Ro, Ve 6.76m: Jo, sub-horizontal, Ir, Ro, Ve 7.05m: Jo, horizontal, Ir, Ro, Ct (4mm extremely weathered seam) 7.98m: Jo, sub-horizontal, Po, Pr, Ct (1mm) 8.05-8.8m: Jo, sub-horizontal, Ir, Ro, Ve 8.39-8.42m: Crushed seam 8.8m: Jo, sub-horizontal, Ro, Ir, Ve 8.85m: Jo, horizontal, Ro, Ir, Ve 9.26m: Jo, horizontal, Ro, Ir, Ct (extremely weathered seam,		
100	42	30									
100	96	93									
100	80	95									

**NOTES:**














- Hole size PQ from surface. Then HQ from 2.7m
- Hole terminated at 150m
- Significant drilling fluid loss to 25m depth
- Borehole grouted to 30.5m and re-drilled through grouted section to planned depth

CONTRACTOR : Capital Drilling  
MACHINE : COMACCHIO CXT 15  
  
LOGGED BY : VIRAJ  
CHECKED BY :

DATE STARTED : 29/04/2024  
DATE PROFILED : 30/04/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3218794  
EASTING : 404640  
INCLINATION: -90  
ELEVATION : 915

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	94			10.5m	<b>ANDESITE</b> , fine grained, amorphous, massive, red brown grey.	MS	MW	10mm 9.34m: Jo, sub-horizontal, Ro, Ir, Ct 10.02m: Jo, sub-horizontal, Ro, Ir, Ve 10.07m: Jo, 45°, Ro, Ir, Ct (extremely weathered seam) 10.29m: Jo, sub-horizontal, Ro, Ir (extremely weathered seam >10mm very low strength)		
					11.6m	<b>VOLCANIC BRECCIA</b> , fine to coarse grained, rounded and angular pebbles and fragments, amorphous, massive, multi coloured.	MS	MW	10.53m: Jo, sub-horizontal, Ro, Ir, Ve 10.88-10.92m: Jo, sub-horizontal, Ir, Ro (extremely weathered seam >10mm very low strength) 11.51m: Jo, sub-horizontal, Ir, Ro, Ct (3mm) 12.01m: Jo, sub-horizontal, Ir, Ro, Ve 12.21m: Jo, horizontal, Pl, Ro, Ve		
100	96	94			14.6m				14.52-15.6m: Infilled seam 14.6m: Jo, horizontal, Pl, Ro, Ve 14.87m: Jo, sub-horizontal, Ir, Ro, particles of material has washed 15.03m: Jo, sub-horizontal, Ir, Ro, extremely weathered seam 15.14m: Jo, sub-horizontal, Ro, Ir, Cn		
100	98	92			17.1m	<b>ANDESITE</b> , fine grained, amorphous, massive, red brown grey.	HS	MW	16.77-16.85m: extremely weathered seam 17.08m: Jo, sub-horizontal, Ir, Ro, Ve, transition from Volcanic Breccia to Andesite 17.43m: Jo, sub-horizontal, Ir, Sm, Ct (2mm) transition from Andesite to Volcanic Breccia		
					17.4m	<b>VOLCANIC BRECCIA</b> .	LS-MS	HW-MW			
					19.2m	<b>ANDESITE</b> , fine to medium grained porphyritic, massive, red brown, black white.	LS-MS	MW	18.7m: Interface grinded 19.05m: Jo, sub-horizontal, Ir, Ro, Sn 19.61m: Jo, sub-vertical, Ro, Un, Ve 19.69m: Jo, sub-horizontal, Ir, Ro, Ve 19.76m: Jo, sub-horizontal, Un, Ro, Ve		
100	80	70			20.6m	<b>ANDESITE</b> , recovered as washed sample, may be broken cavity.	VLS-LS	HW	19.8m: Infilled seam 19.86-19.9m: Broken zone 19.97-20.2m: Broken zone 20.33m: Jo, sub-horizontal, Ir, Ro, Ve (fill material in the joint not recovered)		
					21.6m	<b>ANDESITE</b> , low to medium			20.64-21.57m: Broken zone.		

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	48	45			22				Most of the material (rock fragments) recovered as pieces of washed / cavity zone 21.3-21.34m: 20% of the section has been weathered/washed 21.84m: Jo, sub-vertical, Ir, Ro, Ve		
100	77	69			23						
100	59	30			24						
					25						
100	92	87			26						
					27						
100	99	98			28						
					29						
					30				29.85m: J, sub-horizontal, Vro, Pl, Ct		
					30.5m	<b>BRECCIA</b> , fine to coarse, granular, massive, multi coloured red brown mottled yellow/white.	HS	MW	30.41m: J, sub-horizontal, Ro, Cv, Ve		
					31						
100	100	100	1		32						
					33				32.8m: J, sub-vertical, Ro, Pl, Cn		

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	1	△	34						
100	100	100	1	△	35				35.63m: J, 45°, Vro, Pl, Ct		
100	99	99	1	△	38						
100	100	100	1	△	39.3m	<b>BRECCIA</b> , fine to coarse grained, granular, massive, multi coloured red brown mottled yellow and white.	MS	MW	39.28m: J, sub-vertical, Vro, Ir, Ct 39.45m: J, sub-vertical, Vro, Ir, Ct 39.65m: J, sub-vertical, Vro, Ir, Ve		
100	100	86	3	△	40				40.69m: J, 45°, Vro, Ir, Ve 40.74m: J, sub-vertical, Vro, Ir, Ct 40.78m: J, 45°, Vro, Pl, Ct 40.90m: J, sub-vertical, Vro, Ir, Ve 41.31m: J, sub-horizontal, Vro, Pl, Ve 41.40m: J, sub-horizontal, Vro, St, Ct 41.43m: J, sub-horizontal, Vro, Cv, Ve 41.70m: J, sub-vertical, Vro, Pl, Ct 41.79m: J, sub-vertical, Vro, Ir, Ve 41.97m: J, sub-horizontal, Vro, Pl, Ve 42.06m: J, sub-vertical, Vro, Cv, Ct 42.14-42.46m: J, vertical, Ro, Un, Ct 42.46m: J, 45°, Vro, Ir, Ct 42.66m: J, sub-horizontal, Vro, Un, Ve 43.22m: J, 45°, Vro, Pl, Ve 43.28m: J, 45°, Vro, Pl, Ct 43.52m: J, 45°, Vro, Ir, Ve 43.58m: J, 45°, Vro, Ir, Ve		
100	112	44	>10	△	41						
100	97	87	6	△	43						
100	75	37	9	△	44						
				△	45						
				△	45.5m	<b>BRECCIA</b> , fine to coarse grained, granular, massive,	HS	MW			

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	1	△	46	multi coloured red brown mottled yellow and white.			43.61m: J, 45°, Vro, Ir, Ve		
				△					43.84m: J, sub-horizontal, Vro, Pl, Ct		
				△					43.98m: J, horizontal, Vro, Pl, Ve		
				△					44.00m: J, sub-vertical, Vro, Pl, Ct		
				△	47				44.11m: J, sub-horizontal, Ro, Pl, Ct		
				△					44.32m, J, sub-vertical, Ro, Ir, Ve-Ct		
				△					44.48m: J, sub-horizontal, Ro, Pl, Ct		
				△	48				44.76m: J, sub-horizontal, Vro, Pl, Ve		
				△					44.84m: J, 45°, Vro, Ir, Ve		
				△					44.94m: J, sub-vertical, Vro, Ir, Ve-Ct		
100	100	100	0	△	49	47.25m: J, horizontal, Ro, Pl, Sn					
				△							
				△	50						
				△							
100	100	100	0	△	51						
				△							
				△	52						
				△							
				△	53				52.65m: J, 45°, Vro, Pl		
100	100	100	1	△	53						
				△							
				△	54						
				△							
100	100	100	0	△	55						
				△							
				△	56						
				△							
100	100	100	0	△	57						
				△							
				△							

