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	W6901/2024/1
Applicant	Talison Lithium Australia Pty Ltd
ACN	139 401 308
File number	DER2024/000099
Premises	Talison Lithium Mine Maranup Ford Road Part of mine tenements M01/6 and M01/4 As defined by the premises maps attached to the issued works approval
Date of report	22 July 2024
Decision	Granted

Michael Greenslade

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MANAGER, PROCESS INDUSTRIES

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 and operation of the premises. As a result of this assessment, works approval W6901/2024/1 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 and overview of premises

On 28 February 2024, Talison Lithium Australia Pty Ltd (Talison) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act). The premises is the Talison Lithium Mine in Greenbushes, WA for which Talison holds licence L4247/1991/13.

The works approval application is to:

- undertake construction and time limited operations for an embankment lift to 270 metres Australian Height Datum (m AHD) for tailings storage facility 4 (TSF4) cells 1 and 2 (Figure 1); and
- increase assessed design capacity to 7,100,000 tonnes per year to be consistent with L4247/1991/13 (which currently authorises 7,100,000 tonnes beneficiated per annual period and 5,000,000 tonnes of tailings deposited per annual period).

Construction of tailings storage facility 4 (TSF4) to embankment height 265 m AHD was originally approved under works approval W6618/2021/1 (see section 2.2.1 for further detail).

The premises relates to the category and assessed production / design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6901/2024/1. 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 2020) are outlined in works approval W6901/2024/1.

