Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6891/2024/1
Applicant	Greenstone Resources (WA) Pty Ltd
ACN	100 341 599
File number	DER2024/000052
Premises	King of the Hills Gold Mine LEONORA WA 6438 Legal description - Mining tenements M37/67, M37/76, M37/90, M37/201, M37/222, M37/248, M37/330, M37/410, M37/429, M37/449, M37/451, M37/457, M37/547, M37/548, M37/572, M37/573, M37/574, M37/1105 As defined by the Premises Map attached to the issued works approval
Date of report	18 April 2024
Decision	Works approval granted

Christine Pustkuchen
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Date: 2024.04.18 12:46:57 +08'00'

A/MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Table of Contents

1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction, environmental commissioning, and time limited operation of the premises. As a result of this assessment, works approval W6891/2024/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary

On 9 February 2024, Greenstone Resources (WA) Pty Ltd (the applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake works relating Category 5 (i.e., processing or beneficiation of metallic or non-metallic ore) at a production capacity of 6,000,000 tonnes per annual period at the King of the Hill Gold Mine (the premises), located on mining tenements M37/67, M37/76, M37/90, M37/201, M37/222, M37/248, M37/330, M37/410, M37/429, M37/449, M37/451, M37/457, M37/547, M37/548, M37/572, M37/573, M37/574 and M37/1105. Specifically, the applicant seeks authorisation under works approval W6891/2024/1 to:

1. Construct four stages of embankment raises at tailings storage facility (TSF) 4 and expand the TSF4 footprint to extent into the existing East Waste Dump (EWD);
2. Construct a booster pumping station to improve transport of tailings slurry from the processing plant to TSF4;
3. Undertake up to one month of environmental commissioning for the booster pumping station; and
4. Undertake up to 180 calendar days of time limited operation for each stage of expansion at TSF4 as well as for the booster pumping station.

The premises relates to the category and assessed production capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6891/2024/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020c) are outlined in works approval W6891/2024/1.

2.3 Overview of premises

The premises is located within the Shire of Leonora, approximately 28 km north of the Leonora township. After periods of intermittent mining, the premises entered care and maintenance before being acquired by the applicant in 2017. Works approval W6426/2020/1 was granted to authorise the construction of a new gold processing plant and TSF5, as well as recommission the existing, partially filled TSF4.

The TSF4 is a paddock facility comprising two cells: Cell A and Cell B. Cells A and B were commissioned in 1999 and 2000, respectively. Prior to recommencing tailings deposition, TSF4 Cell A was partially rehabilitated, with the eastern perimeter embankment and beach being

capped, while Cell B was used as an evaporation pond for mine dewatering (Knight Piesold 2020c).

In 2022, the applicant constructed an embankment raise to TSF4 (authorised under works approval W6426/2020/1), increasing the embankment height to RL 429.0 m. At the time, this was thought to be the final embankment height for TSF4, with planned closure following the facility reaching its storage capacity. However, as part of this application, the applicant has proposed to further expand TSF4, by increasing both the footprint and embankment height of the facility.

2.4 Proposed activities

2.4.1 Tailings storage facility 4 expansion

At the existing TSF4 perimeter embankments, the Stage 1 embankment raise will increase the embankment height from RL 429.0 m to RL 433.0 m. Downstream construction method will be utilised at this stage to achieve a robust structure and enable the use of upstream construction for subsequent embankment raises. In the addition to the embankment raise, several modifications will be incorporated into TSF4 (CMW 2023), including:

- The western embankment will not be raised. Instead, the adjacent East Waste Dump (EWD) wall will be lined with low permeability clayey borrow or mine waste material and act as the western boundary of TSF4.
- The northern and southern embankment of TSF4 will be expanded to meet the EWD wall. Doing so expands the TSF4 footprint to abut the EWD.
- The ground surface between the existing western embankment and the EWD will be cleared of any loose material and lined with either 300 mm of compacted clay liner or a high-density polyethylene (HDPE) liner.
- The dividing embankment between TSF4 Cell A and Cell B, as well as the decant towers for each cell will not be raised. As a result, upon completion of the Stage 1 embankment raise, TSF4 will become a single-cell paddock facility, with a total impoundment area of 114.5 hectares (ha).
- To replace the decant towers, a new rock-ring type decant structure will be constructed, along where the dividing embankment footprint was, with the decant accessway constructed from the EWD.

Upon completion of the Stage 1 embankment raise, TSF4 will be at the same elevation as the EWD, enabling expansion of the facility onto the waste rock dump in the following embankment raise.

During the Stage 2 embankment raise, upstream and downstream construction method will be used to increase the TSF4 embankment height to RL 437.0 m. At this stage:

- A new four-metre western embankment will be constructed on the existing EWD, using downstream construction method.
- In addition to being raised to RL 437.0 m, the northern and southern embankments extend into the EWD to connect with the western embankment. As a result, upon completion of the Stage 2 embankment raise, TSF4 will have an impoundment area of 164.5 ha.
- The surface of the EWD to be incorporated into the TSF4 expansion will be cleared of any loose material and be clay-lined or HDPE-lined.

Upon completion of the Stage 2 embankment raise, the TSF4 footprint expansion would have been completed.

Following that, two additional four-metre embankment raises (Stage 3 and Stage 4) will be constructed to reach a final embankment height of RL 445.0 m. Upstream construction will be undertaken on all perimeter embankments, except for the western embankment, which will continue to be raised using downstream construction method.

In total, the existing TSF4 will undergo a total of four embankment raises, with a total height increase of 16 m. At the final Stage 4, the expanded TSF4 will have an embankment height of 42.0 m and is estimated to provide an additional 3.2 mega tonnes of tailings storage capacity and extend the operational storage life of the facility by 5.9 years.

To construct the embankments and raises, existing mine waste material at the premises will be utilised. Low permeability clayey borrow/mine waste/dried tailings material will be used for the upstream zone, while traffic-compacted general mine waste material will be used for the downstream zone to provide bulk/strength and buttressing.

During Stage 1 and Stage 2 works, either a 300mm-thick compacted clay liner or a HDPE liner will be placed over the expanded TSF4 footprint (including on the EWD surface) to manage seepage from the facility. Based on geotechnical assessment, the permeability of clay liner material is expected to be 1 x 10^{-8} m/s or lower (CMW 2023). Proposed decant and seepage water management measurements are further detailed in Section 3.1.1 and Section 3.3.5.

The department understands that the proposed TSF4 expansion, as well as the proposed booster pumping station, were approved by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) on 10 January 2024 under Mining Proposal Reg ID 121453.

2.4.2 Booster pumping station

In addition to the expansion of TSF4, the applicant has also proposed the construction of a booster pumping station to facilitate better delivery of tailings slurry from the processing plant to TSF4. The proposed TSF4 expansion will see the tailings discharge spigots become distributed over a larger area and at a slightly higher elevation, due to the increased footprint and embankment raises, respectively. As such, the booster pumping station has been identified as an important operational upgrade to ensure consistent flow and pressure can be maintained.

The booster pumping station will be constructed along the existing tailings pipeline corridor between TSF5 and the processing plant (Figure 1). The existing tailings delivery pipeline will be reconfigured to incorporate the booster pumping station.

Upon construction of the booster pumping station, the applicant intends to undertake environmental commissioning of the infrastructure, including dry commissioning (i.e., no load), followed by wet commissioning (i.e., operation with water) and then ore commissioning (i.e., operation with intended tailings material). The proposed environmental commissioning period is 30 calendar days.

2.4.3 Operational activities

During time limited operation, tailings slurry will be delivered to TSF4 via an existing HDPE tailings delivery pipeline from the processing plant via the booster pumping station (Knight Piesold 2020c). Upon reaching TSF4, the tailings will then be distributed to offtake spigots by a HDPE distribution pipe, which will run along the whole perimeter embankment crest. Spigots will be spaced in approximately 25 m intervals, with around four to six spigots depositing tailings at a time. The depositional spigot locations will move progressively along the tailings distribution line as required to form a tailings beach within the TSF and ensure the decant pond is near the decant tower.

Tailings deposition will be carried out on a cyclical basis, with tailings being deposited over one area of the TSF until the required layer thickness has been built up. Once that has been achieved, spigots will rotate to the adjacent area, to allow the deposited layer to dry and consolidate.

The spigots will deposit tailings via a sub-aerial technique, which will enable maximum water removal through the formation of the tailings beach for drying and draining. Furthermore, the decant pond size will be kept as small as possible through the use of the rock ring decant structure for water recovery. Altogether, the settled density of the tailings is expected to increase, hence improving storage potential and efficiency of the expanded TSF4.

Recovered decant water will be pumped back to the processing plant for reuse in the processing circuit. Both tailings delivery and return water pipelines will be inspected and monitored for leaks or ruptures.

Operation will be undertaken in accordance with the applicant's TSF Operating Manual (Red5 2023), which stipulates in greater detail the management of TSF4, including deposition strategy, decant pond management, seepage control, inspection, and monitoring requirements, as well as specifying relevant triggers and corresponding management actions to take.

Figure 1: Proposed location of tailings booster pumping station

2.5 Compliance history

The applicant currently holds existing works approvals W6426/2020/1, W6413/2019/1, and W6525/2021/1 as well as licence L8345/2009/3 for the construction and operation of the prescribed premises. In undertaking the risk assessment for the proposed activities, the department will consider the compliance history of the applicant.

In reviewing the Annual Audit Compliance Reports and Annual Environmental Reports from 2019 to 2023 as well as the department's incident management system, the department has identified the following non-compliances that are relevant to the proposed activities:

1. In August 2023, the department received a complaint on several matters related to mining activities undertaken at the premises, including observations of fugitive dust emissions impacting the nearby Tamoorla pastoral station.

2. In 2023, the applicant had constructed TSF5 Stage 1 starter embankment under a modified design that varied from the design that was assessed and authorised under works approval W6426/2020/1. As such, the applicant had constructed TSF5 without assessment and authorisation under a valid Part V instrument.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020c).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction, commissioning and operation have been considered in this decision report are detailed in Table 1 below. Table 1 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 1: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction of TSF4 expansion, including additional embankment raises, footprint expansion into East Waste Dump, central rock ring decant etc.	Air/windborne pathway	• Dust minimisation measures will be implemented for excavation activities and screening of material for TSF construction, including using water carts and watering stockpiled soils. • Vehicles, mining equipment and earthmoving equipment will keep to defined roads. • Dust will be managed by watering unsealed roads with a water cart or with fixed sprays.
Sediment laden stormwater	Construction of booster pumping station	Overland runoff during rainfall events	• Heavy and light vehicles will be washed down in a purpose-built washdown facility, with sediments collected and treated appropriately.
Hydrocarbon and other chemical reagent		Loss of containment, resulting in spills or leaks	• Heavy and light vehicle maintenance will be subject to regular maintenance in designated workshop areas to minimise the likelihood of spills and leakages occurring. • Minor spillage due to accidents or breakdowns will be cleaned up immediately and reported through incident report procedure. • All hydrocarbon and chemical storages will be designed and constructed in accordance with Australian Standards AS1940 and AS1692.
Commissioning and operation			
Dust (dried	Tailings deposition into	Air/windborne	• TSF will be operated using sub aerial deposition methodology, with deposition rates