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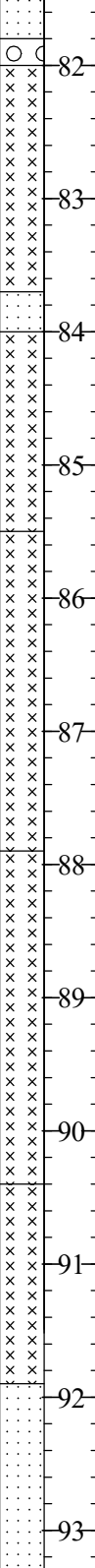
KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	0	△	58						
100	100	100	0	△	59						
100	99	99	1	△	62						
				△	63.5m	<b>BRECCIA</b> , interbedded with <b>SILTSTONE</b> , fine to coarse grained, granular, bedding, red brown mottled white.	LS	MW	63.28-63.31m: extremely weathered seam, sub-horizontal, Ro, Pl		
75	67	67	1	△	64.2m	<b>BRECCIA</b> , fine to coarse grained, granular, massive, red brown grey mottled white (multi coloured).	HS	MW	64.33-64.0m: extremely weathered seam, sub-horizontal, Ro, Pl		
150	150	150	2	△	66				65.70m: J, sub-horizontal, Ro, Ir, Vn 66.17m: J, horizontal, Ro, Cv, Un		
100	100	100	0	△	68m	<b>SANDSTONE</b> , fine to medium grained, granular, laminated, dark reddish brown.	HS	MW	67.81-67.98m: <b>SILTSTONE</b> , very low strength		
				△	69						

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	2		-70						
100	100	100	2		-71				71.19m: J, sub-horizontal, Ro, Pl, Un		
100	100	100	2		-72				71.84m: J, sub-horizontal, Ro, Pl, Ct		
100	100	100	0		-73						
100	100	100	0		73.5m	SANDSTONE, fine to medium grained, granular, bedding, dark red brown and yellow brown.	HS	MW			
100	100	100	0		74.3m	SANDSTONE, fine to medium grained, laminated, dark red brown	HS	MW			
100	100	100	0		-75						
100	100	100	0		-76						
100	100	100	0		-77						
100	100	100	0		-78						
100	100	100	0		-79						
100	100	100	0		-80						
100	100	100	0		-81						
					81.3m	becoming dark grey	HS	MW			

KP\_BH\_2013\_REV\_0\_ISEBORHOLES.GPJ\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	0		81.8m	<b>CONGLOMERATE</b> , medium to coarse grained, granular, bedding, multi colour (dark reddish brown, dark grey and grey).	MS	MW			
					82m	<b>SILTSTONE</b> , fine grained, granular, laminated, red brown and dark grey.					
					83						
					83.7m	<b>SANDSTONE</b> , fine to medium grained, granular, laminated, dark grey.	MS-HS	MW			
					84m	<b>SILTSTONE</b> , fine grained, granular, laminated, red brown and grey.	MS	MW			
100	160	100	0		85						
					85.5m	<b>SILTSTONE</b> , fine grained, granular, laminated, dark grey and red brown banding.	MS-HS	SW			
100	100	100	0		86						
					87						
					88	87.9m <b>SILTSTONE</b> , fine grained, granular, bedding, red brown and grey.	LS	MW			
100	100	100	0		89						
					90						
				90.4m	<b>SILTSTONE</b> , fine grained, granular, laminate, dark grey and red brown banding.	HS	MW				
				91							
100	100	100	0	92	91.9m <b>SANDSTONE</b> , fine grained, granular, laminated, dark grey.	LS	SW				
				93							
									92.90-93.07m: J, sub-vertical, Vro, Pl, Ct		



KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					106						
100	100	100	0		107						
					108						
					109						
100	100	100	0		110						
					111	11.1m SILTSTONE, fine grained, amorphous, laminated, dark red brown with dark grey patches.	HS	MW			
					112						
100	100	100	0		113	13.1m SANDSTONE, medium grained, granular, massive, dark grey.	HS	FR			
					114						
90	90	90	0		115	14.8m SILTSTONE, fine grained, amorphous, laminated, dark red brown.	MS-HS	MW			
					116						
100	100	100	0		117	16.7m SANDSTONE, fine to medium grained, granular, massive, dark grey.	HS	SW-FR			

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATA\_TEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					118						
100	100	100	0		119						
					120						
					121						
100	100	100	0		122						
					122.4m	SANDSTONE, inter bedded by SILTSTONE, fine to medium grain, granular, bedding.	MS	MW			
					123						
					123.35m	SANDSTONE, medium grained, granular, laminated, dark grey.	HS	SW			
					124						
100	100	100	0		124						
					124.5m	SILTSTONE, fine grained, granular, laminated, dark red brown and grey.	MS	MW			
					125						
100	100	100	0		126						
					127						
					126.8m	SANDSTONE, fine grained, granular, laminated, dark grey.	LS				
					128						
100	100	100	0		128						
					129						

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATA TEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					129.6m	SILTSTONE, fine grained, amorphous, laminated, dark red brown grey.	LS	MW			
					130		VLS	HW			
100	66	66	66		131		LS	MW			
					132		HS	MW			
					133	133.1m SILTSTONE, fine grained, granular, laminated, dark red brown.	MS-HS	MW			
100	100	100	0		134						
					135						
					136	138.6m SILTSTONE, fine grained, granular, laminated, dark red brown.					
100	100	100	0		137						
100	91	87.5	4		138				138.20-138.40m: sheared zone, fragmented, Ro, very low strength		
					139		HS	MW			
100	100	100	4		140				140.70m: J, 45°, angle, Ro, Pl, Ct		

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	<b>SAND</b> , silty, with gravel, medium dense, dry, grey, non-plastic. Sand particles fine to medium grained, rounded. Gravel Particles fine to coarse, angular.	MD		0.0-0.2m: Core loss		
					0.2m		VLS	HW			
87	-	-	-	XXXXXXXXXX	1	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.					
				XXXXXXXXXX	2						
100				XXXXXXXXXX	3						
96				XXXXXXXXXX	4						
				XXXXXXXXXX	5						
100				XXXXXXXXXX	6						
				XXXXXXXXXX	7						
				XXXXXXXXXX	8						
93				XXXXXXXXXX	9						
				XXXXXXXXXX	10						
				XXXXXXXXXX	11						
				XXXXXXXXXX	12						
				XXXXXXXXXX	13						
				XXXXXXXXXX	14						
				XXXXXXXXXX	15						
				XXXXXXXXXX	16						
				XXXXXXXXXX	17						
				XXXXXXXXXX	18						
				XXXXXXXXXX	19						
				XXXXXXXXXX	20						
				XXXXXXXXXX	21						
				XXXXXXXXXX	22						
				XXXXXXXXXX	23						
				XXXXXXXXXX	24						
				XXXXXXXXXX	25						
				XXXXXXXXXX	26						
				XXXXXXXXXX	27						
				XXXXXXXXXX	28						
				XXXXXXXXXX	29						
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				XXXXXXXXXX	153						
				XXXXXXXXXX	154						
				XXXXXXXXXX	155						
				XXXXXXXXXX	156						
				XXXXXXXXXX	157						
				XXXXXXXXXX	158						
				XXXXXXXXXX							



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
93	61	41	12		22	SANDSTONE, fine to medium grained, granular, massive, pale grey.	MS-HS	HW-MW	22.15m: Jo, 45°, Pl, Sm, Ve 22.24m: Jo, sub-vertical, Pl, Sm, Ct 22.34m: Jo, horizontal, Pl, Sm, Ve 22.42-23.83m: Broken zone 22.45m: Jo, 45°, Pl, Sm, Ve 22.5m: Jo, 45°, Pl, Sm, Ve 22.59m: Jo, 45°, Pl, Sm, Ve 22.73m: Jo, 45°, Pl, Sm, Ve 22.87m: Jo, 45°, Pl, Sm, Ve 23.09m: Jo, 45°, Pl, Sm, Ve 23.21m: Jo, 45°, Pl, Sm, Ve 23.38m: Jo, 45°, Pl, Sm, Ve 24.01m: Jo, sub-vertical, Sm, Pl, Ve 24.37m: Jo, sub-vertical, Ro, Pl, Ct 24.63m: Ve, vertical 24.84m: Jo, sub-horizontal, Ir, Ro, Ve		
100	63	63	7		25.1m	SILTSTONE, fine grained, amorphous, massive, red brown.	LS	HW	24.37m: Jo, sub-vertical, Ro, Pl, Ct 24.63m: Ve, vertical 24.84m: Jo, sub-horizontal, Ir, Ro, Ve		
					25.6m	SANDSTONE, fine to medium grained, granular, grey.	MS	MW	25.61m: Jo, sub-vertical, Sm, Pl, Ve 25.64m: Jo, sub-horizontal, Ro, Pl, Ct 25.87m: Jo, 45°, Sm, Pl, Ve		
					25.9m	SILTSTONE, fine grained, amorphous, massive, red brown.	VLS-LS	HW			
100					27						
100					28						
100					29						
100					30						
100					31						
100					32						
					33						