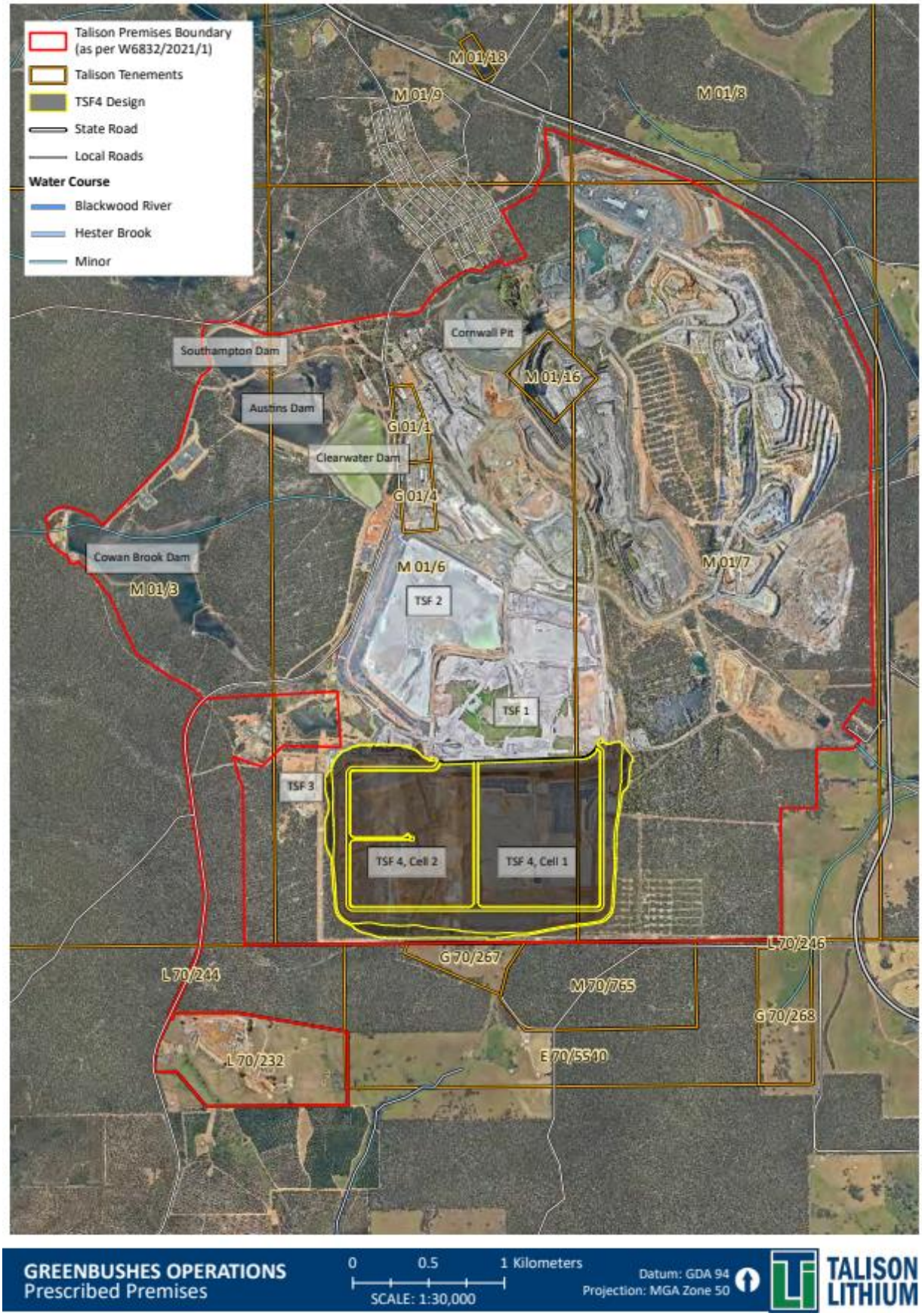

Figure 1 Prescribed premises boundary and TSF4 location.

2.2.1 Compliance with W6618/2021/1

Works approval W6618/2021/1 authorises construction of TSF4 starter embankment to 261 m AHD and one embankment raise to 265m AHD. The approval also authorises deposition of 7,000,000 tonnes per year tailings (for time limited operations allowed under that approval).

Talison submitted a critical containment infrastructure report (CCIR) for the cell 1a starter embankment (to 261m AHD) to DWER on 1 December 2023 and a CCIR for the cell 1b lift to 265m AHD on 26 June 2024. The department has reviewed the CCIR for cell 1a and noted several departures from the requirements conditioned within the works approval and from what was proposed in the original TSF4 design report. The department has yet to review the cell 1b CCIR.

The Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) provided comment to DWER on 4 June 2024 regarding the CCIR cell 1a deviations. Key design deviations, which have implications for seepage management, and DEMIRS comments are presented in Table 1 below. The overall comment provided was that the "DEMIRS Geotechnical Engineer has no current concerns regarding the risk profile of the TSF4 facility". DWER notes that whilst DEMIRS may provide comment regarding geotechnical aspects of the design, comments regarding risk may also be from the viewpoint of stability and safety (rather than emissions to the environment).

Table 1 Summary of key design deviations (starter embankment cell 1a) and DEMIRS comment

Design deviations with implications for seepage management	DEMIRS comment to DWER – 4 June 2024
General design changes: • Change from clay liner to bituminous geomembrane (BGM) liner (to assist in construction timeframe). • Clay core in embankments to clay facing embankments (lack of clay resource). • Seepage system (underdrainage above and below the liner) appears to be adjusted with outlets realigned, finger drains extended. • Removal of rip rap on the perimeter embankment on the proviso that tailings coverage will be in place within 6 months.	General comment regarding design changes: Any deviations to design appear to have had full approval by the design engineers during the construction process. Additional independent testing was completed of the clay liner (permeability). Test results for the clay liner appear to have met compliance to the specifications. Vibrating wire piezometer (VWP) monitoring was completed in the southern embankment foundation and results found a rise in water level due to construction loading which then dissipated to background levels. Based on the information received, it does not appear the walls are at risk of catastrophic failure provided the facility is operated to design. In regard to seepage, the underdrainage appears comprehensive, having been constructed above and below the clay/BGM liner.
Non-compliant clay liner thickness across base of TSF.	Non-compliant locations with respect to the clay liner thickness represent 0.26% of the clay floor. No geotechnical issues are raised based on the supplied information.
Part of the 7.5 m clay facing between the existing TSF 1 embankment and the TSF 4 cell 1 was omitted and replaced with waste rock.	The change in design for the TSF4 / TSF1 interface and removal of 7.5 m of clay facing was confirmed by Talison as applying only to the BGM liner sections. The 7.5 m of clay facing continued to apply where the BGM was not installed. No geotechnical issues were