Emission	Sources	Potential pathways	Proposed controls
tailings)	expanded TSF4 up to maximum operating height of RL 445.0 m (Stage 4)	pathway	appropriate climatic conditions. • Existing depositional dust gauges have been installed around the processing plant towards the Tamoorla homestead, as well as at upwind background locations to monitor amount of dust generated from operations of the premises. In addition, a real-time dust monitor (non-Australian Standard) will be installed near the processing plant. These dust monitors will also detect fugitive dust emissions from TSF4 that may contribute to cumulative impacts to the Tamoorla homestead.
Tailings supernatant		Vertical infiltration and lateral migration through base and embankment walls	• The expanded TSF4 will utilise a centralised rock ring decant structure for greater decant water recovery, reducing tailings supernatant that is released to the environment. • Decant pond size will be maintained as small as possible. • Cut-off trench will be installed at extensions of perimeter embankments as TSF4 is expanded onto the existing East Waste Dump. • TSF4 will be operated in accordance with the TSF Operating Manual (Red5 2023). • Existing production bores used for monitoring TSF4 will be inspected and recommissioned, where possible and required. Alternatively, replacement bores will be installed. • The floor of the expanded TSF4 footprint over the existing East Waste Dump will be lined with 300 mm of compacted clay or HDPE liner. • The historic central decant rock fill in TSF4 Cell A will be covered using low permeability fill material to limit seepage flow towards the TSF basin. • Further investigation into the presence of a paleochannel at TSF4 has been undertaken, resulting in better understanding of local hydrogeology. • Phreatic surface in TSF embankment will be monitored via vibrating wire piezometers and standpipe piezometers monthly. • Exploration drill holes have been fully grouted prior to construction of the expanded TSF4 footprint. The same will be undertaken when decommissioning monitoring infrastructure as part of the TSF4 expansion. • Areas adjacent to TSF4 will be visually inspected for potential signs of seepage or degradation of vegetation condition. • Ambient groundwater monitoring will continue to be undertaken at existing groundwater monitoring bores around TSF4 quarterly. Existing licence L8345/2009/3 also includes

Emission	Sources	Potential pathways	Proposed controls
			requirements for: • **Condition 5 –** Tailings deposition into TSF4 using sub-aerial discharge from spigots. • **Condition 10 –** Process monitoring of tailings and return water recovery throughputs. • **Condition 12 –** Quarterly monitoring of ambient groundwater quality at monitoring locations around TSF4, including corresponding limit and trigger level for standing water level. • **Condition 13 –** Management actions to take in the event standing water level trigger level is exceeded.
		Ingestion by wildlife	• TSF4 will be visually inspected for signs of wildlife, where any fauna deaths will be checked and recorded. • Decant pond size will be maintained as small as possible.
Tailings slurry		Overtopping of TSF4	• Sufficient freeboard will be maintained at the TSF to allow capture of rainfall from a 1% Annual Exceedance Probability (AEP) 72-hour event (i.e., 192 mm). • Return water pumping will be increased if freeboard is found to have been exceeded. Existing licence L8345/2009/3 also includes requirements for: • **Condition 1** – Maintaining total freeboard of at least 500 m (including sufficient allowance for a 1% AEP 72-hour event) using a freeboard marker. • **Condition 3** – Maintaining top of embankment freeboard of at least 300 mm or 1% AEP 72-hour event, whichever is greater. • **Condition 4** – Daily inspection of TSF4 embankment to confirm freeboard capacity and daily inspection of TSF4 decant pond to confirm size and location.
	Operation of booster pumping station	Loss of containment, resulting in spills or leaks	• Perimeter bunding will be constructed around the booster pumping station perimeter, designed to have sufficient capacity to store the volume of tailings slurry contained within the pipework between the nearest isolation points in the event of a leakage or rupture. • The siting of the compound will also include additional surrounding bunding to act as further containment measures in the event of pipeline failure, including bunding along the roadside, perimeter of the nearby workshop and at the TSF5 ramp access. • The bunded area will be equipped with a sump to collect and recover potential spills and leaks.

Emission	Sources	Potential pathways	Proposed controls
Process water	Tailings deposition into expanded TSF4 up to maximum operating height of RL 445.0 m (Stage 4)	Pipeline rupture or failure	• Pipelines will be located within bunds to ensure spills and leaks are contained. Scour pits or sumps will be constructed along the length of the pipeline corridors. • Pipelines and booster pumping station will be fitted with flow and leak detection sensors. • Pipelines will incorporate isolation valves at appropriate intervals. • Pipelines will undergo periodic visual inspection. • Pipelines will be operated in accordance with the TSF Operating Manual (Red5 2023). Existing licence L8345/2009/3 also includes requirements for: • **Condition 1** – Maintaining tailings and return water pipeline within earth-bunded corridors with scour pits or sumps, and be fitted with isolation vales, as well as flow and leak detection sensors. • **Condition 4** – Twice daily visual inspection of tailings and return water pipelines for spills or leaks.

3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020c), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental Siting* (DWER 2020b)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Pastoral station	The premises is located on the Tamoorla pastoral lease. The Tamoorla homestead is located along the premises' south-western boundary, approximately 5.5 km south-west of TSF4.
Environmental receptors	**Distance from prescribed activity**
Native vegetation	The premises is located within the East Murchison subregion of the Murchison bioregion under the Interim Biogeographical Regionalisation for Australia. Vegetation in the subregion is described as being '*dominated by Mulga woodlands often rich in ephemerals, hummock grasslands, saltbush shrublands and Tecticornia shrublands'*. Native vegetation is present within the prescribed premises. At TSF4, native vegetation abuts the northern and western boundary of the facility. Based on a vegetation survey report (Mattiske 2020), the vegetation community around TSF4 is characterised as low woodland of *Acacia aneura* and other *Acacia* spp. Vegetation community shifts closer to the adjacent creek line, becoming a

	denser woodland traditionally associated with drainage lines.
Conservation significant flora	A recent flora survey identified the following priority flora species at the premises (Figure 2): 1. *Frankenia georgei* (Priority 1) – Population of over 1,000 individuals recorded along Sullivan Creek, approximately 4.2 km west of TSF4. 2. *Stenanthemum patens* (Priority 1) – A population recorded approximately 2.6 km north of TSF4.
Terrestrial fauna and avifauna	As part of a pastoral lease, cattle and goats are known to forage around, and at times within, the premises. A level 2 vertebrate fauna assessment found up to 72 fauna species recorded within the survey area, including small terrestrial reptiles, birds, mammals (e.g., red kangaroo, common wallaroo, dingoes, feral cats), and amphibians (Terrestrial Ecosystems 2020). Up to 53 avifauna species were recorded, with eight waterbird species sighted near the isolated open Rainbow Pit, which contained permanent freshwater and acts as a drinking water source for avifauna during dry periods (Terrestrial Ecosystems 2020). A separate report also found animal bones nearby unfenced pits, including Rainbow Pit, having likely accessed the pit for drinking water but were unable to leave due to the steep pit slope (DPLH 2022). This suggests that terrestrial fauna may also access nearby water sources. Furthermore, while not recorded in the fauna survey, several conservation significant avifauna species were noted to likely frequent the premises, including: 1. Princess parrot (*Polytelis alexandrae*) – Priority 4; 2. Fork-tailed swift (*Apus pacificus*) – Migratory species; and 3. Peregrine falcon (*Falco peregrinus*) – Species otherwise in need of special protection. As TSF4 is unfenced, livestock, terrestrial fauna and especially avifauna (due to ease of access) may also be access TSF4 and may ingest cyanide-bearing water from the decant pond. Recent monitoring of the decant pond water quality has determined total dissolved solid levels to range between 3,380 mg/L and 8,690 mg/L (Red5 2024), which does not make the decant water completely unpalatable for cattle and wildlife (Adams et al. 2013).
Surface water bodies	The premises is located within the Sullivan Creek catchment. Sullivan Creek is a minor, non-perennial watercourse that runs along the western premises boundary, approximately 3.5 km west of TSF4 (Figure 3). The creek flows infrequently after heavy rainfall events and has formed an alluvial plane ranging from 2 km to 3 km in width, broadening downstream. The local topography slopes to the south and west, with surface drainage via tributaries of Sullivan Creek. A drainage line is present south of TSF4, with the closest distance between the two being approximately 300 m at the southern corner of the TSF. Sullivan Creek and its tributaries flows towards Lake Raeside, a hypersaline salt lake located approximately 15 km south-west of the premises.
Groundwater aquifer	The premises is located within the Archaean Yilgarn Craton, which generally comprises metamorphosed, deformed volcanic and sedimentary rocks (greenstones) with significant granitic intrusions (Stewart 2004). The local aquifer system can be summarised as (in order of increasing depth): 1. Alluvial and colluvial sediments (thin paleochannel sediments); 2. Weathered bedrock; and 3. Fractured Archaean bedrock (faulted, joints and sheared). While the Archaean crystalline rocks generally have low permeability and are not recognised as a groundwater resource, the weathered zones and fractures within the bedrock offer greater permeability and locally significant

	groundwater volumes. The shallow alluvial cover and deeper paleochannels overlying the weathered bedrock are recognised as locally important aquifers. Groundwater recharge occurs mainly along creek lines and direct infiltration through alluvial sediments. Sullivan Creek located west of TSF4 (as discussed above) represents the surface expression of a paleochannel sedimentary sequence. Paleochannel sediments are present at a depth of approximately 10 m at the premises, thickening towards the creek area, where the reach up to 80 m in depth. Regional groundwater flows south-west towards Lake Raeside. However, local groundwater flow regime is also influenced by dewatering activities at the premises, resulting in groundwater drawdown and sinks within mine pits. The premises is located within the Goldfields Groundwater Area. Groundwater abstraction is regulated under licence GWL63771(8) and GWL204011(2). Groundwater is utilised by nearby third parties for mining, exploration, and ore processing activities.
Cultural receptors	**Distance from prescribed activity**
Aboriginal heritage places	Based on historical ethnographic and archaeological surveys, the premises and its wider areas were found to be within an important Dreaming track. Most topographical features within the track hold significance as embodiment of Creation Beings for Traditional Owners. Clumps of trees, ridges, mounds, hills and rock holes were also noted to likely hold spiritual significance. This is reflected in the Aboriginal Cultural Heritage Inquiry System (ACHIS), where a number of heritage sites were registered as natural features and artefacts/scatters. Of potential concern is the Wanangari Pool heritage site (Place ID 22420), located within the prescribed premises, directly south of TSF4 (Figure 4). The site characteristics include camp, hunting place, natural feature and water source. The site is currently classified as ‘Lodged’ on the ACHIS. Additionally, the entirety of Sullivan Creek has been classified as the Lake Raeside/Sullivan Creek heritage site (Place ID 25955) (Figure 4). A portion of the site overlaps with the premises, located west of TSF4. The site characteristics is mythological and has been classified as a ‘Registered Site’ on ACHIS.