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
33	-	-	-		0m	<b>SAND</b> , with clay, trace of gravel, medium dense, brown, dry. Sand particles fine. Gravel particles fine to coarse, angular.	MD				
					1.1m	<b>CLAY</b> , with sand, trace gravel, hard, dark brown, <u>dry to moist</u> . Sand particles fine to medium. Gravel particles medium to coarse and angular.	H				
78	-	-	-		1.7m	<b>CLAY</b> , with sand, hard, dark brown, <u>dry to moist</u> . Sand particles are fine.	H				3, 16, 30 N=Ref.
100	-	-	-		3.3m	<b>SILT</b> , trace sand, hard, red brown, <u>moist</u> , extremely weathered. <b>SILTSTONE</b> .	H	XW			18, 41, (30/90), N=Ref.
100	83	82	-		4.5m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	VLS	HW			30/95MM, H3, N=Ref.
100	93	91	1		7.4m	<b>ANDESITE/PYROCLASTIC ROCK</b> , fine to medium grained, amorphous, massive, grey.	MS	MW	7.83-7.9m: Broken zone		
									9.24m: Jo, sub-vertical, Po, Pl, Ct		
									9.8m: Jo, sub-horizontal, Ro,		

**NOTES:**

- Hole size PQ from surface. Then HQ from 3.3m
- Hole terminated at 27.3m
- Groundwater recorded at 3.5m on 03/05/2024

▼ Water Level Indicator



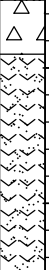

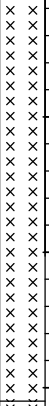
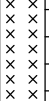
⊠ Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013\_GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : COMACCHIO CXT 15  
LOGGED BY : VIRAJ  
CHECKED BY :

DATE STARTED : 1/05/2024  
DATE PROFILED : 3/05/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3216309  
EASTING : 402617  
INCLINATION: -90  
ELEVATION : 879

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	84	6		11				Pl, Ve 9.85m: Jo, sub-horizontal, Ro, Pl, Ve 9.92m: Jo, sub-horizontal, Ro, Pl, Ve 10.18m: Jo, horizontal, Ir, Ro, Ve 10.25m: Jo, horizontal Ro, Ir, Ve 10.34m: Jo, sub-horizontal, Ro, Ir, Ve		
100	100	98			13.5m	<b>VOLCANIC BRECCIA</b> , fine to medium grained, amorphous, massive, (intrusion of pebbles), multi coloured.	MS	MW			
100	100	98			13.9m	<b>ANDESITE/PYROCLASTIC ROCK</b> , fine to medium grained, amorphous, massive, grey.	MS	MW	13.75m: Jo, horizontal, Ro, Ir, Cn 13.88m: Jo, horizontal, Ro, Ir, Cn (grinded) 13.95m: Jo, horizontal, Ro, Ir, Cn (transition from Volcanic Breccia to Andesite/Pyroclastic rock)		
100	5	5	-		15.7m	<b>SILTSTONE</b> , fine grained, amorphous, massive, red brown.	MS VLS	MW MW HW-XW	15.72m: jo, horizontal, Pl, Sm, St (transition) 15.98m: Jo, sub-horizontal, Ro, Ir, Ct (extremely weathered material) 16.2-20.19m: Broken zone, with extremely weathered seam		
100	19	17	-		20		MS VLS MS	MW HW MW	20.39-20.53m: Broken zone		
					21.1m	<b>SILTSTONE</b> , fine grained, amorphous, flow banded, red brown.	MS	MW	20.87-21.1m: Broken zone 21.73m: Jo, horizontal, Ro, Ir,		

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATA\_TEMPLATE\_BH\_2013.GDT\_25/7/24



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
93	42	36	HF		0m 0.1m	<b>SAND</b> , gravelly, trace silt, non-plastic fines, dark grey and brown, dry. Sand particles are fine to medium. Gravel particles are fine to coarse, medium to high strength.	L MS	HW MW	0.0-0.1m: Core Loss 0.1-0.5m: Highly fractured, fragmented		
					1	<b>SANDSTONE</b> , fine to medium grained, granular, massive, grey brown and mottled red brown and white.	L MS	HW MW	1.0-1.4m: Highly fractured, fragmented, SZ, Ir, Ro, Infill seam >10mm 1.5m: Jo, sub-vertical, Ro, Pl, Ct 1.6m: Jo, sub-vertical, Ro, Pl, Ct 1.9m: Jo, sub-vertical, Ro, Pl, Ct 2.1m: Jo, sub-vertical, Ro, Pl, Ct 2.2m: Jo, sub-vertical, Ro, Pl, 20mm infill seam 2.4m: Jo, sub-vertical, Ro, Pl, 10mm infill seam 2.67m: Jo, sub-horizontal, Pl, Vro, Vn 2.97m: Jo, sub-horizontal, Ro, Pl, Ct 3.1m: Jo, sub-vertical, Ro, Pl, Ct 3.25m: Jo, sub-vertical, Ro, Pl, Ct 3.4m: Jo, sub-vertical, Ro, Pl, Un		
100	64	59	7		2						
					3						
100	65	65	10		4						
					5						
					5.8m	<b>SANDSTONE</b> , fine to medium grained, granular, massive, grey brown mottled red brown.	HS	MW	3.55m: Jo, sub-vertical, Ro, Pl, Ct 3.9m: Jo, vertical, Vro, Pl, Vn 4.93m: J, horizontal, Vro, Cu, Vn 5.34m: Jo, horizontal, Ro, Pl, Ct 5.34m: Jo, sub-vertical, Ro, Cu, Ct 5.75m: XWS (40mm), Pl, Ro 6.25m: Jo, sub-vertical, Pl, Ro, Ct 6.88m: Jo, horizontal, Pl, Vro, Un 7.15m: Jo, horizontal, Cu, Ro, Un 7.28m: Jo, sub-horizontal, Pl, Ro, Un 7.56m: Jo, sub-horizontal, Pl, Ro, Ct 7.77m: Jo, sub-horizontal, Pl, Vro, Un 8.1m: Jo, horizontal, Pl, Ro, Ct 8.33m: Jo, horizontal, Pl, Ro, Ct 8.4m: Jo, horizontal, Pl, Ro, Infill seam 5mm		
100	96	96	13		6						
					7						
					8						
					9						

**NOTES:**

- Hole size PQ from surface. Then HQ from 2.8m
- Hole terminated at 150m

 CONTRACTOR : Capital Drilling  
 MACHINE : RIG145

DATE STARTED : 12/05/2024

NORTHING : 3214318

INCLINATION: -90

 LOGGED BY : DE/RR  
 CHECKED BY :