	noted regarding the above.
The divider embankment between cell 1 and cell 2 was designed to be built with a clay core, with waste rock facing on the eastern side, however, it has instead been constructed with a mine waste rock core and clay facing on the western side.	Further information from Talison confirmed the divider embankment with the clay face (now BGM liner) on the western face (cell 2) controls seepage between the cells (given that cell 2 low points are along that divider wall based on surface topography). The eastern side (cell 1) of the divider embankment is mine waste and more resistant to erosion (also noting the decant pond storage is towards the middle of cell 1). The BGM is lower permeability than the initial clay layer design and meets the same intent as the initial design of clay core and mine waste facing.
The clay facing on the embankment of TSF 1 was not keyed into the clay liner on the floor of the TSF 4 cell 1. Instead, they have "scarified the top of the clay liner" to join it with the clay facing on the embankment of TSF 1.	DEMIRS was unable to find the reference to TSF1/4 interface clay liner tie-in/scarification. It was requested Talison provide further detail to demonstrate that the facility/liner/seepage is not impacted by the change. Further information provided by Talison confirmed that there was no design change, as the design did not include the need for keying in the two clay liners given that the TSF1/4 embankment is an inner embankment. Given the two clay liners are scarified together, building the clay layer on the embankment is an extension of the clay liner on the floor and as such no geotechnical stability issues were raised (provided the QA/QC was followed as required - and appears to be the case given the information provided in the construction report). This query is specific to the areas without BGM.

2.2.2 TSF4 embankment lift to 270 m AHD

The TSF4 design report (GHD, 2021), submitted for works approval W6618/2021/1, included detail relevant to the facility up to its maximum height of 295 m AHD (Figure 2). Talison state that no major changes to the design given in the GHD (2021) report are proposed for the lift to 270 m AHD. Design deviations for the starter embankment are summarised in section 2.2.1.

Table 2 provides a summary of the embankment heights, freeboard and capacity for the proposed raise to 270 m AHD.

Table 2 TSF4 starter embankment and proposed lift ("Raise 1A")

Lift	**Starter embankment (W6618/2021/1)**		**Stage 1b starter embankment (W6618/2021/1)**		**Raise 1A (this approval)**	
Parameter	**Cell 1**	**Cell 2**	**Cell 1**	**Cell 2**	**Cell 1**	**Cell 2**
Status	Stage 1a: **complete** – see section 2.2.1	Scheduled for completion in mid to late July 2024	Stage 1b: CCIR submitted to the department on 26 June 2024 – pending assessment	-	This approval	

			by DWER			
Crest level m AHD	Stage 1a: 261 m AHD	265 m AHD	Stage 1b: 265 m AHD	-	270 m AHD	270 m AHD
Crest level m RL	1261 m RL	1265 m RL	1265 m RL	-	1270 m RL	1270 m RL
Freeboard - maximum tailings beach	1260.7 m RL	1264.7 m RL	1264.7 m RL	-	1269.7 m RL	1269.7 m RL
Freeboard – Maximum operating pond level[1]	1260.1 m RL	1264.1 m RL	1264.1 m RL		1269.1 m RL	1269.1 m RL
Maximum tailings storage capacity	1,627,484 m^3	N/A	1,902,589 m^3	892,960 m^3	3,433,030 m^3	1,637,306 m^3

Note 1: Maximum operating pond level so that TSF4 can safely contain a 1 in 1000 year 72 hour storm event. For TSF4, this requires an operating pond level not less than 0.9 m below the embankment crest.

The following is a summary of works proposed associated with the embankment lift:

- construction of embankments to 270 m AHD;
- subgrade preparation and installation of BGM liner on embankments;
- tying BGM liner into the existing liner (liner at 265 m AHD) and TSF1 southern embankment;
- construction of seepage collection systems (above liner drainage) and connection to the existing system;
- construction of underdrainage systems (drainage below BGM liner) including sumps;
- extension of toe drains; and
- installation of new vibrating wire piezometers.