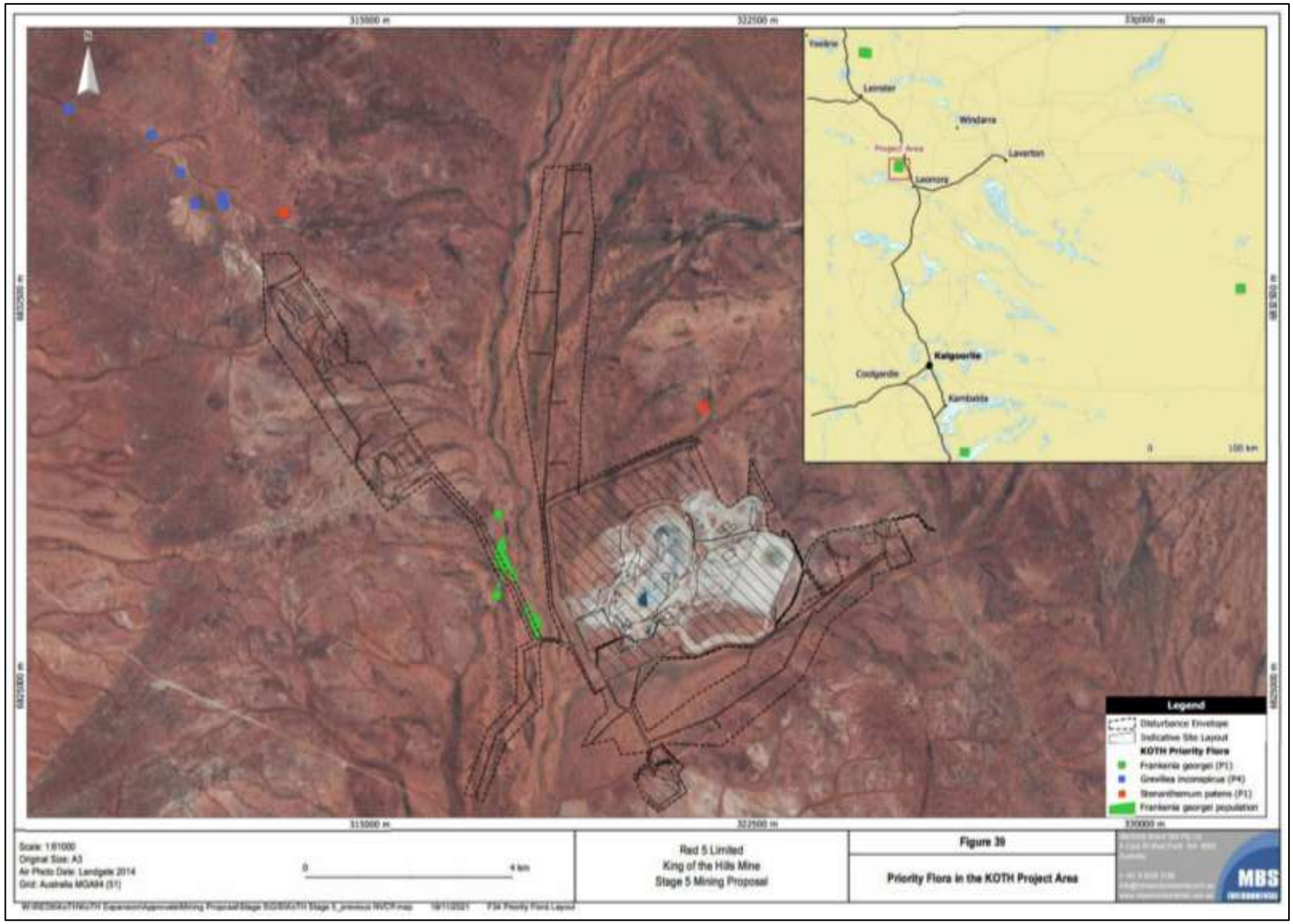

Figure 2: Population of conservation significant flora near the premises

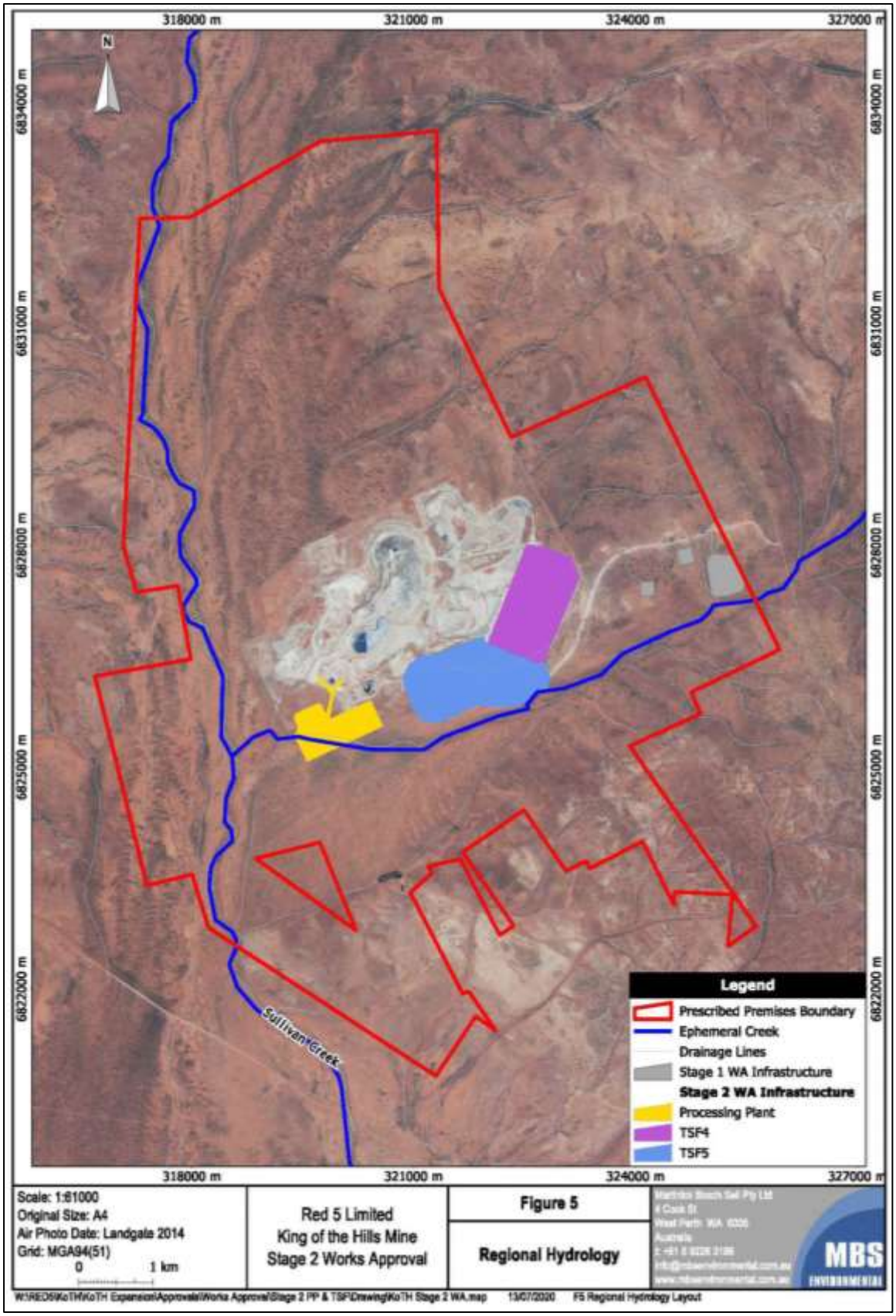

Figure 3: Surface water bodies and water lines at the premises

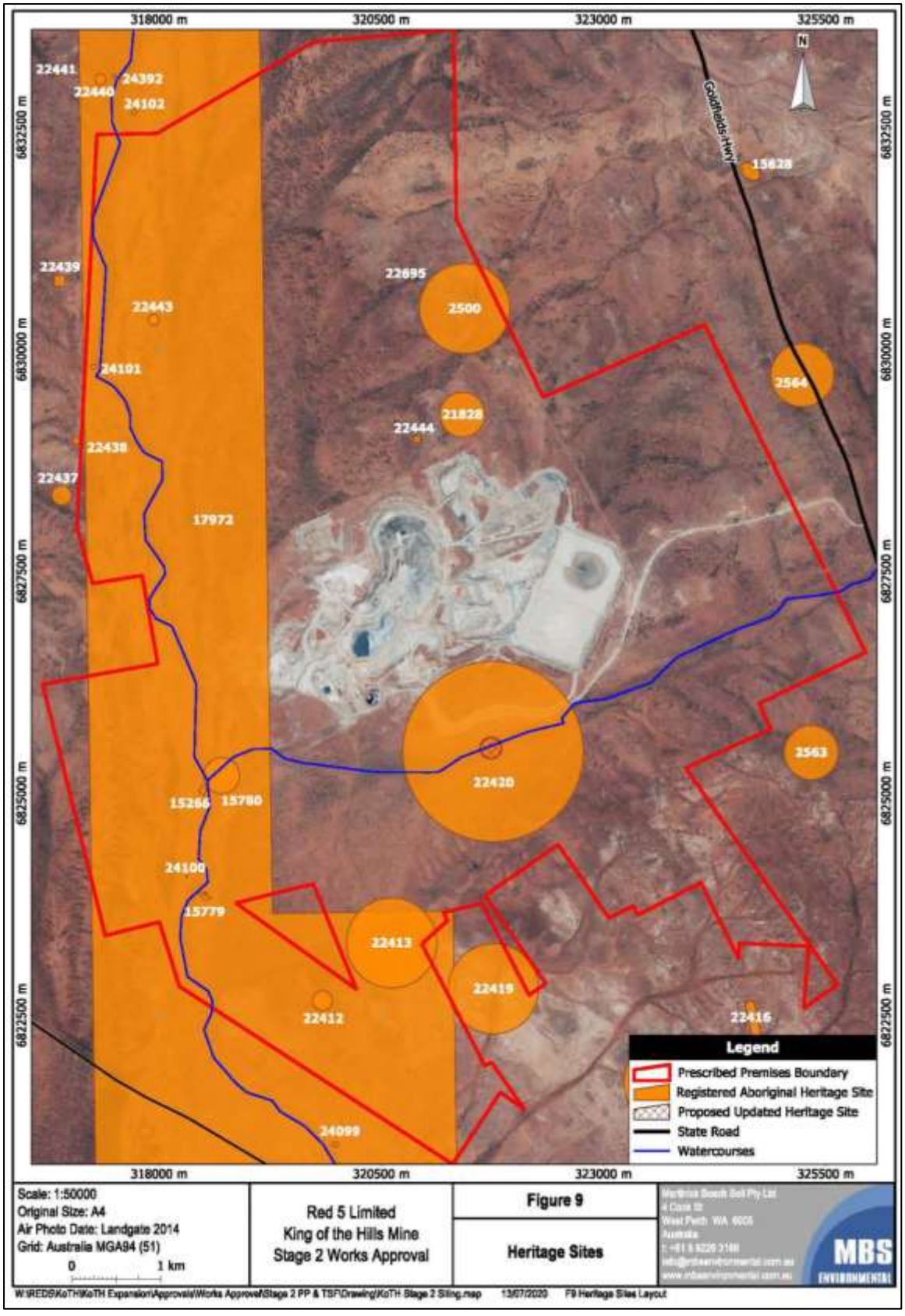

Figure 4: Aboriginal heritage cultural sites at the premises

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020c) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

Works approval W6891/2024/1 that accompanies this decision report authorises construction, environmental commissioning and time limited operation. The conditions in the issued works approval, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. tailings deposition into TSF4. A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the licence application.

The conditions in the issued licence, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 3: Risk assessment of potential emissions and discharges from the premises during construction, commissioning, and time limited operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Construction of TSF4 expansion, including four additional embankment raises to RL 445.0 m, footprint expansion into East Waste Dump at RL 433.0 m, central decant rock ring and booster pumping station	Dust	***Pathway:*** Air / windborne pathway ***Impact:*** Impact to ecological health and amenity	Pastoral station Native vegetation	Refer to Section 3.1	C = Minor L = Rare **Low risk**	Y	Condition 1 – Critical containment infrastructure construction requirements Condition 2 – Infrastructure construction requirements	The Delegated Officer has determined the proposed controls for managing dust, sediment laden stormwater, as well as hydrocarbon and other chemical reagent emissions from the construction of the proposed infrastructure to be adequate. No additional regulatory control is required.
	Sediment laden stormwater	***Pathway:*** Overland runoff during rainfall events ***Impact:*** Impact to ecological health	Native vegetation Surface water bodies Aboriginal heritage place	Refer to Section 3.1	C = Slight L = Unlikely **Low risk**	Y	N/A	
	Hydrocarbon and other chemical reagent	***Pathway:*** Loss of containment, resulting in spills and leaks ***Impact:*** Direct discharge to land, resulting in impacts to ecological health	Native vegetation Surface water bodies	Refer to Section 3.1	C = Minor L = Rare **Low risk**	Y	N/A	
Commissioning and operation (including time limited operation)								
Tailings deposition into expanded TSF4, up to maximum operating height of RL 445.0 m (Stage 4) Operation of booster pumping station	Dust (dried tailings)	***Pathway:*** Air / windborne pathway ***Impact:*** Impact to human and ecological health, as well as amenity	Pastoral station Native vegetation, including conservation significant flora	Refer to Section 3.1	C = Moderate L = Unlikely **Medium risk**	Y	Condition 15 – Infrastructure operational requirements	The Delegated Officer has determined the proposed controls for managing dust emissions from dried tailings as a result of the time limited operation of the proposed infrastructure to be adequate. Additionally, existing dust monitors are sited such that fugitive dust emissions from the