DATE PROFILED : 19/05/2024

EASTING : 400743

HOLE SIZE : PQ / HQ

ELEVATION : 887

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)		
100	90	90	9	.....	11				8.4m: Jo, sub-vertical, Pl, Ro, Ct 8.45m: Jo, 45°, Pl, Ro, Ct 8.78m: Jo, sub-horizontal, Pl, Ro, Ct 8.8m: Jo, sub-vertical, Pl, Ro, Ct 9.3m: Jo, sub-horizontal, Pl, Ro, Ct 9.45m: Jo, sub-vertical, Pl, Ro, Ct 9.63m: Jo, sub-horizontal, Pl, Ro, Ct 9.82m: Jo, sub-vertical, Pl, Ro, Un 10.12m: Jo, 45°, Pl, Ro, Un 10.6m: Jo, vertical, Pl, Ro, Un 11.36m: Jo, sub-horizontal, Pl, Ro, Ct 11.46m: Jo, sub-horizontal, Pl, Ro, Ct 12.42m: Jo, sub-vertical, Pl, Vro, Un 13m: Jo, sub-vertical, Pl, Ro, Ct 14.26m: Jo, sub-horizontal, Pl, Vro, Un				
100	100	100	1	.....	12.1m	<b>SANDSTONE</b> , fine to coarse grained, granular, massive, grey brown mottled red brown.	MS-HS	MW					
100	100	100	2	.....	14								
				△△△	14.7m	<b>BRECCIA INTERBEDDED BY SANDSTONE</b> , fine to coarse grained, granular, massive, grey brown mottled red brown and white.	HS	MW					
				△△△	15								
				△△△	16				16.16m: CS, sub-vertical, Pl, Ro, (30mm thick)				
100	96	96	3	△△△	17				16.72m: Jo, sub-horizontal, Pl, Ro, Un				
				△△△	18								
				△△△	19								
100	99	97	3	△△△	19.5m	<b>BRECCIA</b> , medium to coarse grained, granular, massive, multi coloured (grey, brown and green brown).	HS	MW					
				△△△	20				20.02m: Jo, sub-vertical, Pl, Vro, Ct				
				△△△	21				20.89m: Jo, 45°, Ro, Pl, XWS (40mm) 20.99m: J, 45° angle, Ro, Pl, Ct				

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	80	80	1	△	22						
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	2	△	23				23.08m: Jo, vertical, Ro, Pl, Ct		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	99	99	3	△	24				24.95m: XWS (10mm), 45°, Ro, Pl		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	99	99	3	△	25				27.5m: Jo, 45°, Ro, Pl, Ct		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	26				28.7m: Jo, sub-horizontal, Vro, Pl, Ct		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	27				29.52m: SZ (20mm), 45°, Ro, Pl, Un		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	28				30.5m: Jo, sub-horizontal, Ro, Pl, Un		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	29				32.85m: Jo, 45°, Ro, Pl, Un		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	30				32.92m: Jo, sub-vertical, Ro, Pl, Un		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	31				33m: Jo, sub-vertical, Ro, Pl, Ct		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	32				33.1m: Jo, sub-vertical, Ro, Pl, Ct		
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
				△							
100	100	100	5	△	33						
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KP\_BH\_2013\_REV\_0\_ISEBOREHOLES\_CELL\_KP\_DATA\_TEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
				△	34				Un		
				×	34.3m	<b>SILTSTONE</b> , fine grained, amorphous, bedding, green brown mottled brown and grey	HS	MW	33.28m: Jo, 45°, Ro, Pl, Ct 34.26m: J, horizontal, Pl, Ro, Ct 34.68m: J, 45°, Sm, Pl, Ct 34.8-35.06m: Broken core 35.2-35.4m: Broken core 35.56m: J, sub-horizontal, Ro, Pl, Ct		
100	85	85	>10	×	35						
				△	36m	<b>BRECCIA</b> , medium to coarse grained, granular, massive, multi coloured (grey, brown, dark brown and green brown)	HS	MW			
				△	37						
100	100	100	0	△	38						
				△	39						
100	94	86	>10	△	39.1m	<b>SILTSTONE</b> , fine grained, amorphous, bedding, dark grey mottled brown	HS	MW	39.23m: J, sub-horizontal, Vro, Pl, Ct 39.3-39.37m: Broken core 39.44m: Ve, sub-vertical 39.59m: J, sub-vertical, Ro, Pl, Un 39.75m: J, sub-horizontal, Ro, Pl, St		
				×	40						
				△	40.6m	<b>BRECCIA</b> , fine to medium grained, granular, massive, multi coloured (grey and brown)	HS	MW	40.04m: J, sub-horizontal, Ro, Ir, St 40.24m: Broken core 40.62m: J, sub-horizontal, Ro, Pl, Un 41.52m: J, sub-vertical, Vro, Pl, St		
100	96	93	>10	△	41						
				×	41.8m	<b>SILTSTONE</b> , fine grained, amorphous, bedding, grey to dark grey	HS	MW-SW	41.6m: V, sub-vertical 41.77m: V, vertical 41.89m: J, sub-horizontal, Pl, Sm, Ct 42.25m: J, sub-horizontal, Pl, Sm, Ct 42.5m: J, sub-horizontal, Ro, Pl, St 42.69m, 42.76m: J, sub-horizontal, Sm, Pl, Ct 43.65m: J, sub-vertical, Ro, Pl, Ct 43.7m: J, sub-vertical, Ro, Ir, Ct 43.89m: J, sub-vertical to sub-horizontal, Ro, Ir, Ve		
				×	42						
				×	43						
				×	44						
100	100	96	6	×	44.6m	<b>BRECCIA</b> , fine to medium grained, granular, massive, multi coloured (dark grey mottled red brown and white)	HS	SW			
				△	45						





KP\_BH\_2013\_REV\_0\_ISEB0REHOLES.GPJ\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	85	85	3	XXXXXX	70				Un 69.2m: Jo, sub-vertical, Pl, Ro, Ct 69.5m: Jo, sub-vertical, Pl, Ro, Ct 69.85m: Jo, sub-vertical, Pl, Ro, Ct 70.3m: Jo, 45°, Pl, Ro, Un 70.72m: J, sub-horizontal, Sm, Pl, St 71-71.05m: Broken core 71.2m: J, sub-vertical, Sm, Un, Sn 71.35m: J, 45°, Sm, Pl, Sn 71.5m: Broken core 72.3m: J, vertical or 45°, Sm, Pl, Ct 72.5m: J, vertical, Sm, Ir, Ct		
100	31	43	>10	XXXXXX	71						
				XXXXXX	72						
100	85	80	>10	XXXXXX	72.8m	SANDSTONE, medium grained, granular, massive, dark grey	HS	SW			
				XXXXXX	73						
100	85	80	>10	XXXXXX	73.5m	SILTSTONE, fine grained, amorphous, bedding, dark grey	HS	SW			
				XXXXXX	74						
				XXXXXX	75						
96	66	66	8	XXXXXX	75.7m	SANDSTONE, medium grained, granular, massive, grey	HS	SW			
				XXXXXX	75.9m	SANDSTONE, medium grained, granular, massive, grey	HS	SW			
				XXXXXX	76.2m	SILTSTONE, fine grained, amorphous, bedding, dark grey	HS	SW			
				XXXXXX	76.2m	SANDSTONE, medium grained, granular, massive, grey	HS	SW			
				XXXXXX	76.9m	SILTSTONE, fine grained, amorphous, bedding, dark grey	HS	SW			
				XXXXXX	77						
100	37	23	HF	XXXXXX	77.6m	SILTSTONE, fine grained, granular, massive, dark grey	LS	HW			
				XXXXXX	78						
				XXXXXX	78.7m						
0	0	0	HF	XXXXXX	79						
				XXXXXX	79.5m						
50	9	0	HF	XXXXXX	80						
				XXXXXX	80.0-80.5m						
57	0	0	HF	XXXXXX	81						
				XXXXXX	80.5m						