Perimeter embankment

The 270 m AHD perimeter embankment raise will be constructed with a combination of mine waste rock and BGM subgrade material (GHD, 2023a). Talison also stated, in a response to a request for information (Talison, 2024b), that the embankment lift will have a low permeability clay core. The downstream slope will be constructed from mine waste rock at a minimum of 3(H):1(V) slope. The upstream slope will have 5 m wide BGM subgrade material on the face at a minimum of 3(H):1(V) slope. A sand tailings platform will be placed internally to the 265 m AHD elevation at some locations to provide a foundation to construct the 270 m AHD raise and allow for a working space to tie in the BGM liner.

Divider embankment

The 270 m AHD divider embankment raise will be constructed using centreline construction with a combination of mine waste rock, BGM subgrade (GHD, 2023a) and a low permeability clay core (Talison, 2024b). The cell 1 upstream slope will be constructed from mine waste rock at a minimum of 3(H):1(V) slope. The cell 2 upstream slope will have a 5 m wide BGM subgrade material on the face at a minimum of 3(H):1(V) slope. Similar to the perimeter embankment, a 20 m wide tailings sand platform made from selected materials from TSF2 will be placed to assist in construction.

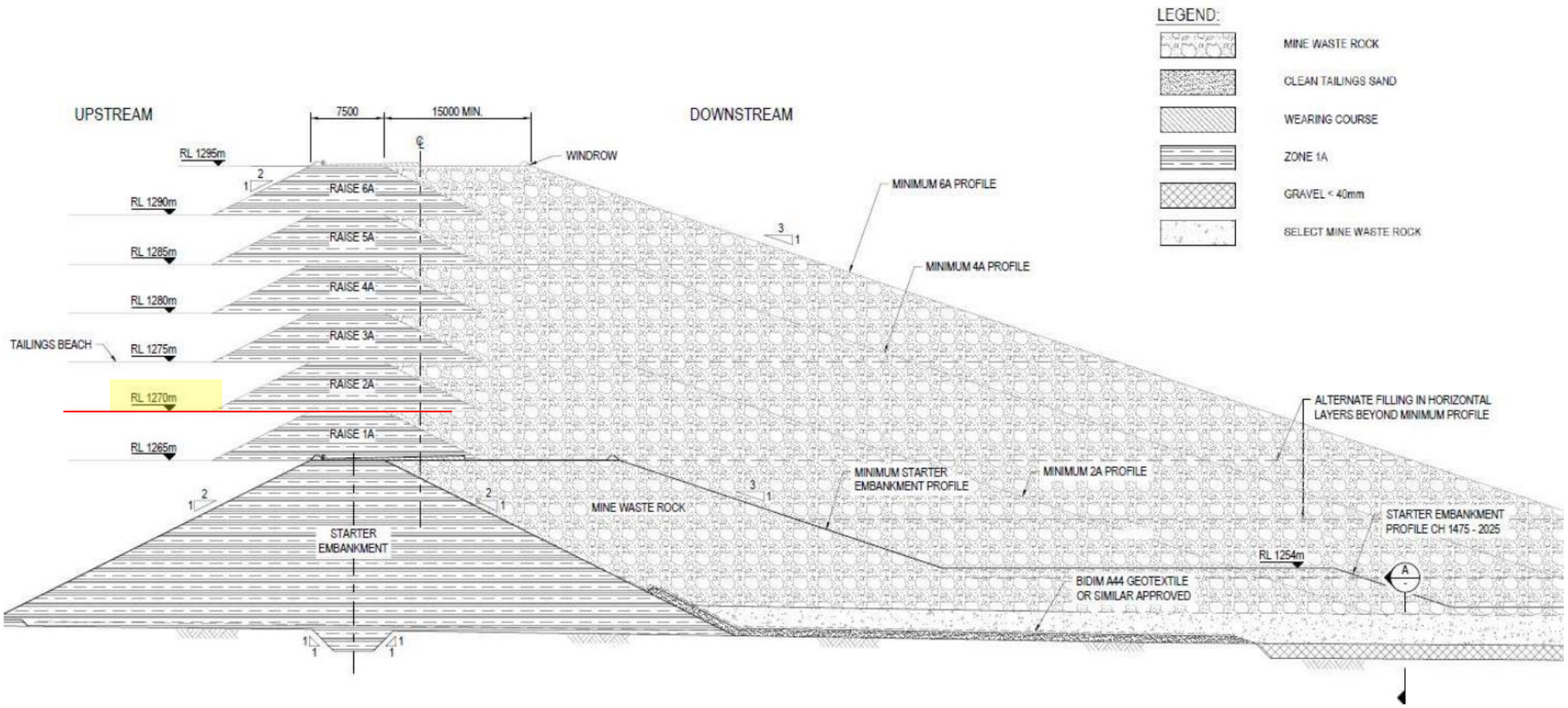

Figure 2 Typical cross-section of TSF4 perimeter embankment (GHD 2021) – raise to 270 m AHD / 1270 m RL requested for this approval.

2.2.3 Mine water circuit

Seepage, underdrainage and decant water that is collected from TSF4 is pumped to the mine water circuit. The mine water circuit is made up of several hydraulically connected unlined earthen dams; namely Clear Water Dam (primary dirty water dam), Austin Dam, Southampton Dam and Cowan Brook Dam. The mine water circuit also contains process water and treated wastewater (sewage) from the site and is known to be contaminated with metals and metalloids including lithium, arsenic, manganese and nickel. Some of this water is reused in the process, however water from the circuit also discharges to the surrounding environment via seepage and overtopping.