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
								proposed activities may also be detected. No additional regulatory control is required.
	Tailings supernatant	***Pathway:*** Vertical infiltration and lateral migration through base and embankment wall ***Impact:*** Groundwater mounding and deterioration of groundwater quality, potentially resulting in impact to ecological health	Native vegetation Surface water bodies Groundwater aquifer Aboriginal heritage places	Refer to Section 3.1	C = Moderate L = Possible **Medium risk** Refer to Section 3.3	N	Condition 1 – Critical containment infrastructure construction requirements Condition 2 – Infrastructure construction requirements Condition 15 – Infrastructure operational requirements Condition 17 – Inspection requirements Condition 21 – Discharge monitoring **Condition 22 – Ambient groundwater monitoring** Condition 23 – Process monitoring	Refer to Section 3.3.
		Pathway: Direct ingestion of tailings supernatant ***Impact:*** Impacts to wildlife health	Transient wildlife, including birdlife	Refer to Section 3.1	C = Major L = Unlikely **Medium risk**	N	Condition 17 – Inspection requirements **Condition 21 – Discharge monitoring**	The Delegated Officer has determined that additional regulatory controls are required for managing the risk of tailings supernatant impacting transient wildlife (including birdlife) as a result of direct ingestion of tailings supernatant. Specifically, the applicant is required to undertake monitoring of the decant pond water quality during time limited operation. Weak acid dissociable cyanide (WAD CN) concentrations at the decant pond is of particular

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
								concern, because: • previous tests measuring WAD CN concentrations above 100 mg/L (Knight Piesold 2020b); • transient cattle and wildlife have been sighted in the area, with recorded indications of them utilising nearby open water bodies as a source of drinking water; and • water quality at the decant pond may not be saline enough to render to water unpalatable (Adams *et al.* 2013). Based on the monitoring during time limited operation (Condition 21), the department may require continued monitoring of WAD CN at the TSF4 decant pond and specify a relevant limit for the protection of wildlife receptors for the ongoing operation of TSF4 (i.e., under licence L8345/2009/3).
	Tailings slurry	***Pathway:*** Overtopping of TSF4 ***Impact:*** Discharge to land, resulting in impact to ecological health	Native vegetation Surface water bodies Aboriginal heritage places	Refer to Section 3.1	C = Moderate L = Rare **Medium risk**	Y	Condition 1 – Critical containment infrastructure construction requirements Condition 2 – Infrastructure construction requirements Condition 15 – Infrastructure operational requirements Condition 17 – Inspection requirements	The Delegated Officer has determined the proposed controls for managing tailings slurry emissions from the time limited operation of the proposed infrastructure to be adequate. No additional regulatory control is required.
		Pathway: Loss of		Refer to	C = Minor	Y	Condition 8 –	

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
		containment at booster pumping station, resulting in spills and leaks ***Impact:*** Direct discharge to land, resulting in impacts to ecological health		Section 3.1	L = Rare **Low risk**		Environmental commissioning requirements Condition 15 – Infrastructure operational requirements	
		Pathway: Pipeline rupture or failure ***Impact:*** Discharge to land, resulting in impact to ecological health		Refer to Section 3.1	C = Moderate L = Unlikely **Medium risk**	Y	Condition 1 – Critical containment infrastructure construction requirements Condition 15 – Infrastructure operational requirements Condition 17 – Inspection requirements	
	Decant / return water			Refer to Section 3.1	C = Moderate L = Rare **Medium risk**	Y	Condition 1 – Critical containment infrastructure construction requirements Condition 15 – Infrastructure operational requirements Condition 17 – Inspection requirements	The Delegated Officer has determined the proposed controls for managing process water emissions from the time limited operation of the proposed infrastructure to be adequate. No additional regulatory control is required.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020c).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment for tailings seepage from TSF4 expansion

3.3.1 Background and overview of risk events

Through the construction and continued operation of the TSF4 expansion, it is anticipated that tailings seepage will continue to be released into the environment through infiltration of the base and embankment walls of the TSF. Tailings seepage, characterised by the source tailings slurry that is deposited into TSF4, has the potential to impact surrounding environmental receptors, including nearby native vegetation, surface water body (i.e., Sullivan Creek tributary, which connects to mainstem Sullivan Creek), Aboriginal heritage sites and the local groundwater aquifer.

It is understood that previous significant seepage had previously occurred from the eastern portion of TSF4 Cell A during the early stages of its operation in the early 2000s (Golder 2003). In response, the occupier at the time installed 23 monitoring bores along three transects, as well as two seepage recovery bores (TA Bore 76, TA Bore 86). The recovery bores were successful in controlling the seepage plume.

Prior to recommencement of mining in 2018, the current occupier (i.e., the applicant) had to undertake dewatering of underground mine (Red5 2021). Mine dewater was discharged into the then-inactive TSF4 Cell B to manage fugitive dust emissions (Red5 2021). At the time, the discharge of mine dewater was authorised under licence L8345/2009/2. The discharge of mine dewater into TSF4 had ceased to allow tailings deposition to recommence in 2022.

In considering the proposed activities, a detailed risk assessment is necessary to assess the risk events associated with expansion of TSF4 and continued tailings deposition up to RL 445.0 m (Stage 4). The risk events assessed relate to seepage from TSF4 infiltrating into the subsurface environment, resulting in the following impacts:

1. Localised mounding of the water table, resulting in potential inundation of the root zone of surrounding native vegetation.
2. Localised mounding and contamination of the unconfined aquifer, resulting in uptake of seepage contaminants by surrounding native vegetation.
3. Subsurface and surface lateral migration of seepage contaminants, resulting in contamination of nearby Sullivan Creek and its tributary, as well as the Wanangari Pool.
4. Subsurface infiltration of seepage contaminants, resulting in contamination of and contaminant migration through the paleochannel to Lake Raeside.

3.3.2 Source characterisation: Tailings seepage

Tailings seepage is largely characterised by the properties of the source tailings slurry, which depends on the ore type, as well as chemical reagents added during the mining and beneficiation process.

Tailings that are proposed to be deposited into the TSF4 expansion are produced at the gold processing plant at the premises. The processing plant was constructed in 2022 under works approval W6426/2020/1, consisting of a crushing and grinding circuit, gravity concentrator circuit, carbon in leach and adsorption circuit and elution circuit and a gold room. Gold ore is processed at the processing plant, mined from adjacent Tamoorla North and Tamoorla South open pits.

Tailings seepage quality

Tailings were initially characterised in 1997 to support the construction of TSF4 (Knight Piesold 2020c). To support the recommencement of operations at the premises, tailings were

characterised again in 2020 (Knight Piesold 2020a, 2020b). The tailings characteristics from the 2020 investigation were considered in the assessment of works approval W6426/2020/1 (DWER 2020). The applicant has not undertaken further tailings characterisation as the ore type and processing method has not been modified.

Based on the existing tailings characterisation investigations (Knight Piesold 2020a, 2020b), tailings being deposited into the expanded TSF4 are expected to have the following properties:

- Tailings is described as a non-plastic sandy silt with trace clay, classified as ML in accordance with AS1726 *Geotechnical site investigations*. The sample comprises 49% sand, 45% silt and 6% clay and has a P_{80} of 150 µm.
- Sedimentation test indicated that tailings sediment occurred within less than half a day. In the undrained test, tailings sample released approximately 57% of water in slurry to the supernatant, while in the drained test, this was reduced to 39%.
- Tailings achieved an average maximum dry density of 1.52 tonnes/m^3, after approximately seven days of air-drying.
- In the range of expected settled densities, the vertical permeability of tailings was approximately 2 x 10^{-6} m/s. As tailings consolidate, it is anticipated that the permeability may reduce due to the coarse silt characteristics of the tailings.
- Based on monthly water balance provided (Red5 2024), tailings solids content has ranged between 44% to 51% since recommencement of tailings deposition in 2022. The design target for tailings solids content is 50%.
- Based on maximum potential acidity and acid neutralising potential, the tailings recorded strongly negative net acid producing potentials of -100 kg to -103 kg H_2SO_4/t, which suggests excess neutralising capacity. ANC/MPA ratio ranged between 16 and 16, indicating a high factor of safety against acid generation.
- Total elemental analysis indicated that tailings were enriched with several elements. Of potential concern were silver, molybdenum, sulfur, arsenic, bismuth, chloride, and chromium, due to varying levels of enrichment ranging from slight to significant, when compared to average crustal abundance. No leachate analysis was undertaken.
- Tailings supernatant was analysed and identified total dissolved solids (TDS), copper, iron, molybdenum, nickel, selenium, silver, sulfate, zinc, and cyanide as potential contaminants of concern.

No tailings leachate information was provided at the time of assessment for works approval W6426/2020/1. As a result, tailings leachate characterisation works in accordance with the US EPA (2017) LEAF test method 1313 were required to be undertaken upon recommencement of tailings deposition at TSF4 (DWER 2020a). The results are shown in Table 4. It was noted that most of the enriched elements identified in the Knight Piesold (2020b) investigation were not measured at detectable concentrations in the tailings leachate samples.

Table 4: Average and maximum tailings leachate concentrations

Parameter	Unit	Sample size	Average concentration	Maximum concentration
pH	pH unit	10	8.81	9.39
Total dissolved solids (TDS)	mg/L	10	6,170	6,700
Boron (B)	mg/L	10	0.74	0.95
Calcium (Ca)	mg/L	10	525	555
Cerium (Ce)	mg/L	10	0.002	0.005
Cobalt (Co)	mg/L	10	0.3	0.5
Copper (Cu)	mg/L	10	8.3	10.6

Parameter	Unit	Sample size	Average concentration	Maximum concentration
Iron (Fe)	mg/L	10	4	8
Mercury (Hg)	mg/L	10	0.003	0.004
Potassium (K)	mg/L	10	98	110
Magnesium (Mg)	mg/L	10	11	34
Sodium (Na)	mg/L	10	1,348	1,536
Nickel (Ni)	mg/L	10	1.5	1.5
Rubidium (Rb)	mg/L	10	0.063	0.072
Antimony (Sb)	mg/L	10	0.030	0.076
Strontium (Sr)	mg/L	10	5.2	6.8
Tungsten (W)	mg/L	10	0.064	0.008
Zinc (Zn)	mg/L	10	0.2	0.4
Silver (Ag)	mg/L	10	<0.2	<0.2
Aluminium (Al)	mg/L	10	<2.0	<2.0
Arsenic (As)	mg/L	10	<1.0	<1.0
Barium (Ba)	mg/L	10	<0.5	<0.5
Beryllium (Be)	mg/L	10	<0.5	<0.5
Bismuth (Bi)	mg/L	10	<1.0	<1.0
Cadmium (Cd)	mg/L	10	<0.5	<0.5
Chromium (Cr)	mg/L	10	<1.0	<1.0
Lithium (Li)	mg/L	10	<0.5	<0.5
Manganese	mg/L	10	<0.5	<0.5
Molybdenum (Mo)	mg/L	10	<0.5	<0.5
Niobium (Nb)	mg/L	10	<0.01	<0.01
Lead (Pb)	mg/L	10	<0.5	<0.5
Selenium (Se)	mg/L	10	<0.5	<0.5
Tin (Sn)	mg/L	10	<0.02	<0.02
Tantalum (Ta)	mg/L	10	<0.001	<0.001
Thorium (Th)	mg/L	10	<0.005	<0.005
Titanium (Ti)	mg/L	10	<1.0	<1.0
Thallium (Tl)	mg/L	10	<0.05	<0.05
Uranium (U)	mg/L	10	<0.005	<0.005
Vanadium (V)	mg/L	10	<0.2	<0.2

Note 1: Grey values represent sample concentrations detected the limit of reporting for the corresponding parameter.

Tailings seepage volume

To estimate the seepage rates being emitted from the facilities, a seepage analysis was undertaken for the proposed TSF4 expansion (as well as TSF5 expansion, which is not assessed or authorised as part of this works approval) (CMW 2023). At Stage 4 of the expansion, assuming the decant pond is located at least 250 m from the perimeter embankments, daily seepage through the embankments would be 44.1 m^3/day. Seepage rate may increase up to 88.2 m^3/day, if the decant pond is closer to or next to the perimeter embankment, due to a rise in phreatic surface within the embankments. This is notably higher than the estimated seepage from the adjacent TSF5, which was expected to range between 21 m^3/day and 37 m^3/day (Rockwater 2022).

Based on the permeability of the foundation material, seepage through the base of TSF4 (and TSF5) was estimated to be 272.2 m^3/day. Cumulative seepage (through embankment and base) was estimated to reach up to 360.4 m^3/day (i.e., 131,636 m^3 per annum).