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KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
85	35	35	HF	XXXXXXXXXX	82				81.52m: Jo, sub-vertical, Ro, Pl, XWS 10mm 81.68m: Jo, sub-horizontal, Ro, Pl, CT & XWS 81.82m: Jo, sub-horizontal, Ro, Pl, XWS 10mm 81.97m: fragmented, highly fractured, SZ, Ir, Ro		
93	53	53	HF	XXXXXXXXXX	82.5m - 83	SILTSTONE, fine grained, granular, laminated dark grey, fragmented	LS-MS	SW	82.37m: Jo, sub-horizontal, Ro, Pl, Ct 82.45m: Jo, sub-vertical, fragment, Pl, XWS 82.78m: Jo, vertical, Ro, Pl, XWS (10mm) 83m: Jo, subvertical, Ro, Pl, XWS 83.16m: CS, Pl, (Core loss), Ro 83.59m: Jo, sub-horizontal, Pl, Ro (XWS 20mm) 83.67m: Jo, sub-horizontal, Pl, Ro, Ct 83.8m: Jo, sub-vertical, Pl, Ro, Ct 83.9-84.0m: Jo, sub-vertical, Pl, Ro, fragmented, 50% core loss, XWS 84.13m: Jo, 45°, Pl, Ro, Ct 84.2m: Jo, sub-horizontal, Pl, Ro, Ct 84.28m: Jo, sub-vertical, Pl, Ro, Ct 84.6m: Jo, vertical, Pl, Ct, Vro 84.7m: Jo, sub-horizontal, Pl, Ro (XWS 30mm) 84.83m: Jo, fragmented, Ir, Ro, Ct		
100	77	69	HF	XXXXXXXXXX	84 - 85				84.99m: Jo, 45°, Pl, Ro, Ct 85.06-85.29m: SZ, Ro, Ir, Ct 85.4m: Jo, 45°, Ro, Pl, Ct 85.56m: Jo, 45°, Ro, Pl, Ct 85.73m: Jo, Pl, 45°, Ro, Ct 86.27m: Jo, sub-vertical, Pl, Ro (XWS 30mm) 86.35-86.8m: SZ, fragmented, Ct, Ro 86.7m: Jo, sub-vertical, Pl, Ro, Ct 86.8m: Jo, sub-vertical, Pl, ro, (XWS 60mm?) 86.9-86.98m: fragmented, SZ, Ro, Ct 87.2m: Jo, Pl, Ro, Ct, sub-horizontal 87.36-87.5m: fragmented, SZ, Ro Ct 87.5m: J, 45°, Sm, Pl, St 87.58m: J, sub-vertical, Ro, Un, Un 87.76m: J, 45°, Vro, St Sn 87.81m: J, sub-horizontal, Sm, St 87.86m: J, sub-horizontal, Sm, St 89.37m: J, sub-vertical, Ro, Cu, St 89.7m: J, 45°, Sm, Pl, Un 90.86m: J, 45°, Sm, Pl, Cl 91.45m: J, sub-vertical, Sm, Pl, Cl		
100	67	44	HF	XXXXXXXXXX	87						
100	96	93	7	XXXXXXXXXX	87.5m - 88	SILTSTONE, fine grained, amorphous, laminated, dark grey	MS-HS	SW			
				XXXXXXXXXX	88 - 89						
				XXXXXXXXXX	89 - 90						
				XXXXXXXXXX	90 - 91						
100	100	100	5	XXXXXXXXXX	91 - 92						
				XXXXXXXXXX	92 - 93						
				XXXXXXXXXX	93						



TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
83	55	55	1	XXXXXXXXXX	106				103.13m: Jo, sub-vertical, Ro, Pl, Ct (fragmented) 103.25m: Jo, vertical, Ro, Pl, Ct (fragmented)		
95	30	30	HF	XXXXXXXXXX	106.1m	SILTSTONE, fine grained, amorphous, laminated dark grey, fragmented	LS-MS	SW	104.07m: Jo, sub-horizontal to vertical, Ro, Pl, Ct 104.12m: Jo, sub-vertical, Ro, Pl, Ct 104.62m: Jo, sub-horizontal, Ro, Pl, Ct 104.65m: Jo, sub-vertical, Ro, Pl, Ct (fragmented) 104.8m: Jo, sub-vertical, Ro, Pl, Ct (fragmented) 105.05m: Jo, sub-horizontal, Ro, Pl, Vn 105.7m: CS, fragmented, Ir, Ro 106.1m: CS, fragmented, Pl, Ro 106.4m: Jo, sub-horizontal, Pl, Sm, Ct 106.46m: J, sub-vertical, Pl, Ro, Ct 106.6m: fragmented, CS, Ir, Ro 107.45: XWS (10mm), sub-horizontal, Sm, Pl 107.61: Jo, sub-vertical, Pl, ro, XWS 10-30mm 107.8m: CS, Ir, Ro, fragmented 108.22m: Jo, sub-vertical, Pl, Ro, Ct		
95	64	55	13	XXXXXXXXXX	108.2m	SILTSTONE interbedded with SANDSTONE, fine grained, bedding, granular and amorphous, multi-coloured (dark grey and grey)	HS	SW	108.28m: Jo, horizontal, Pl, Ro, Vn 108.65, 108.7m: Jo, sub-horizontal, Pl, Ro, Ct 108.92, Jo, sub-horizontal, Pl, Sm, Ct 109.03m: Jo, sub-horizontal, Pl, Sm, Un 109.32m: Jo, sub-horizontal, Pl, Ro, Un 109.49m: Jo, sub-horizontal, Pl, Ro, Ct 109.65m: Jo, sub-vertical, Pl, Ro, Ct 109.74m: Jo, horizontal, Pl, Ro, Ct 109.8m: XWS, Pl, Ro, sub-horizontal 110.17m: Jo, sub-vertical, Pl, Ro, XWS 110.32-110.5m: Fragmented 110.5-111.6m: Fragmented 111.87m: XWS 112.3-112.5m: Fragmented 112.3m: Core loss 112.85m: J, sub-vertical, Sm, Pl, Ct 113.5m: J, sub-vertical, Sm, Pl, Ve 113.9m: J, 45°, Sm, Pl, Ct 114.05m: J, 45°, Sm, Pl, Ct 114.35m: J, 45°, Sm, Pl, Un 114.42m: J, sub-vertical, Sm, Pl, Un 114.5-114.6m: Broken core 114.76-114.96m: Broken zone 114.96m: J, sub-horizontal, Sm, Pl, Ct		
100	0	0	>10	XXXXXXXXXX	109						
78	64	50	>10	XXXXXXXXXX	110.5m	SILTSTONE, fine grained, amorphous, laminated, dark grey, highly fractured, fragmented	LS-MS	SW			
100	100	93	7	XXXXXXXXXX	111						
97	83	72	>10	XXXXXXXXXX	112						
				XXXXXXXXXX	112.5m	SILTSTONE, fine grained, amorphous, laminated, dark grey, fractured	MS-HS	SW			
				XXXXXXXXXX	113						
				XXXXXXXXXX	114						
				XXXXXXXXXX	115						
				XXXXXXXXXX	116						
				XXXXXXXXXX	117						



KP\_BH\_2013\_REV\_0\_USEBOREHOLES.GBL\_KP\_DATA TEMPLATE\_BH\_2013.GDT\_25/7/24


TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	13	13	HF	XXXXXXXXXX	130				122.58-123.26m: Core loss, xws, Pl, Ro 122.65m: J, sub-vertical, Pl, Ro, Ct 123.43m: Jo, 45°, Pl, Sm, Ct 123.53m: Fragmented, SZ, sub-vertical, Ro 123.8m: J, sub-vertical, Pl, Ro, Ct 124m: Jo, sub-vertical, Pl, Sm Ct 124.05m: Jo, sub-vertical, Pl, Sm, Ct, Fragmented 124.2m: XWS, sub-vertical, Pl, Sm 124.3m: Jo, sub-vertical, Pl, Ro, Ct, Fragmented 124.6m: Jo, sub-vertical, Pl, Ro, Ct 124.7m: Jo, sub-vertical, Pl, Sm, Ct 124.86-125.05m: Fragmented, SC, Pl, sub-vertical 125.25-124.35m: Fragmented, SC, Pl, sub V 125.39m: J, sub-vertical, Pl, Sm, Un 125.40m: Jo, sub-horizontal, Pl, Sm, Un 125.45m: Jo, sub-vertical, Ro, Pl, Ct 125.65m: Jo, sub-vertical, Ro, Pl, Ct 125.73-126.0m: XWS, sub H, Pl 126m: Jo, sub-horizontal, Ro, Pl, Ct 126.1-126.3m: Fragmented, CS, Pl, sub V 126.3m: Jo, sub-vertical, Ro, Pl, Ct 126.36m: Jo, sub-vertical, Sm, Pl, Ct 126.55-127.6m: XWS, Pl, sub-horizontal 127m: XWS / CS 127.25-128.25m: Core loss [only 250mm recovered] 128.25m: Jo, sub-vertical, Sm, Pl, Un 128.4m: Jo, 45°, Sm, Pl, Ct 128.42m: Jo, 45°, Sm, Pl, Un 128.5-128.8m: Fragmented 129.03, 129.05m: J, 45°, Ro, Pl, Vn 129.09m: J, sub-horizontal, Vro, Pl, Un 129.3, 129.35m: J, 45°, Sm, Pl, Un 129.4m: J, 45°, Ro, Pl, Un 129.5m: J, 45°, Ro, Pl, Ct 129.56m: J, 45°, Sm, Pl, Un 129.7-129.88m: Fragmented 129.95m: J, 45°, Sm, Pl, Un 130.13-130.4m: Fragmented 130.4-131.15m: Fragmented (interfaces are smooth and Vn)		
92	17	17	HF	XXXXXXXXXX	131						
33	-	-	HF	XXXXXXXXXX	132						
92	13	13	HF	XXXXXXXXXX	133						
90	37	30	HF	XXXXXXXXXX	134						
111	48	39	HF	XXXXXXXXXX	135						
100	38	13	HF	XXXXXXXXXX	136						
89	38	33	5	XXXXXXXXXX	137	36.9m SILTSTONE, fine grained, amorphous, laminated, light grey, highly fractured, fragmented	HS	SW			
90	50	46	6	XXXXXXXXXX	139						
63	0	0	HF	XXXXXXXXXX	140	39.6m SILTSTONE, fine grained, amorphous, laminated, dark grey, highly fractured, fragmented	VLS	XW-HW			