The capacity of the mine water circuit during the 2022 – 2023 annual reporting period is given below. Talison advised DWER on 30 April 2024 that it is currently experiencing reduced water availability and there is below average water levels within the mine water circuit.

Table 3 Mine water circuit capacity (1 July 2022 – 30 June 2023)

Location	**Water level range below overflow level**	**Mine water circuit capacity** 1 July 2022 – 30 June 2023	**Mine water circuit capacity as of 8 July 2024**
Clear Water Dam	0.7 m to 1.0 m	127,886 m^3 to 180,764 m^3	-54,563 m^3
Austin Dam	1.3 m to 2.2 m	527,852 m^3 to 700,318 m^3	114,206 m^3
Southampton Dam	0.12 m to 2.42 m	17,169 m^3 to 175,822 m^3	58,661 m^3
Cowan Brook Dam	1.28 m to 3.18 m	465,202 m^3 to 1,098,473 m^3	1,296,630 m^3

A detailed risk assessment for the mine water circuit and contaminant removal (via treatment with a reverse osmosis plant and arsenic remediation unit) was undertaken via a licence amendment (L4247/1991/13) granted in December 2022. Specified actions to reduce seepage risk from the mine water circuit were placed on the licence at this time. Several of those actions have been completed, including the development of a *Clear Water Dam Emissions Management Plan* and revised Water Balance for Clear Water Dam. The department intends to undertake a detailed assessment of the emissions management plan separate to this approval.

2.3 Other approvals

2.3.1 The Mining Act 1978

For the embankment lift to 270 m AHD, DEMIRS provided the following advice to DWER on 7 May 2024 and 27 June 2024:

- DEMIRS confirms TSF4 was originally approved under Mining Proposal registration ID 92728, with subsequent amendments including:
    - change in the lining type from clay liner to bituminous geomembrane for 20% of cell 1 within TSF4.
    - change in the lining type from clay liner to bituminous geomembrane for 100% of cell 2 within TSF4.
- Construction/operation of TSF4 has been approved to a maximum design height of 45

m (1,295 m RL / 295 m AHD).