For comparative purposes, the estimated seepage volume from the water balance was compared to seepage losses during the time limited operation of TSF4, which was calculated using empirical data (Red5 2024) (Figure 5). Over the 12-month period, monthly seepage loss estimates ranged from 5,507 m^3 to 41,506 m^3. This was considered to be more variable than the seepage estimates of around 11,000 m^3/month, which is based on and assumes seepage occurring at a constant rate. Furthermore, the overall seepage loss over the 12-month time limited operation period was calculated to be approximately 214,349 m^3, which is over 1.5 times than the predicted seepage loss for the TSF4 expansion despite the latter also accounting for seepage from the TSF5 expansion (not assessed under this works approval). This indicates that, despite acceptable decant water recovery (discussed further in Section 3.3.5), a significant volume of tailings supernatant is likely to be released to the environment as seepage. This trend is expected to exacerbate as a result of the expansion and raising of TSF4, subject to the effectiveness of controls being implemented.

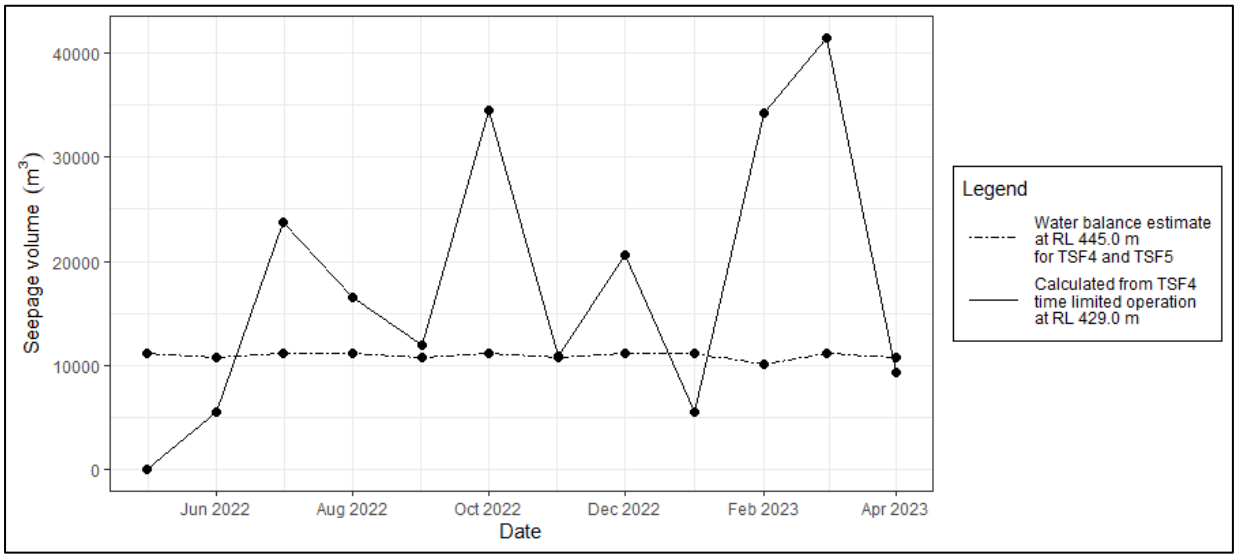

Figure 5: Comparison between seepage volume estimated from water balance (for TSF4 and TSF5 at RL 445.0 m) and measured from time limited operation of TSF4 at RL 429.0 m

3.3.3 Pathway characterisation: Hydrogeology

The premises is located within the Archaean Yilgarn Craton, which generally comprises metamorphosed, deformed volcanic and sedimentary rocks (greenstones) with significant granitic intrusions (Stewart 2004). The local aquifer system can be summarised as (in order of increasing depth):

1. Alluvial and colluvial sediments (thin paleochannel sediments);
2. Weathered bedrock; and
3. Fractured Archaean bedrock (faulted, joints and sheared).

While the Archaean crystalline rocks generally have low permeability and are not recognised as a groundwater resource, the weathered zones and fractures within the overlying bedrock offer greater permeability and holds locally significant groundwater volumes. Shallow alluvial cover and deeper paleochannels overlying the incising the basement rocks are recognised as locally important aquifers.

The alluvial sediments and unconfined aquifer systems are recharged from surface flooding following high rainfall events, and typically contain fresher groundwater (i.e., <4,000 mg/L TDS) (CMW 2023). Fresh groundwater recharge occurs at deeper depths through fractures and quartz veins, with groundwater TDS increasing with depth, where recharge is less frequent.

Regional groundwater flows towards Sullivan Creek and Tamoorla Pit, likely due to the presence of the paleochannel and active open pit dewatering, respectively (Rockwater 2022). However, the groundwater gradient measured was very weak and could be locally reversed by other influencing factors, such as groundwater mounding from tailings deposition (Rockwater 2022).

A Tertiary paleochannel sand aquifer runs parallel to Sullivan Creek. The applicant utilises the paleochannel aquifer to as a long-term water supply for ore processing activities at the premises (Rockwater 2022). The Sullivan Creek borefield comprises nine production bores drilled to 90 m depth, intercepting the paleochannel.

Recent drilling and magnetic survey results, supported by historical exploration borelogs, suggest that TSF4 (and the abutting TSF5) is also underlain by the Tertiary paleochannel (Rockwater 2022) (Figure 6). Further characterisation work has found that the paleochannel is a tributary of the paleochannel that runs parallel to Sullivan Creek. At the TSF4 and TSF5 area, the paleochannel tributary appears run directly beneath the aboveground Sullivan Creek tributary, before deviating from it at the western tip of TSF5. Northerly branches of the paleochannel extend to the TSF4 and TSF5 footprint.

The width of the paleochannel tributary is approximately 400 m, with a maximum recorded depth of 56 m (Rockwater 2022). The base of the paleochannel is filled with ferruginous gravel interbedded with clay, overlain by clay that coarsens upwards through lenses of ferruginous gravel, before arriving at a more extensive and uniform layer of Quaternary ferruginous gravel at the surface.

As required under works approval W6426/2020/1, the applicant undertook an electromagnetic survey of the TSF5 footprint using Loup time-domain instrument. The survey imagery revealed a zone of low-conductivity at mid-range depth that broadly overlaps with the paleochannel outline. The resistive layer likely represented the Quaternary ferruginous gravel and the upper parts of the Tertiary paleochannel at a maximum depth of 21 m, though the full depth of the paleochannel likely around 40 m and 55 m in the northern and southern portions of TSF5, respectively (Rockwater 2022).

Permeability testing indicated that the average permeabilities of the weathered bedrock, paleochannel clay and ferruginous gravels were approximately 0.045 m/day, 0.055 m/day and 0.56 m/day[1], respectively (Rockwater 2022). The permeability of the ferruginous gravel is at least one order of magnitude higher than the interbedded clays and underlying bedrock. With the hydraulic gradient of 0.008, with average groundwater flow rate within the ferruginous gravel aquifer was estimated to be 0.048 m/day (or 18 m/year).

The presence of the paleochannel beneath and surrounding TSF4 is of concern as it may represent a preferential flow pathway for tailings seepage. This is evident in the higher permeability of the ferruginous gravel units within the paleochannel.

As discussed in Section 3.3.6, risk events (3) and (4) relate to the migration of contaminants through the paleochannel tributary as a pathway for impacting the surface water and groundwater receptors. The seepage incident recorded in the early 2000's (refer to Section 3.3.1) was also thought to be due to the paleochannel, as the location of mounding correlated roughly with the spatial extent of the paleochannel tributary (Figure 6).

Nevertheless, it was thought that the ferruginous gravel at greater depths within the paleochannel were likely to be hydraulically isolated by intervening layers of clay. As such, the zone of interest for seepage modelling and management is likely restricted to the top 20 m.

[1] Previous drawdown analysis undertaken in 2003 at production bore TA_Bore 76 derived a permeability of 1.5 m/day for the ferruginous gravel unit, based on pumping at 5.5 L/s for one month (Rockwater 2022). As this permeability is higher than those measured by Rockwater (2022), it is used as a conservative measure in estimating groundwater flow rate.

(Rockwater 2022).

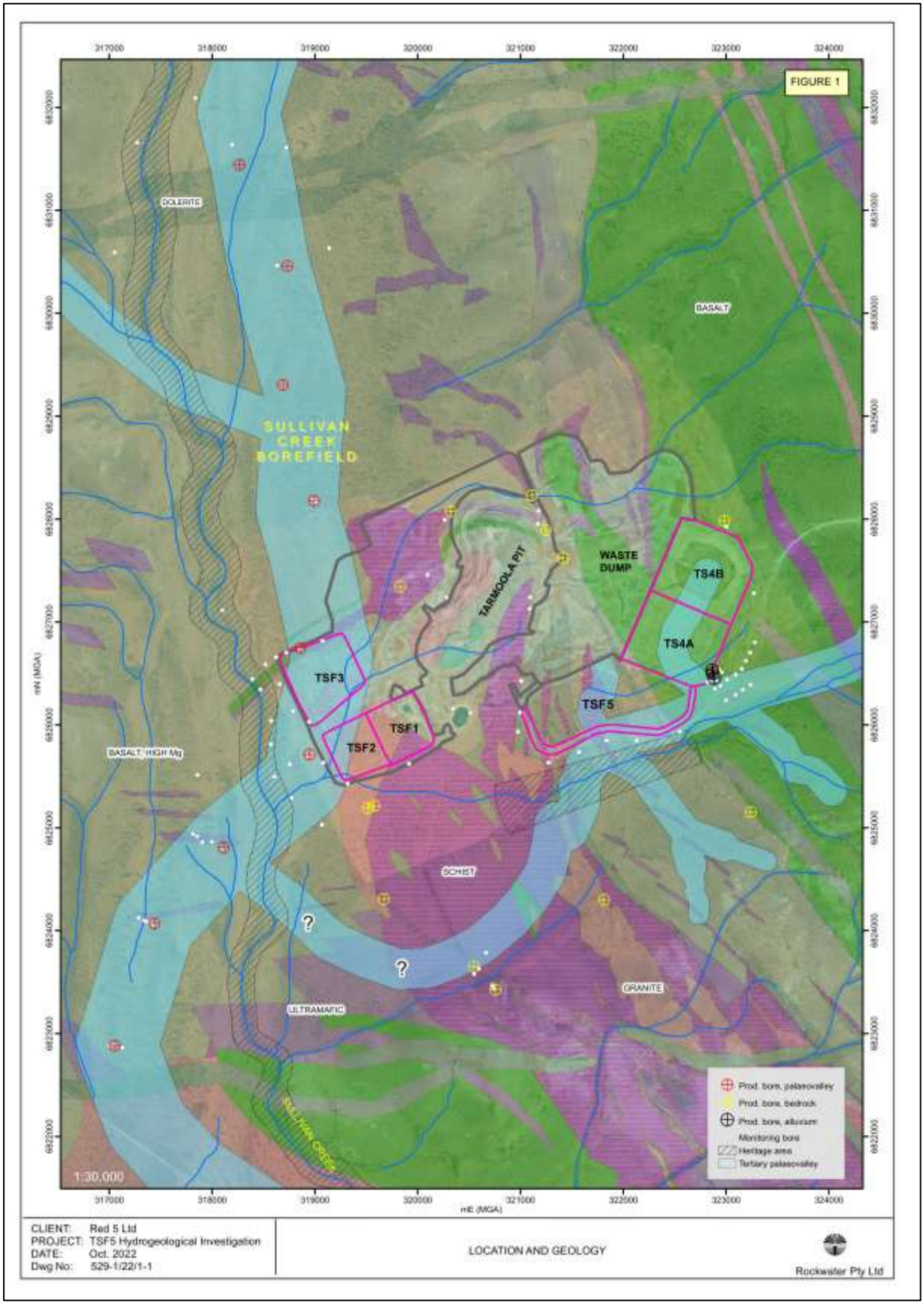

Figure 6: Siting of TSF4, existing monitoring and seepage recovery bores, and the tertiary paleochannel

3.3.4 Pathway characterisation: Groundwater assessment

The four risk events described in this detailed risk assessment depends on whether (and if so, the extent of) the local aquifer being impacted by tailings seepage, which could result in either groundwater mounding and/or contamination. Routine groundwater monitoring is a useful tool for assessing and detecting potential changes in groundwater properties.