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					154				141.36m: Jo, sub-vertical, Pl, Ro, Ct 141.5m: Jo, sub-horizontal, Pl, Ro, Ct 141.75m: Jo, sub-horizontal, Pl, Ro, Sm, Ct 141.9m: Jo, sub-horizontal, Pl, Sm, Ct 142.0-142.6m: Fragmented, sub-horizontal to vertical, Joints, CS, Ir, Sm 142.6-142.75m: XWS, sub-horizontal, Pl, Sm 142.87m: Jo, vertical, Pl, Ro, Ct (fragmented) 142.97-143.07m: XWS, sub-horizontal, Pl, Sm 143.17m: Jo, sub- H, Pl, Sm, Un 143.25m: Jo, sub-horizontal, PL, Sm, Un 143.31m: Jo, 45°, Pl, Ro, Ct 143.47m: Jo, sub-horizontal, Pl, Sm, Ct 143.7: Jo, sub-horizontal, Pl, Sm, Ct 143.84-144.5m: Fragmented, sub-horizontal, vertical, joints 144.05m: Jo, sub-vertical, Pl, Sm, Un 144.25-144.3m: Fragmented 144.4m: Jo, Vertical, Pl, Ro, Un (fragmented) 144.55-145.06m: XWS, sub-horizontal, Pl 145.9-146.1m: Fragmented, Jo, vertical, Pl, Ro, Ct 146.1m: Jo, 45°, Ro, Pl, Ct 146.47m: Jo, 45°, Sm, Pl, Un 146.65m: Jo, sub-vertical, Ro, Pl, Ct 146.8-147.0m: Fragmented, CS, sub-horizontal, Pl 147.0-147.4m: Fragmented 147.5-147.9m: Fragmented 147.9-148.1m: Core loss 148.2m: J, sub-vertical, Sm, PL, Un 148.3-148.35m: EMS 148.5m: J, sub-vertical, smooth, Pl, Un 148.6m: J, sub-horizontal, Sm, Pl, Ct 148.75m: J, sub-vertical, Sm, Pl, Un 148.9m: J, 45°, Sm, PL, Un 149.0-149.1m: J, 45°, Sm, Pl, Ct, Fragmented 149.25-149.7m: Fragmented 149.7-150.0m: Core loss		
					155						
					156						
					157						
					158						
					159						
					160						
					161						
					162						
					163						
					164						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
73	59	53	04		0m	<b>GRAVEL</b> , sandy, with silt, non-plastic fines, <u>dry</u> , medium dense. Sand particles are fine to medium. Gravel particles are fine to coarse.	MD		0.0-0.4m: Core loss		
					0.4m		D				
					0.5m		LS	HW	0.73m: Jo, sub-vertical, PL, Ro, Ct		
					0.7m	<b>SAND</b> , with silt, fine, low-plastic fines, <u>dry</u> , dense to very dense.	MS	MW	0.95-0.96m: J, sub-vertical, PL, Ro, EMs (10mm)		
					1	<b>SANDSTONE</b> , fine grained, granular, massive, red brown.	HS	MW	1.0-1.06m: 60mm EMS, sub-vertical, PL, Ro		
100	97	97	01		2				2.13 - 2.16m: 30mm EMS, sub-horizontal, Ro, Pl		
					3						
100	100	100	02		4				3.52m: Jo, sub-horizontal, Pl, Ro, Ct		
					5				4.34m: Jo, sub-horizontal, Pl, Ro, (EMS 10mm)		
					6						
100	98	96	03		7	7m <b>SANDSTONE</b> , fine grained, granular, laminated, red brown mottled white	HS	MW			
					8	7.9m <b>SILTSTONE</b> , fine grained, granular, laminated, red brown.	MS	MW	7.94-7.99m: 50mm EMS, sub-horizontal, Pl, Sm		
					9	8.8m <b>SANDSTONE interbedded with SILTSTONE</b> , fine grained, granular, bedding, red brown mottled white.	HS	MW	8.14m: Jo, 45°, PL, Sm, (5mm EMS) 8.3m: Jo, sub-horizontal, Pl, Sm (5mm XW Seam)		

**NOTES:**

- Hole size PQ from surface. Then HQ from 2.5m
- Hole terminated at 25.05m

 CONTRACTOR : Capital Drilling  
 MACHINE : RIG145 / CXT15

DATE STARTED : 20/05/2024

NORTHING : 3226301

INCLINATION: -90

DATE PROFILED : 21/05/2024

EASTING : 398503

LOGGED BY : RR

HOLE SIZE : PQ / HQ

ELEVATION : 898

CHECKED BY :

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES\_CELL\_KP\_DATATEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	0		11						
					11.4m	SANDSTONE , fine grained, granular, laminated, red brown.	HS	MW			
100	100	100	0		12						
					13						
97	97	97	0		14	14m CONGLOMERATE , fine to coarse grained, granular, massive, red brown.	HS	MW	14.2 - 14.3m: Core loss		
					14.3m	SILTSTONE interbedded with SANDSTONE , fine to medium grained, amorphous, laminated and granular, red, brown.	HS	MW			
					15						
					15.3m	SANDSTONE interbedded with SILTSTONE , fine to medium grained, granular, laminated, red brown.	HS	MW			
					16						
100	100	100	0		17	17m SILTSTONE, fine grained, amorphous, massive, red brown.	HS	MW			
					18						
					19						
100	100	100	0		20	20.2m SANDSTONE , fine to medium grained, granular, laminated, red brown.	HS	MW			
					21						

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	100	100	2	[Dotted Pattern]	22						
100	100	100	0	[Dotted Pattern]	23						
					24				23.94m: Jo, Ro, PL, sub-vertical, Vn		
					25				24.49m: Jo, 45°, Sm, Ir, Ct		
					25	Borehole TSF-BH-20 terminated at 25.05 m depth.					
					26						
					27						
					28						
					29						
					30						
					31						
					32						
					33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	SAND, silty, non plastic, dry, medium dense. Sand particles are fine to medium. ( sub angular)	MD				
					0.35m	SAND, silty, low plastic, grey brown dry, dense. Sand particles are fine to medium. ( sub angular).	D				
100					0.7m	SAND, silty, low plastic, grey brown dry, dense. Sand particles are fine to medium. ( sub angular). Moderately cemented	D/VD	XW	0.7-1.3m: Gravel recovered as highly weathered, Siltstone, very low strength.		
					1	GRAVEL, clayey with trace sand, low plasticity, red brown. dry, dense to very dense. Sand particles are fine and angular. Gravel is fine to medium.			1.3-1.5m: Gravel, clayey with sand, low plasticity red brown, dry.	30, 22/100mm (HB), N =Ref.	
100					2						
100					3						
100					3.4m	SILTSTONE, fine grained, granular, massive, red brown.	VLS	XW/HW		34, 18/100mm (HB), N =Ref.	
100					4						
100					5						
100	60	60	03		5.5m	SILTSTONE, fine grained, granular, massive, red brown.	LS	MW	5.6-5.7m: Fragmented 5.7-5.84m: J, sub-vertical, Pl, Sm, Ct 6.0-6.2m: Fragmented, EMS, sub-horizontal, Pl 6.5, 6.64m: EMS, sub-horizontal, (fragmented) 6.8m: J, sub-horizontal, Pl, Sm, Ct 7.09- 7.1m: 10mm EMS, Pl, horizontal 7.15m: 10mm XWS, Pl, horizontal 7.72m: Jo, sub-horizontal, Pl, Ro, Ct 7.9m: Jo, horizontal, Pl, Sm, Ct 8.2m - 8.27m: J, sub-vertical, Pl, Ro, Ct		
100	86	86	09		7.5m	SILTSTONE, fine grained, granular, massive, red brown.	MS	MW	8.88m: J, sub-vertical, Pl, Sm, Ct 9.28m: J, sub-horizontal, Pl, Ro, Ct		
100					8						
					9						