- There are several tenement conditions on M 01/6 and M 01/7 relating specifically to construction of additional lifts to TSF4 that Talison must comply with:
    - The construction of the tailings storage embankment shall be supervised by an engineering or geotechnical specialist.
    - Prior to each lift of the tailings storage facility, the stability of the perimeter embankment shall be assessed by a suitably qualified engineer, taking into account the results of monitoring of the phreatic surface and the performance of seepage management measures.
    - Prior to construction of any additional lifts on TSF4 cell 1 above the starter embankment, provide DEMIRS with a design report that includes confirmation of tailings properties where used as a foundation.
    - Submit a report that confirms design assumptions for TSF4 before construction of the first raise that includes confirmation of consolidation behavior for the foundation layer of the TSF and the tailings material parameters where the embankment sits on a tailings foundation, and that the underdrainage system is effective.
- Tailings sand used for embankment construction is required to meet minimum material specifications as specified in approvals under the *Mining Act 1978*;
- The TSF operating manual (which must be complied with under the *Mining Act 1978*) specifies minimum tailings density requirements (i.e. % weight solids); and
- Under the *Mining Act 1978* Talison have an environmental outcome requiring that they operate the TSF to minimise the decant pond size.

DEMIRS comments regarding design deviations for the starter embankment (construction to 261 m AHD) are summarised in section 2.2.1.

2.3.2 Part IV of the EP Act

Ministerial statement MS 1111 authorises expansion activities for the mine including clearing of vegetation associated with the construction of tailings storage facility 4. Requirements of MS 1111 are not assessed or duplicated as conditions in this works approval. However, the report refers to Part V of the EP Act for assessment and management of emissions and discharges including dust and impacts to surface water and groundwater.

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 2020).

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 and operation which have been considered in this decision report are detailed in Table 4 below. Table 4 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

The nearest town Greenbushes is directly adjacent to the northern premises boundary.

Table 4: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction activities associated with TSF4 embankment lift to 270 m AHD	Air/windborne pathway causing impacts to health, amenity and nearby native vegetation	<u>Existing controls for dust (L4247/1991/13)</u> • Talison are required to develop a dust trigger / action / response plan • Conditions 32, 34, 37, 44 and 45 require dust monitoring and management <u>Proposed controls</u> • Use of water cart for dust suppression – extent and frequency to be determined according to site conditions
Noise	Construction activities associated with TSF4 embankment lift to 270 m AHD	Air/windborne pathway causing impacts to health and amenity	*Noise emissions and impacts on human receptors are regulated under a Regulation 17 exemption under the Environmental Protection (Noise) Regulations 1997. This requires a noise management plan with noise monitoring and reporting and site specific limits, including approved times of day, for both blasting and non-blasting activities.* *Noise emissions are not assessed further in this report.*
Operation			
Increased tailings and contaminated water (metals / metalloids) seepage	Additional tailings storage associated with TSF4 embankment lift to 270 m AHD and additional tailings deposition (100,000 tonne per year increase)	Seepage through base and embankments causing groundwater contamination and mounding Seepage through base and embankments causing contamination of surface water	<u>Existing controls for TSF4 (W6618/2021/1)</u> • Existing liners including a mixture of clay liner engineered with permeability of <1x10^{-9}m/s and bituminous geomembrane liner. BGM liner has requirements/specifications for installation as detailed in W6618/2021/1. • Underdrainage system ▪ Upstream toe drains above and below the engineered clay or BGM liner discharging directly into seepage collection sumps ▪ Sand drainage blanket downstream of clay core, discharging to toe drain, reporting to collection sumps ▪ Gravel finger drain outlets to sand blanket along southern boundary;