Groundwater levels

A number of groundwater monitoring bores were installed during the commissioning of TSF4. Standing water level (SWL) data was analysed from 2017 to 2024. This was an appropriate period for assessment, as TSF4 was inactive until 2017. At the end of 2017, the applicant commenced constant discharging of mine dewater into TSF4 from the King of the Hills underground workings. The discharge of mine dewater continued until May 2022, when tailings deposition commenced at TSF4 Cell A. It is not known whether the facility was left to drain before commencement of tailings deposition.

Reflecting the change in operations at TSF4, SWL at the surrounding bores began to increase from 2017, which is likely a response to the discharge of mine dewater at TSF4 (Figure 7). At the time, licence L8345/2009/3 did not contain a limit of standing water level. Shallow and deep monitoring bores at MBH1 and MBH2 (i.e., north and east of TSF4) showed the shallowest groundwater levels, peaking around mid-2020 before slowly decreasing.

Other monitoring bores located closer to the south-eastern corner of TSF4 had lower ambient SWL and did not exhibit a strong response to the discharge of mine dewater. This is to be expected, as the discharge had occurred at only Cell B, which was the northern cell. However, a gradual increase in SWL was observed around 2019, peaking in mid-2022 before decreasing. This weaker, delayed trend may have captured the dispersal of the mound due to being further away from the discharge point at Cell B.

Nevertheless, when tailings deposition first recommenced at TSF4 Cell A from May 2022 to November 2022, and then at TSF4 Cell B from December 2022 to April 2023, groundwater SWL have been either stable or continuing on a decreasing trend.

During the most recent groundwater monitoring event on first quarter of 2024, the shallowest SWL was measured at MBH23 (8.41 meters below ground level (mbgl)) and MBH21 (8.49 mbgl), which are located east of TSF4, close to the dividing embankment of Cell A and Cell B. Average SWL at monitoring bores at TSF4 was 10 mbgl. Current SWLs are not exceeding the corresponding trigger level and limit specified in existing licence L8345/2009/3, which is 4 mbgl and 6 mbgl, respectively. Standing water level at a number of monitoring locations have not been determined for the past several monitoring events in 2023 and 2024 as they were dry, indicating a lowering of the water table below these bore depths.

Groundwater quality

Groundwater quality has been monitored under existing licence L8345/2009/3 since 2021. Based on monitoring results, the following observations were made:

- Field pH ranged between 6.67 pH unit and 9.07 pH unit, with most monitoring bores exhibiting a stable, if not slightly acidifying trend. These trends suggest limited influence from tailings seepage, as tailings leachate was found to be relatively alkaline, not acidic (Table 4).
- Groundwater around TSF4 was considered brackish, with TDS generally remaining below 7,000 mg/L. No temporal trends were identified. However, TDS at monitoring bore MBH2S spiked between 2021 and 2022, reaching a peak of 40,256 mg/L. The cause of this is not known, with no nearby bores available for comparison and no impacts were observed at its corresponding deep bore MBH2D. While this may be a result of tailings seepage, TDS concentration had begun to increase in 2021, which preceded commencement of tailings deposition into TSF4 in 2022. Furthermore, TDS

measurements observed were several times higher than those from tailings leachate (Table 4).

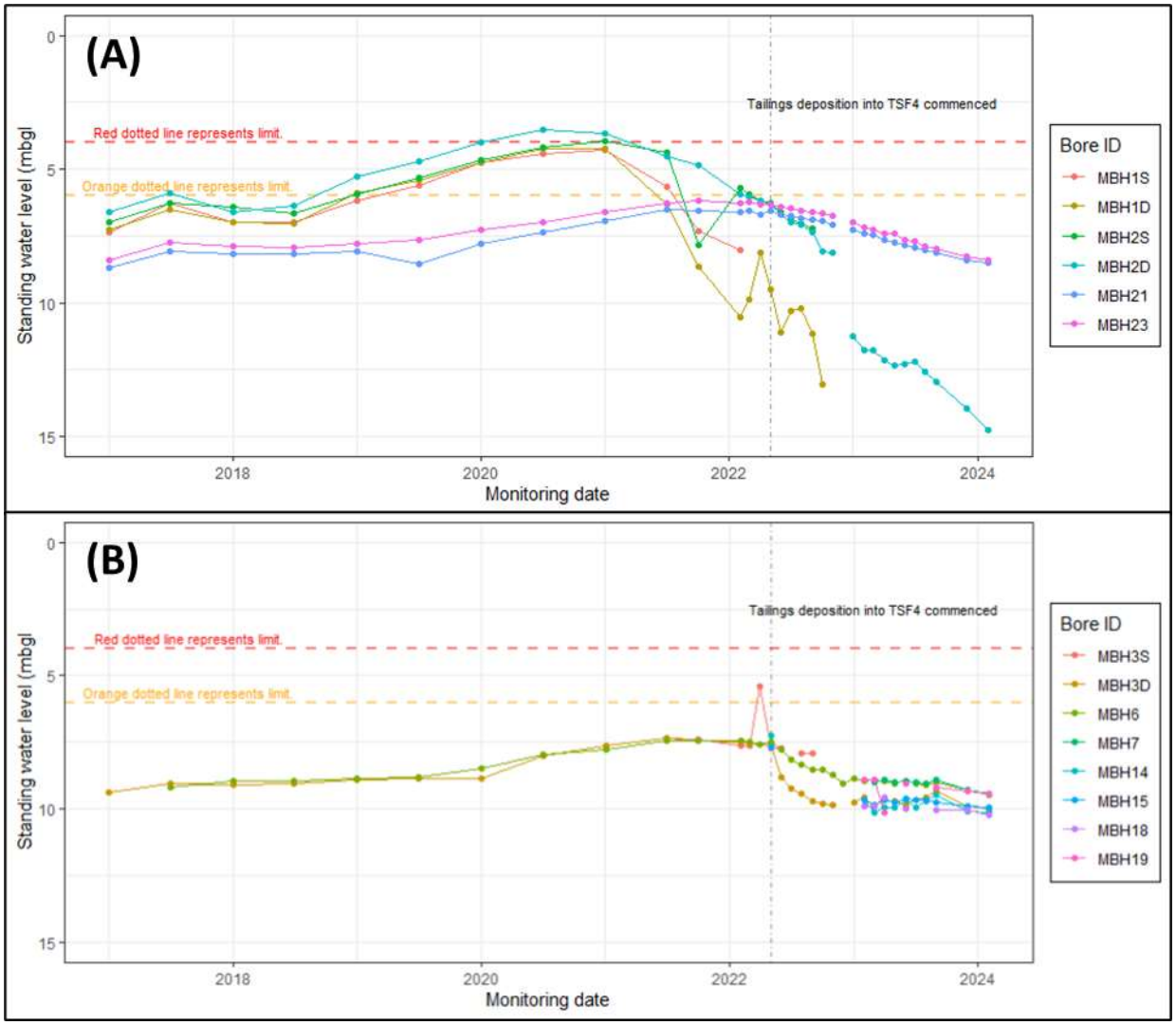

Figure 7: Standing water level at (A) northern and (B) southern monitoring bores around TSF4

- Metals such as cadmium, copper, lead, mercury, iron, and nickel were detected mostly below their corresponding limits of reporting (LOR), with detections above LOR occurring in some groundwater monitoring bores during various monitoring events. No trends were observed, in relation to potential impacts from tailings seepage.
- Similar observations were made for weak acid dissociable cyanide (WAD CN), which was detected at monitoring bore MBH1D, MBH2D, MBH3D, MBH3S and MBH7. However, detection of WAD CN above 0.004 mg/L at these locations only occurred during one to three monitoring events. Detection of WAD CN at deep paired bores (i.e., MBH1D, MBH2D and MBH3D) indicates that deeper aquifer may be impacted by tailings seepage.
- Arsenic has been consistently detected at monitoring locations MBH14, MBH15, MBH21 and MBH3D, though concentrations appear to be stable. These monitoring bores are located on the south-east corner of TSF4 (i.e., near where historical groundwater mounding had previously occurred).
- Cobalt has been consistently detected at monitoring locations MBH1D, MBH2D, MBH3D, MBH7, as well as MBH14, MBH15 and MBH18.

- Chromium has been consistently detected at all monitoring locations, though concentrations appear to be stable. A similar observation was made for zinc as well, though detections had only commenced from mid-2023, with previous monitoring results containing zinc below the LOR. In terms of timing, zinc detections were observed around the same time tailings deposition at TSF4 had ceased.

Overall, groundwater quality appears to be good, with some potential signs of impact (i.e., WAD CN). Nevertheless, there were no strong trends that suggest impacts from tailings seepage. Metal and metalloid concentrations are currently relatively low. For comparative purposes, groundwater quality at these monitoring bores complied with relevant livestock drinking water guidelines (Table 5) (ANZG 2023).

As many groundwater monitoring bores are currently dry due to the low water table, groundwater samples could not be obtained from the shallow bores. Only three monitoring bores currently have a corresponding well screened at the deeper aquifers. As such, it may be difficult to obtain consistent shallow groundwater quality data and establish long-term trends.

It is plausible that groundwater mounding is being controlled by the paleochannel underlying TSF4, where seepage from TSF4 is being diverted from the paleochannel at a rate that a significant groundwater mound is not forming in the immediate vicinity of the facility. Under this scenario, there could potentially be a migration of tailings seepage contaminants through the paleochannel that is not being detected by the dry shallow monitoring bores. The potential adverse impacts from this are discussed further in Section 3.3.6.

Table 5: Summary of ambient groundwater monitoring results

Parameter	Unit	Concentration range	Maximum concentration[1]	Livestock drinking water default guideline value[2]
Field pH	pH unit	6.67 – 9.07	9.07 (MBH1D – 2022 Q3 event)	----
Electrical conductivity (field EC)[2]	µS/cm	524 – 59,200	59,200 (MBH2S – 2021 Q4 event)	---
Total dissolved solids (field TDS)	mg/L	305 – 40,256	40,256 (MBH2S – 2021 Q4 event)	500
Weak acid dissociable cyanide (WAD CN)	mg/L	<0.004 – 0.06	0.06 (MBH7 – 2023 Q3 events)	---
Major ions				
Sodium	mg/L	<0.5 – 14,000	14,000 (MBH2S – 2021 Q4 event)	---
Potassium	mg/L	<0.5 – 820	820 (MBH2S – 2021 Q4 event)	---
Calcium	mg/L	305 – 40,256	40,256 (MBH2S – 2021 Q4 event)	1,000
Magnesium	mg/L	<0.5 – 2,800	2,800 (MBH2S – 2022 Q1 event)	500
Chloride	mg/L	56 – 23,000	23,300 (MBH2S – 2021 Q4 event)	---
Metals and metalloid (dissolved)				
Arsenic (As)	mg/L	<0.001 – 0.009	0.009 (MBH15 – 2024 Q1 event)	0.025
Cadmium (Cd)	mg/L	<0.001	No detection above LOR (<0.001)	0.01
Copper (Cu)	mg/L	<0.001 – 0.021	0.021 (MBH18 – 2023 Q4 event)	0.5
Chromium (Cr)	mg/L	<0.001 – 0.05	0.05 (MBH19 – 2023 Q1 event)	0.05
Cobalt (Co)	mg/L	<0.001 – 0.336	0.336 (MBH14 – 2024 Q1 event)	1.0
Iron (Fe)	mg/L	<0.01 – 3.0	3.0 (MBH3S – 2023 Q3 event)	---
Lead (Pb)	mg/L	<0.001 – 0.003	0.003 (MBH3S – 2021 Q3 event)	0.1
Mercury (Hg)	mg/L	<0.0001 – 0.0004	0.0004 (MBH2D – 2024 Q1 event)	0.002
Nickel (Ni)	mg/L	<0.001 – 0.004	0.004 (MBH18 – 2023 Q4 event; MBH1D – 2023 Q3 event)	1.0
Zinc (Zn)	mg/L	<0.005 – 0.044	0.044 (MBH2D – 2023 Q4 event)	20

Note 1: Red values represent maximum groundwater concentration that exceed the corresponding livestock drinking water guideline

value.
Note 2: Guideline value adopted from ANZG (2023).