**NOTES:**

- Hole size PQ from surface. Then HQ from 2.5m
- Hole terminated at 25m

 Standard Penetration Test

KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24

CONTRACTOR : Capital Drilling  
MACHINE : RIG145 / CXT15  
LOGGED BY : RR  
CHECKED BY :

DATE STARTED : 21/05/2024  
DATE PROFILED : 22/05/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3224237  
EASTING : 395412  
INCLINATION: -90  
ELEVATION : 883




TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
				XXXXXXXXXXXXXXXXXXXX	22						
100	100	100	0	XXXXXXXXXXXXXXXXXXXX	23				23.3-25.0m: Is, vertical, Un, 5 to 30mm, thick clay infill		
				XXXXXXXXXXXXXXXXXXXX	24						
100	100	100	0	XXXXXXXXXXXXXXXXXXXX	25	Borehole TSF-BH-21 terminated at 25 m depth.					
				XXXXXXXXXXXXXXXXXXXX	26						
				XXXXXXXXXXXXXXXXXXXX	27						
				XXXXXXXXXXXXXXXXXXXX	28						
				XXXXXXXXXXXXXXXXXXXX	29						
				XXXXXXXXXXXXXXXXXXXX	30						
				XXXXXXXXXXXXXXXXXXXX	31						
				XXXXXXXXXXXXXXXXXXXX	32						
				XXXXXXXXXXXXXXXXXXXX	33						

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TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
					0m	<b>SAND</b> , silty, and gravelly, low plasticity, yellow brown dry, medium dense.	L		0.0-1.5m: Core loss		
					0.3m	Sand particles are fine to medium. (sub angular) Gravel particles are fine to medium angular and of medium strength.	MD				
13					1	<b>GRAVEL</b> , silty and sandy, low plasticity, yellow brown, dry. Sand particles are fine to medium (Sub angular)					
					1.5m	Gravel particles are fine to coarse, angular and medium to high strength.	D			17, 21, 20 N=Ref.	
80					2	<b>SAND</b> , silty and gravelly, low plasticity fines, yellow brown, dense.					
42					2.6m	<b>GRAVEL</b> , silty and sandy, low plasticity fines, brown, dry, very dense.	VD			16, 11/20 (HB), N=Ref.	
100					3	Sand particles are fine to medium and sub-angular. Gravel particles are fine to coarse and sub-angular.					
65					3.6m	<b>SAND</b> , silty and gravelly, low plasticity fines, dry, very dense, weakly cemented.	VD			26, 30/80mm, N=Ref.	
100					4	Sand particles are fine to medium and sub-angular Gravel particles are coarse and sub-angular.					
88					4.5m	<b>GRAVEL</b> , sandy and silty, low plasticity fines, yellow brown, dry, very dense, weakly cemented.	VD				
					5	Sand particles are fine to medium and sub-angular Gravel particles are fine to coarse, angular and medium to high strength					
					6						
					7						
100					8						
					9						
					10						

**NOTES:**

- Hole size PQ from surface. Then HQ from 2.9m
- Hole terminated at 25m

 Standard Penetration Test

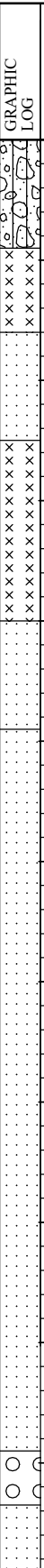
KP\_BH\_2013\_REV\_0\_ISEBOREHOLE\_TEMPLATE\_BH\_2013.GDT\_25/7/24


CONTRACTOR : Capital Drilling  
MACHINE : RIG145 / CXT15  
LOGGED BY : DE/RR  
CHECKED BY :

DATE STARTED : 22/05/2024  
DATE PROFILED : 23/05/2024  
HOLE SIZE : PQ / HQ

NORTHING : 3222500 INCLINATION: -90  
EASTING : 392743.4  
ELEVATION : 900

KP\_BH\_2013\_REV\_0\_ISEBOREHOLES.GPJ\_KP\_DATA\TEMPLATE\_BH\_2013.GDT\_25/7/24

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)
100	53	53	0		10.9m	SILTSTONE, fine grained, amorphous, massive, red brown.	LS	MW			
					11.6m	SANDSTONE, fine grained, granular, laminated dark red brown	LS	MW			
					12.5m	SILTSTONE interbedded with SANDSTONE, fine grained, amorphous/granular, laminated, dark red brown.	LS	MW			
					14m	SANDSTONE, fine grained, granular, laminated dark red brown	MS-HS	MW			
					14.9m	SANDSTONE, fine to medium grained, granular, massive, red brown.	MS-HS	MW			
100	100	100	0		16.88-17.02m				V, 3mm thick, gypsum, horizontal, Pl		
100	100	100	0		18.72m				V, 2mm thick, gypsum, horizontal, Pl		
					18.96m				V, 2mm thick, gypsum, horizontal, Pl		
					19.2m				V, 7 mm thick, gypsum, horizontal, Pl		
					19.21m				V, 5mm thick, gypsum, horizontal, Pl		
100	100	100	2		20.45m				J, 45°, VRo, Pl, Cn		
					20.9m	CONGLOMERATE, fine to coarse grained, granular, massive, multi coloured red brown, grey and red)	MS-HS	MW			
					21.35m	SANDSTONE, fine to medium grained, granular, massiv, red brown.	MS	MW			
					21.39m				J, 45°, Ro, Pl, Ve		

TCR (%)	SCR (%)	RQD (%)	FRACTURE FREQUENCY	GRAPHIC LOG	DEPTH (m)	MATERIAL DESCRIPTION	STRENGTH/CONSISTENCY	WEATHERING	DEFECTS/ADDITIONAL COMMENTS	IN SITU TESTING	SAMPLING (DEPTH IN m)	
100	100	100	0		22							
					23					22.62 - 22.8m: V, 2mm thick, gypsum, sub-vertical, Pl		
					23.5m	SANDSTONE interbedded with SILTSTONE, fine to medium grained, granular, bedding, red brown.	MS	MW	23.28 - 24.35m: V 3-5mm thick, gypsum, vertical, Un			
100	100	100	0		24				24.5-24.75m: V, 5mm thick, gypsum, sub-vertical, Pl			
					25	Borehole TSF-BH-22 terminated at 25 m depth.						
					26							
					27							
					28							
					29							
					30							
					31							
					32							
					33							