Emission	Sources	Potential pathways	Proposed controls
			seepage collected by twin collector pipes, discharging into collection sumps • Toe drains ▪ Collecting seepage from underdrainage system and sand drainage blanket • Collection sumps ▪ Four seepage collection sumps have been installed at low points along the embankment toe. ▪ They are equipped with valves which close automatically in the event of water level in the sump rising to a maximum level or in case of pump failure. ▪ They are sized to accommodate 3 hours of seepage from the facility, run-off from the perimeter embankment toe drain and an additional 10% annual exceedance probably 24 hour storm event ▪ Daily inspections of integrity and sufficient capacity of collection sumps • All seepage recovery systems equipped with remotely operated pumps and standby and/or back up pumps to prevent overflows • Captured seepage and decant is returned to the mine water circuit • Operated with a decant pond size of approximately 300 m^2 <u>Additional proposed controls (this embankment lift)</u> • A seepage monitoring and management plan (detail included in section 3.3.5) • Installation of new BGM liner along the embankment lift to 270 m AHD, to be tied into the existing liner for the embankment at 265 m AHD. • BGM liner to have permeability of <1.0 x 10^{-14} m/s • BGM liner properties are included in Appendix 1. Minimum BGM installation specifications to include: ▪ The panels shall overlap 20 cm (minimum) for seaming. Ends and overlaps must be welded on a homogeneous and continuous basis, leaving 10 - 30 mm bitumen bead along the seam. ▪ Quadruple overlaps due to the

Emission	Sources	Potential pathways	Proposed controls
			alignment of 4 strips are prohibited. ▪ Immediately prior to covering the BGM shall be inspected for defects, tears, holes or damage ▪ Tears, holes, blisters, and other defects shall be repaired with patches made of the same BGM, and extend a minimum of 200 mm beyond the edge of defects • Subgrade for BGM liner to have: ▪ minimum 300 mm thickness on embankments; ▪ be free from angular material (i.e. sharp rocks), vegetation, tree roots and stumps; ▪ have less than 3% organic material • Construction of seepage collection systems (above liner drainage) and connecting to existing system • Construction of underdrainage systems (subsoil drainage below BGM liner) including sumps • Extension of toe drains • Seepage, underdrainage and decant pumped to the mine water circuit • Installation of vibrating wire piezometers in the embankments (minimum pressure rating of 350 kPa) <u>Existing monitoring points surrounding TSF4 (L4247/1991/13)</u> • Shallow, intermediate and deep groundwater monitoring bores surrounding TSF4: MB22/01, MB22/08, MB20/01, MB20/03, MB22/21, MB22/22, MB22/23, PB22/01 (Figure 7) • Annual ecological monitoring at surface water locations surrounding the site including sampling locations along Woljenup Creek • Water balance monitoring for TSF4 <u>Proposed additional monitoring</u> • Additional groundwater monitoring bores along TSF4 southern perimeter embankment (see section 3.3.5) • Monitoring to the north of Jones Dam and two additional surface water monitoring locations (see section 3.3.5)
		Overtopping of TSF4 and discharge to land/surface water causing poor	<u>Proposed controls</u> • 0.9 m freeboard, allowing for storage of an extreme storm event (1 in 100 year,

Emission	Sources	Potential pathways	Proposed controls
		vegetation health/death and surface water contamination	72 hours, 217mm) • Installation of new vibrating wire piezometers for the embankment lift
		Increased risk of pipeline leak/rupture and direct discharge to land/surface water causing vegetation poor health/death and surface water contamination	<u>Existing controls for TSF4 (L4247/1991/13)</u> • All tailings, decant and seepage pipelines to be: ▪ equipped with telemetry and pressure sensors to detect leaks and failures ▪ equipped with automatic cut-outs in the event of a pipe failure ▪ provided with secondary containment sufficient to contain any spill for a period of time equal to the time between inspections. <u>Proposed controls</u> • constructed according to Australian Standards AS/NZS 2033-2008, AS/NZS 4130-2018, AS 4131-2010 for installation of polyethylene pipe systems, pipes for pressure applications and polyethylene compounds for pressure and fittings • Pipes shall be placed and installed in accordance with the manufacturer's specifications • All pipes shall be surveyed and inspected prior to placement of backfill
Mine water circuit contaminated water (metals /metalloids)	Additional decant water and tailings underdrainage deposited to mine water circuit (associated with TSF4 embankment lift to 270 m AHD and additional tailings deposition – 100,000 tonnes per year increase)	Further seepage through base and embankments causing increased groundwater contamination and mounding	<u>Existing controls (licence L4247/1991/13)</u> • Clear water dam has an underdrainage system and seepage cut off trench (this water is then returned to the same dam); • Water from clear water dam is treated with a reverse osmosis plant and arsenic remediation unit. • Annual ecological monitoring in surface waters surrounding the site <u>Specified actions (licence L4247/1991/13)</u> Specified actions to reduce seepage risk from the mine water circuit were placed on the licence in December 2022. Several of those actions have been completed, including the development of a Clear Water Dam Emissions Management Plan and revised Water Balance for Clear Water Dam. The department intends to undertake a detailed assessment regarding the mine water circuit and efficacy of the emissions management plan at a later date.
		Seepage through base and embankments causing contamination of surface water	
		Overtopping and discharge to land/surface water causing poor vegetation	<u>Existing controls (licence L4247/1991/13)</u> • Freeboard to allow for a 1% annual exceedance probability 72-hour event