3.3.5 Water management at TSF4

The management of water within the TSF4 will be a crucial consideration when assessing the risk of impacts from tailings seepage. For the proposed expansion, the applicant has proposed several controls, on top of existing controls that are being implemented under licence L8345/2009/3. These have been summarised in Table 1.

Seepage management

Several seepage management measures were considered in the design of the TSF4 expansion, including the use of low-permeability upstream zone for the new embankments that will be constructed in the existing EWD, the construction of a cut-off trench under the new embankments, and the installation of a clay or HDPE liner on the expanded footprint.

Currently, the existing underdrainage system at TSF4 is not operational, with the underdrainage tower within Cell A removed/backfilled during previous care and maintenance, and the status of the Cell B underdrainage unknown. The applicant does not intend to repair or incorporate an underdrainage system in the expanded design. In addition, no new toe drainage will be constructed on the new embankments. Instead of relying on downstream infrastructure to intercept and capture tailings seepage, the applicant intends to optimise decant water recovery in order to minimise the amount of seepage generated in the first place.

Decant water recovery

In terms of water management, a major change proposed for the TSF4 expansion is the transition from a two-cell to single-cell facility, with a central rock ring decant infrastructure. The use of the rock ring decant, instead of the existing decant tower system, would result in more efficiency, allowing greater volumes of decant water to be recovered, as the rock ring forms an efficient filter system for removing total suspended solids from the decant water. As the tailings beach is raised, a sump will be formed within the rock ring, continually promoting water recovery. A similar design was implemented for the adjacent TSF5.

Based on the predictive water balance provided for the TSF4 expansion[2], at Stage 4, approximately 4,804,100 m^3 of return water would be recovered annually[3], which will account for an average of 60% of tailings slurry water deposited into the TSF (Figure 8) (CMW 2023). For comparative purposes, up to 2,268,200 m^3 of return water was recovered over a 12-month period during the time limited operation of TSF4 (Figure 8) (Red5 2024). Based on the tailings slurry water inputted during this period, return water recovery rate ranged between 47% and 83%, averaging at 57%[4]. Based on these historical results as well as existing seepage management measurements, it is likely that the proposed water balance for the TSF4 expansion would be achievable (Figure 9).

Water recovery at the facility would likely be bolstered by the transition to a rock ring decant system, despite no plans to repair or reinstate an underdrainage system as part of the TSF4 expansion. The design report for the TSF4 expansion recommended the decant recovery system (e.g., pump, pipeline) be capable of recovering no less than 85% of tailings slurry water,

[2] The water balance provided derives potential return water volume by calculating the residual between inputs (e.g., rainfall, tailings slurry water) and outputs (e.g., evaporation, evapotranspiration, seepage, moisture retained in tailings). As such, the model assumes that all residual water that is unaccounted for can be recovered via the decant system.

[3] The water balance measurements account for both TSF4 and TSF5 cumulatively. Note that this assessment does not include TSF5.

[4] No return water was recovered during the first month of time limited operation. This may have been due to the time needed to reform the decant pond. As such, recovery rate of the first month (i.e., 0%) was not considered in calculating the average annual recovery rate.

including additional pumping capacity to account for rainfall inputs. This equates to an approximate pumping rate of 18,100 m^3/day, assuming a tailings deposition rate of 6 million tonnes per annum at 43% solids content (CMW 2023).

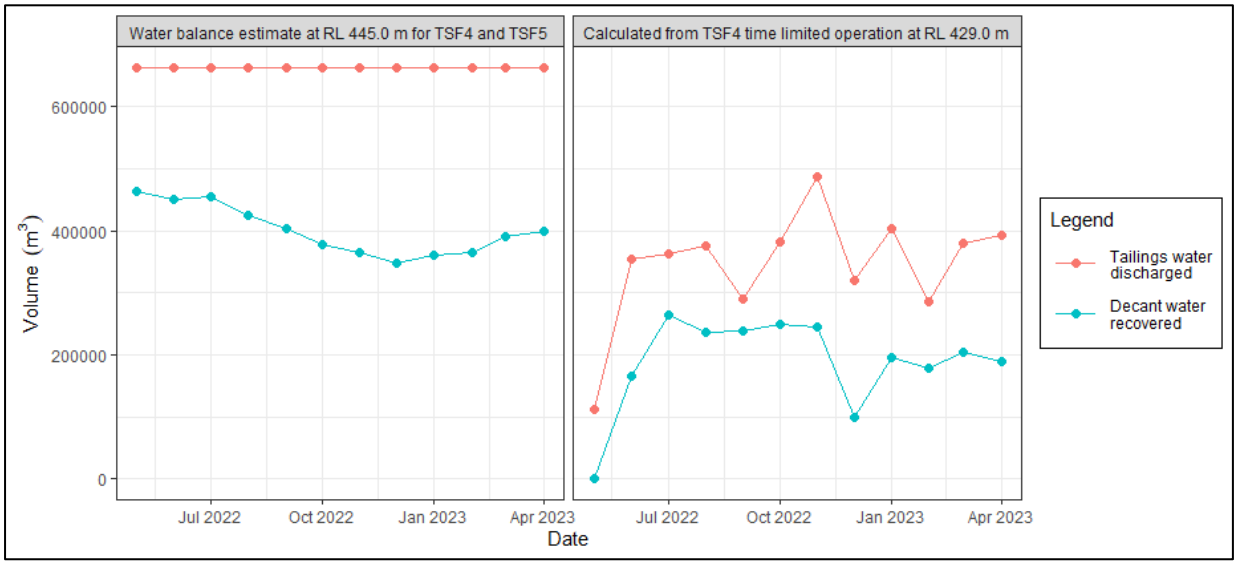

Figure 8: Comparison between tailings water discharged and decant water recovered as predicted by water balance of TSF4 and TSF5 at RL 445.0m (left) and as measured during time limited operation of TSF4 at RL 429.0

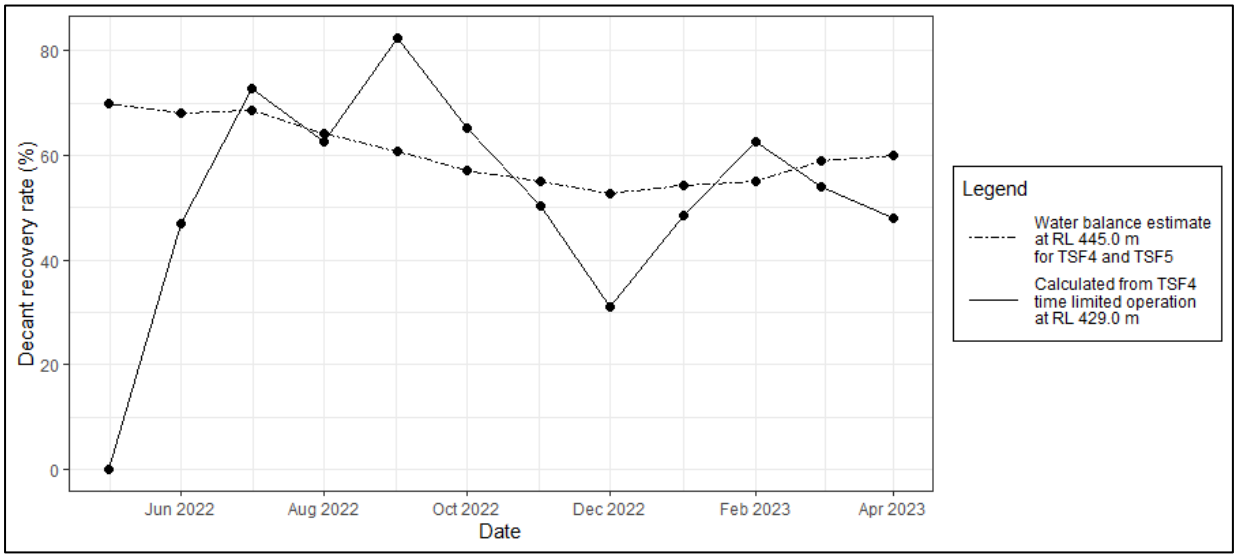

Figure 9: Comparison between decant water recovery rate estimated from water balance (for TSF4 and TSF5 at RL 445.0 m) and measured from time limited operation of TSF4 at RL 429.0 m

Seepage impact monitoring

The potential release of tailings seepage through the base of TSF4 will be monitored through the existing groundwater monitoring bore network. The bore network is extensive in the south-east corner, where historical seepage had occurred at TSF4 Cell A. The applicant has also proposed the installation of vibrating wire piezometers and standpipe piezometers on the expanded TSF4 perimeter embankments to monitor pore pressure and phreatic surface within the embankments.

Should seepage be detected, up to three seepage recovery bores located on the south-east

corner of TSF4 may be activated (Figure 6). Currently, TA Bore 76 is commissioned and ready for pumping, with pump flow rates at approximately 2.76 L/s. Another two bores TA Bore 86 and BH19_05 are also present nearby and are found to be in serviceable condition. As part of the TSF Operating Manual's Trigger Action Response Plan, the applicant will consider installing additional seepage recovery bores, if required (Red5 2023).

3.3.6 Potential adverse impacts of tailings seepage

Seepage that occurs as a result of tailings deposition into the expanded TSF4 could adversely impact nearby sensitive receptors through several mechanisms and pathways (i.e., risk events). Primarily, seepage influences the characteristics of the unconfined aquifer underlying the TSF4 footprint, by altering its physical (i.e., groundwater mounding) and chemical (i.e., contamination of metal, metalloids, and/or cyanide) properties.

At the time of this assessment, groundwater monitoring data discussed in Section 3.3.4 have indications of tailings seepage may be influencing groundwater quality, though standing water levels have remained stable or decreased during tailings deposition during the time limited operation of TSF4.

In considering the underlying paleochannel at TSF4, the shallow unconfined aquifer is considered both a receptor that could be impacted, as well as a pathway mechanism for impacting other environmental receptors (i.e., native vegetation, surface water bodies).

(1) Groundwater mounding impacting native vegetation

Groundwater mounding around TSF4 may impact surrounding native vegetation if the local water table reaches a level where the root zone becomes inundated. Waterlogged soils become deficient in oxygen, disrupting root respiration and normal cellular processes, causing plant stress and potentially death (Pan *et al.* 2021). Unlike most parts of the Goldfields region, groundwater salinity may not contribute significantly towards furthering plant stress/death, as the local groundwater is brackish, with relatively low TDS (i.e., mostly below 7,000 mg/L).

While the premises is mostly cleared for mining purposes, native vegetation is still distributed throughout and around the premises. The closest patch of native vegetation is the riparian vegetation that occurs along the Sullivan Creek tributary, present south of TSF4 (and TSF5) (Figure 3).

The likelihood of this risk event requires the following considerations:

- The presence of the paleochannel underlying TSF4 acts as a preferential flow pathway due to the high permeability of the ferruginous gravel unit. Because of this, higher hydraulic conductivity may cause the groundwater mound to disperse more readily, preventing significant accumulation of tailings seepage near the TSF4 footprint, which reduces the risk of nearby vegetation's root zones being inundated.
- In a previous investigation for TSF5, Rockwater (2022) predicted that a groundwater mound of up to 1.6 m may form. However, this may be an underestimation, as it was shown that seepage losses from the TSF4 may be higher than previously estimated from seepage analyses and water balances (refer to Section 3.3.2).
- Furthermore, groundwater mounding may still occur, where seepage losses from TSF4 may occur at a rate higher than groundwater can flow through the paleochannel. This was evident with the mounding event in the early 2000s (refer to Section 3.3.1), as well as the mounding observed as a response to the applicant continuously discharging mine dewater into TSF4 from 2017 onwards (refer to Section 3.3.4).
- Groundwater mounding can be better managed during operation of the expanded TSF4 due to use of ambient groundwater monitoring bores, as well as up to three seepage recovery bores that can be operated, if required. Most groundwater monitoring bores in the bore network , as well as all seepage recovery bores, are concentrated in the south-

east corner of TSF4, which is where previous groundwater mounding was observed.