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## REKO DIQ PROJECT

## PACKER TEST SUMMARY

Date	Time	Borehole	From	To	Centre	Lithology	Average k
			(m)	(m)	(m)		(m/s)
17/04/24	12:35 PM	TSF-BH-01	8.50	15.00	11.75	Siltstone/Tuff	1.32E-08
17/04/24	11:00 PM	TSF-BH-01	12.00	25.00	18.50	Siltstone/Tuff/Andesite	7.52E-09
15/04/24	11:50 PM	TSF-BH-02	5.90	12.40	9.15	Conglomerate/Sandstone	1.04E-07
16/04/24	9:40 PM	TSF-BH-02	12.00	25.00	18.50	Sandstone/Conglomerate/Andesite	7.64E-09
14/04/24	11:50 PM	TSF-BH-03	5.50	12.00	8.75	Conglomerate/Andesite	1.30E-07
15/04/24	9:40 AM	TSF-BH-03	13.40	25.00	19.20	Siltstone/Andesite	7.71E-08
13/04/24	12:00 PM	TSF-BH-04	9.50	14.50	12.00	Siltstone/Andesite	8.95E-09
13/04/24	11:50 PM	TSF-BH-04	12.00	25.00	18.50	Siltstone/Andesite	1.62E-09
11/04/24	11:40 AM	TSF-BH-05	6.70	12.20	9.45	Andesite	7.24E-08
11/04/24	4:08 PM	TSF-BH-05	14.00	19.00	16.50	Volcanic Breccia/Conglomerate	4.96E-07
8/04/24	11:05 AM	TSF-BH-06	6.40	12.40	9.40	Andesite	8.17E-09
8/04/24	10:45 PM	TSF-BH-06	12.40	18.40	15.40	Andesite	1.23E-08
9/04/24	9:50 PM	TSF-BH-06	19.40	24.40	21.90	Andesite	2.30E-08
6/04/24	1:30 PM	TSF-BH-07	6.40	12.00	9.20	Volcanic Breccia	1.28E-08
6/04/24	11:30 PM	TSF-BH-07	12.60	18.60	15.60	Volcanic Breccia	9.14E-10
7/04/24	9:00 AM	TSF-BH-07	19.60	24.60	22.10	Volcanic Breccia	1.33E-08
19/04/24	10:30 AM	TSF-BH-08	7.00	12.00	9.50	Andesite/Siltstone	4.13E-07
20/04/24	1:00 AM	TSF-BH-08	12.00	25.00	18.50	Andesite/Siltstone/Tuff	3.47E-09
22/04/24	8:35 AM	TSF-BH-09	6.80	12.00	9.40	Siltstone	1.52E-07
22/04/24	2:35 PM	TSF-BH-09	12.00	25.00	18.50	Siltstone	1.99E-08
23/04/24	10:00 AM	TSF-BH-10	6.20	12.00	9.10	Siltstone	8.43E-09
23/04/24	8:35 PM	TSF-BH-10	12.00	25.00	18.50	Siltstone	8.72E-09
21/04/24	2:00 AM	TSF-BH-11	6.00	12.00	-	Siltstone/Andesite	No Test
21/04/24	11:30 AM	TSF-BH-11	12.00	25.00	18.50	Andesite/Siltstone	1.18E-09
3/04/24	10:30 PM	TSF-BH-12	8.00	12.70	10.35	Siltstone	6.36E-08
4/04/24	2:00 PM	TSF-BH-12	13.70	18.70	16.20	Siltstone	8.14E-08
5/04/24	8:45 AM	TSF-BH-12	19.70	24.70	22.20	Siltstone	2.85E-08
27/04/24	10:30 PM	TSF-BH-13	6.50	12.50	9.50	Andesite	1.07E-09
28/04/24	11:00 AM	TSF-BH-13	12.00	25.00	18.50	Andesite	1.51E-06
24/04/24	3:00 AM	TSF-BH-14	6.50	12.50	9.50	Siltstone/Conglomerate	8.00E-10
24/04/24	12:45 PM	TSF-BH-14	12.00	25.00	18.50	Siltstone/Conglomerate	7.73E-09
26/04/24	11:00 AM	TSF-BH-15	6.10	12.10	9.10	Siltstone	2.77E-09
27/04/24	2:15 AM	TSF-BH-15	12.00	25.00	18.50	Siltstone	2.66E-09
28/04/24	7:55 PM	TSF-BH-16	6.60	11.60	9.10	Conglomerate/Volcanic Breccia	3.84E-07
29/04/24	6:00 AM	TSF-BH-16	12.60	25.00	-	Volcanic Breccia/Andesite	No Test
29/04/24	8:50 PM	TSF-BH-16	25.00	30.50	-	Andesite	No Test
6/05/24	12:30 AM	TSF-BH-16	30.50	40.00	35.25	Breccia	3.09E-07
6/05/24	10:00 AM	TSF-BH-16	40.00	50.00	45.00	Breccia	1.85E-06
6/05/24	11:00 PM	TSF-BH-16	46.20	55.20	50.70	Breccia	1.48E-08
7/05/24	9:45 AM	TSF-BH-16	55.00	65.00	60.00	Breccia	9.55E-09
7/05/24	8:00 PM	TSF-BH-16	66.00	75.50	70.75	Breccia/Sandstone	6.43E-09
8/05/24	4:00 AM	TSF-BH-16	75.50	85.50	80.50	Sandstone/Siltstone	6.16E-09
8/05/24	10:45 AM	TSF-BH-16	85.00	95.00	90.00	Siltstone/Sandstone	5.57E-09
9/05/24	12:40 AM	TSF-BH-16	94.30	105.50	99.90	Siltstone/Sandstone	1.98E-09
9/05/24	7:40 PM	TSF-BH-16	115.50	125.00	120.25	Sandstone/Siltstone	3.50E-09
10/05/24	2:50 AM	TSF-BH-16	124.30	136.50	130.40	Sandstone/Siltstone	1.72E-09
10/05/24	1:00 PM	TSF-BH-16	136.50	150.00	143.25	Sandstone/Siltstone	2.84E-09
10/05/24	11:00 PM	TSF-BH-16	141.20	150.00	145.60	Siltstone/Sandstone	4.16E-08
3/05/24	11:00 AM	TSF-BH-17	6.00	12.00	-	Siltstone	No Test
4/05/24	10:00 AM	TSF-BH-17	15.00	30.50	22.75	Siltstone/Sandstone	3.37E-09
4/05/24	6:00 PM	TSF-BH-17	30.00	39.50	34.75	Siltstone	1.32E-08
2/05/24	6:00 AM	TSF-BH-18	6.50	12.50	9.50	Siltstone / Andisite	7.56E-07
2/05/24	8:00 PM	TSF-BH-18	12.00	27.30	19.65	Andesite/Siltstone	5.43E-08
9/05/24	8:00 AM	TSF-BH-18	105.50	115.50	110.50	Sandstone/Siltstone	4.60E-09
13/05/24	3:40 AM	TSF-BH-19	4.50	12.50	8.50	Siltstone	4.57E-08
13/05/24	10:50 AM	TSF-BH-19	12.50	24.50	18.50	Siltstone	3.84E-07
13/05/24	9:20 PM	TSF-BH-19	25.00	37.50	31.25	Breccia/Siltstone	3.01E-08
14/05/24	2:30 AM	TSF-BH-19	37.50	51.50	44.50	Siltstone	1.71E-08
14/05/24	10:45 AM	TSF-BH-19	51.50	60.50	56.00	Siltstone/Sandstone	7.97E-09
14/05/24	9:00 PM	TSF-BH-19	60.50	70.50	65.50	Siltstone/Sandstone	2.94E-07
15/05/24	10:45 AM	TSF-BH-19	70.50	80.50	75.50	Siltstone/Sandstone	3.47E-07
15/05/24	11:45 PM	TSF-BH-19	84.40	93.20	88.80	Siltstone	4.01E-08
16/05/24	10:20 PM	TSF-BH-19	93.50	102.50	98.00	Siltstone/Sandstone	2.13E-08
17/05/24	8:40 AM	TSF-BH-19	102.50	110.50	106.50	Siltstone	2.00E-08
17/05/24	9:30 PM	TSF-BH-19	111.10	120.40	115.75	Siltstone	1.13E-08
18/05/24	11:15 AM	TSF-BH-19	120.40	130.40	125.40	Siltstone	7.89E-09
18/05/24	10:30 PM	TSF-BH-19	130.30	140.40	135.35	Siltstone	9.39E-09
19/05/24	4:00 PM	TSF-BH-19	139.30	150.00	144.65	Siltstone/Breccia	4.12E-09
21/05/24	4:15 AM	TSF-BH-20	6.00	12.60	9.30	Siltstone/Sandstone	1.37E-08
21/05/24	11:20 AM	TSF-BH-20	13.00	25.05	-	Siltstone/Sandstone	No Test
22/05/24	8:45 AM	TSF-BH-21	6.00	12.50	9.25	Siltstone/Sandstone	2.39E-08
22/05/24	3:20 PM	TSF-BH-21	13.00	25.00	19.00	Siltstone/Sandstone	2.04E-08
23/05/24	1:25 PM	TSF-BH-22	7.00	13.50	10.25	Gravel/Siltstone/Sandstone	6.35E-07
23/05/24	11:20 PM	TSF-BH-22	13.50	25.00	19.25	Siltstone/Sandstone	2.22E-07