- A limit on SWL has been specified in existing licence L8345/2009/3. Furthermore, a trigger level of 6 mbgl has also been included, which requires the applicant to design and implement a Seepage Management Plan in the event where SWL exceeds the trigger level. The Seepage Management Plan must include the installation of additional seepage recovery bores for the purposes of controlling groundwater mounding.

(2) Contaminated groundwater impacting native vegetation

The local groundwater aquifer may be contaminated by tailings seepage from TSF4. The contaminants of potential concern depend on the tailings geochemistry, which has been discussed in Section 3.3.2.

While there are no human receptors or third-party groundwater users in the immediate vicinity of TSF2, surrounding native vegetation along the Sulllivan Creek tributary may be exposed to tailings seepage contaminants through the mounded water table. That being said, the likelihood of this risk event is dependent on the risk event (1), where contaminated groundwater could only potentially impact native vegetation once the local aquifer has been mounded to the point where it inundates the root zone. This was considered unlikely to occur (refer to above for rationale). This is supported by the number of shallow groundwater bores that have been dry as the water table was lower than the shallow bore depths.

Furthermore, analysis of current groundwater monitoring data has indicated limited influence from tailings seepage (Table 5). While continued routine monitoring is required to better establish long-term trends, characterisation of tailings leachate has shown that tailings seepage is relatively benign. The concentrations of most tailings leachate parameters were able to comply with the relevant livestock drinking water guidelines[5,6]. While not associated with TSF4, paired monitoring bore series MB20-1 was installed further downstream to monitor impacts to ambient groundwater near the vegetation.

(3) Contaminated groundwater impacting Sullivan Creek and its tributaries

An ephemeral creek line is located directly south of TSF4 and TSF5 (Figure 3). The creek is a tributary and flows from east to west, joining up with Sullivan Creek 3.5 km west of TSF4. The Sullivan Creek is also considered an Aboriginal heritage site, for mythological purposes (Figure 4). Closer to TSF4, the Wanangari Pool takes up a portion of the Sullivan Creek tributary and is also an Aboriginal heritage site. The heritage site is classed for ‘camp, hunting place, natural feature and water source’.

Similar to risk event (2), this risk event is dependent on groundwater mounding around TSF4. Groundwater expression may occur more readily within the creek, as the creek bed is on a lower elevation. Alternatively, groundwater expression at the toe of TSF4 may also enter the tributary as overland runoff.

The expressed groundwater may introduce contaminants associated with tailings seepage. Further downstream, there is potential for the contaminated water to impact surface water quality along Sullivan Creek, as well as riparian vegetation health along the creek.

Relevant considerations include the potential quality of contaminated groundwater as well as measures for monitoring potential impacts to groundwater, which have been discussed in risk event (2). The ephemeral nature of the tributary should also be considered.

[5] Comparison of data not shown.

[6] Application of the ANZG (2023) livestock drinking water default guideline values is for comparative purposes only, as there are no toxicity guideline values applicable for native vegetation. No risk assessment was undertaken for the risk of impact to livestock as a result of drinking abstracted groundwater that has been impacted by tailings seepage.

Contaminated groundwater impacting the paleochannel and downgradient environment

Currently, it is understood that parts of the existing tertiary paleochannel branches off and underlies the existing TSF4 footprint (Figure 6). The paleochannel presents a potential preferential flow pathway for groundwater impacted by tailings seepage. In this respect, the migration of tailings contaminants may be expediated.

The paleochannel more or less follows the aboveground tributary, flowing to the west to join the main Sullivan Creek, before continuing its flow to the south, where it discharges at the terminal salt lake Lake Raeside.

Based on groundwater flow rates calculated (refer to Section 3.3.2), groundwater would migrate approximately 18 m through the ferruginous gravel aquifer unit each year. At this estimated rate, groundwater would take an extended period to reach Lake Raeside. Over this time, natural attenuation processes (e.g., progressive adsorption of metals and metal-cyanide complexes by aquifer sediments) would likely remove or immobilise contaminants from groundwater, such that residual contamination would be minimal by the time it discharges at the terminal salt lake.

Lake Raeside is likely the only sensitive receptor to be potentially impacted by migration of contaminated groundwater in the paleochannel environment. While there are a number of licence holders under the *Rights in Water and Irrigation Act 1914*, they do not appear to be located hydraulically downgradient of TSF4 (along the inferred paleochannel flow path) or use abstracted groundwater for potable and/or livestock drinking purposes. As such, there are no sensitive human health receptors to consider under this risk event.

3.3.7 Risk assessment and additional regulatory controls.

In considering the source characteristics, pathway mechanism, sensitivity of the receptors, as well as existing monitoring information and the applicant's proposed controls, a risk rating has been assigned to each risk event, as detailed in Table 6.

Table 6: Risk rating for tailings seepage from TSF4

	Risk event	Consequence	Likelihood	Risk rating
1	Tailings seepage from TSF4 infiltrating into the subsurface environment, causing localised mounding of the water table. Resulting in potential inundation of the root zone of surrounding native vegetation.	**Moderate** Vegetation stress and/or death. No conservation significant flora or threatened/priority ecological communities present.	**Possible** Seepage losses from TSF4 may be greater than anticipated from water balances, resulting in greater likelihood of mounding occurring. Use of rock ring decant to improve decant water recovery, as well as TSF foundation liner and cut-off trench to reduce seepage volume into the environment. However, expanded TSF4 will not utilise underdrainage system or extended toe drainage. Faster groundwater movement due to paleochannel at TSF4. Monitoring of standing water level at groundwater monitoring bores, with trigger level and limit specified (under licence L8345/2009/3). Existing seepage recovery bores in place for emergency pumping.	**Medium risk** No additional regulatory controls required.
2	Tailings seepage from TSF4 infiltrating into the subsurface environment, causing localised mounding and contamination of the uncontaminated aquifer. Resulting in uptake of seepage contaminants by surrounding native vegetation.	**Moderate** Vegetation stress and/or death. No conservation significant flora or threatened/priority ecological communities present.	**Unlikely** Risk event will only occur when groundwater mounding has caused local water table to reach vegetation rootzone. Existing monitoring results suggest limited tailings seepage impacts from current operations. Tailings leachate characterisation completed. Monitoring of groundwater quality will continue to be undertaken (in accordance with licence L8345/2009/3), including at downgradient monitoring bores (at TSF5).	**Medium risk** The Delegated Officer has determined that additional regulatory controls are required for managing this risk event. Specifically, the applicant will be required to monitor sulfate in ambient groundwater, under condition 22, as high sulfate concentrations were measured in tailings supernatant (refer to Section 3.3.2). As such, sulfate may be a potential chemical indicator of seepage influence in groundwater.

	Risk event	Consequence	Likelihood	Risk rating
				Furthermore, the Delegated Officer has also specified a limit of 0.5 mg/L for WAD CN, which is the standard limit for protection of groundwater quality and groundwater dependent ecosystems.
3	Tailings seepage from TSF4 infiltrating into the subsurface and surface environment, causing subsurface lateral migration of seepage contaminants. Resulting in contamination of the nearby Sullivan Creek tributary, Wanangari Pool and Sullivan Creek.	**Moderate** Deterioration of surface water environment, including water body with spiritual significance. Creek is ephemeral, with irregular flow depending on rainfall and limited biotic activity. No known downgradient surface water user.	**Unlikely** Risk event will only occur when groundwater mounding has caused local water table to reach creek bed. Creek is ephemeral, where flow only occurs during high rainfall event. Existing monitoring results suggest limited tailings seepage impacts from current operations. Tailings leachate characterisation completed. Monitoring of groundwater quality will continue to be undertaken (in accordance with licence L8345/2009/3), including at downgradient monitoring bores (at TSF5).	**Medium risk** No additional regulatory controls required.
4	Tailings seepage from TSF4 infiltrating into the subsurface environment, causing subsurface lateral migration of seepage contaminants through paleochannel. Resulting in contamination of the paleochannel and migration of contaminants to Lake Raeside.	**Minor** Deterioration of groundwater quality and downgradient groundwater and terminal basin environment. No known downgradient third-party groundwater users and livestock exposure.	**Unlikely** Paleochannel and aquifer hydraulic conductivity characterised, with impacts likely to occur within upper 20 m of ferruginous gravel unit, due to confining clays. Groundwater flow provides adequate time for contaminants to attenuate prior to reaching terminal basin (Lake Raeside). Tailings leachate characterisation completed. Monitoring of groundwater quality will continue to be undertaken (in accordance with licence L8345/2009/3), including at downgradient monitoring bores (at TSF5).	**Medium risk** No additional regulatory controls required.

4. Direct interest stakeholders

Table 7 provides a summary of the comments received from direct interest stakeholders.

Table 7: Comments received from direct interest stakeholders

Stakeholders	Comments received	Department response
Application advertised on the department's website on 22 February 2024.	No response received.	N/A
Application advertised in The West Australian on 26 February 2024.	No response received.	N/A
Shire of Leonora advised of proposal on 22 February 2024.	No response received.	N/A
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) advised of proposal on 22 February 2024.	The DEMIRS responded on 11 March 2024 with no comments, noting that the proposed TSF4 expansion and booster pumping station were approved by DEMIRS on 10 January 2024 under Mining Proposal Reg ID 121453.	The approval of the Mining Proposal was noted and considered in the risk assessment.
Watarra Aboriginal Corporation (WAC) advised of the proposal on 14 March 2024.	WAC responded on 15 April 2024, noting that: 1. WAC have significant concerns for the potential impact of the proposed activities on the environment; 2. WAC need to be consulted on this matter and clear information provided to them on the impacts of the proposed activities. 3. As the determined native title holder for the area where the prescribed premises is located, WAC need to be engaged formally to provide any comments or advice on the appropriateness of this application. The applicant needs to consult with the entire WAC board through the WAC chairperson regarding this application and the broader project. 4. The applicant is required to conduct a heritage survey as the register of Aboriginal sites with Department of Planning, Lands and Heritage is not accurate and up to date.	The department has assessed the potential impacts of the proposed activities on sensitive human and environmental receptors, where Aboriginal heritage sites were assessed as part of wider environmental receptors (refer to Section 3) A detailed risk assessment was also undertaken for the potential impacts of tailings seepage on surrounding environmental receptors (refer to Section 3.3). The department considers that the risk of potential impact from the proposed activities have been assessed and can be adequately managed under works approval W6891/2024/1. The department notes that the proposed activities will not result in direct impact of existing known heritage sites, as the proposed expansion of the TSF will occur on existing waste rock landforms and the proposed booster pumping station will be constructed on

		cleared and disturbed land within the mine footprint. The department has notified the applicant in writing on 18 April 2024 that further formal engagement with WAC is recommended. The department notes that it is the applicant's responsibility to undertake appropriate consultation with the relevant traditional owner stakeholders in planning and implementing their project proposal.
Applicant was provided with draft documents on 9 April 2024.	The applicant responded on 10 April 2024 with comments. Refer to Appendix 1.	Refer to Appendix 1.

5. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

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Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Condition 2	The applicant requested that the construction requirement for the booster pumping station in Table 2 be removed. The applicant stated that the bunding around the proposed booster pumping station will not be constructed to meet requirements of AS 1940 and AS 1692 as there is no operational requirement to store flammable and/or combustible liquid at the station. The infrastructure will have perimeter bunding designed to store the volume of tailings contained within the tailings pipework between the nearest isolation points in the event of pipeline failure of leakages. Furthermore, the siting of the compound also includes additional surrounding bunding. While not specifically for the purposes of containing spills at the booster pumping station, they would act as further containment measures in the event of a pipeline failure. These include bunding along the roadside, the perimeter of the nearby workshop and at the TSF5 ramp access.	The proposed control to construct the bunding around the proposed booster pumping station to meet requirements of AS 1940 and AS 1692 was outlined within the applicant's application supporting documents. Hence it was conditioned within the works approval as per the departments Guideline: Risk Assessments. The department has updated the risk assessment based on the new information that bunding will now not meeting these requirements (as shown in Section 3.1.1 and Section 3.3). With the updated controls proposed, the risk rating for this risk event remains unchanged (i.e., medium risk). Consequently, the construction requirement has been modified as requested by the applicant.