Emission	Sources	Potential pathways	Proposed controls
		health/death and surface water contamination	• Cowan Brook Dam: 0.5 m plus additional Freeboard to allow for a 1% annual exceedance probability 72-hour event • Visual marker installed along embankment for freeboard monitoring. <u>Monitoring (licence L4247/1991/13)</u> • There is a requirement for water balance monitoring of the mine water circuit including daily freeboard inspections.

3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), 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 5 and Figures Figure 3 and Figure 4 below provide 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 2020)).

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
Residential dwellings south of TSF4 Annual climate summary statistics[1] indicate: • 9am prevailing wind direction is variable and can occur towards the north-west, west, south-east and south. • 3pm prevailing wind direction is to the north and the south-east.	The Greenbushes townsite is ~3.2 km north of TSF4. The closest residential dwellings to TSF4 are given below and shown in Figure 3. **K: Lot 504 on Plan 73712 (Talison owned)** ~1.3 km south-west of TSF4 **J: Lot 11888 on Plan 162545 (Talison owned)** ~1.1 km south of TS4 **I: Lot 5220 on Plan 136672** ~1.0 km south of TSF
Downstream surface water users	Figure 4 shows the location of the surface water users downstream from TSF4. The results of a water survey carried out by Talison in 2021 indicates that downstream users access surface water from Woljenup Creek for purposes including drinking water, domestic uses such as showering, laundry, water for gardens, recreational activities (including swimming), aquaculture activities, irrigation for crops and stock water. The owners of Lot 4 Daniels Road (Greenbushes), ~2.5 km downstream of TSF4, advised the department on 4 July 2024 that they drink the creek water and eat crustaceans in the creek and on their property dam.
Groundwater users	Whilst the groundwater underlying the site is not recognised as a strategic resource area (not listed as a proclaimed area) there are several groundwater users surrounding the site. Figure 14 (Appendix 2) shows the location of the groundwater users near TSF4. The distance to closest down hydraulic gradient groundwater user is 3.2 km southeast for stock/irrigation and 3.6 km south east for domestic purposes.
Environmental receptors	**Distance from prescribed activity**
Surface water receptors: Woljenup creek, Blackwood River and associated tributaries	Woljenup creek is immediately south and down-gradient of TSF4 (Figure 4).
Cowan Brook, Norilup Dam and Norilup Brook (water quality and ecology)	At the western edge of the premises boundary (offsite). Seepage from Cowan Brook Dam flows into Cowan Brook and into Norilup dam.
Aboriginal Heritage Blackwood River and Woljenup Creek listed under the *Aboriginal Heritage Act 1972*, place ID 20434	Woljenup creek is immediately south and down-gradient of TSF4 (Figure 4).
Groundwater	Shallow aquifers underlie the premises. See section 3.3.4 for

	further detail regarding groundwater levels and quality.
Nearby native vegetation	Immediately adjacent to TSF4.
DBCA legislated tenure Greenbushes state forest	These receptors have been addressed in the EPA report and regulated under Part IV and are therefore not considered further in this risk assessment.
Hester State Forest	
Threatened / priority flora and fauna	

Note 1: Taken from the closest weather station at Bridgetown (12.9km from Greenbushes), site ID 009617.

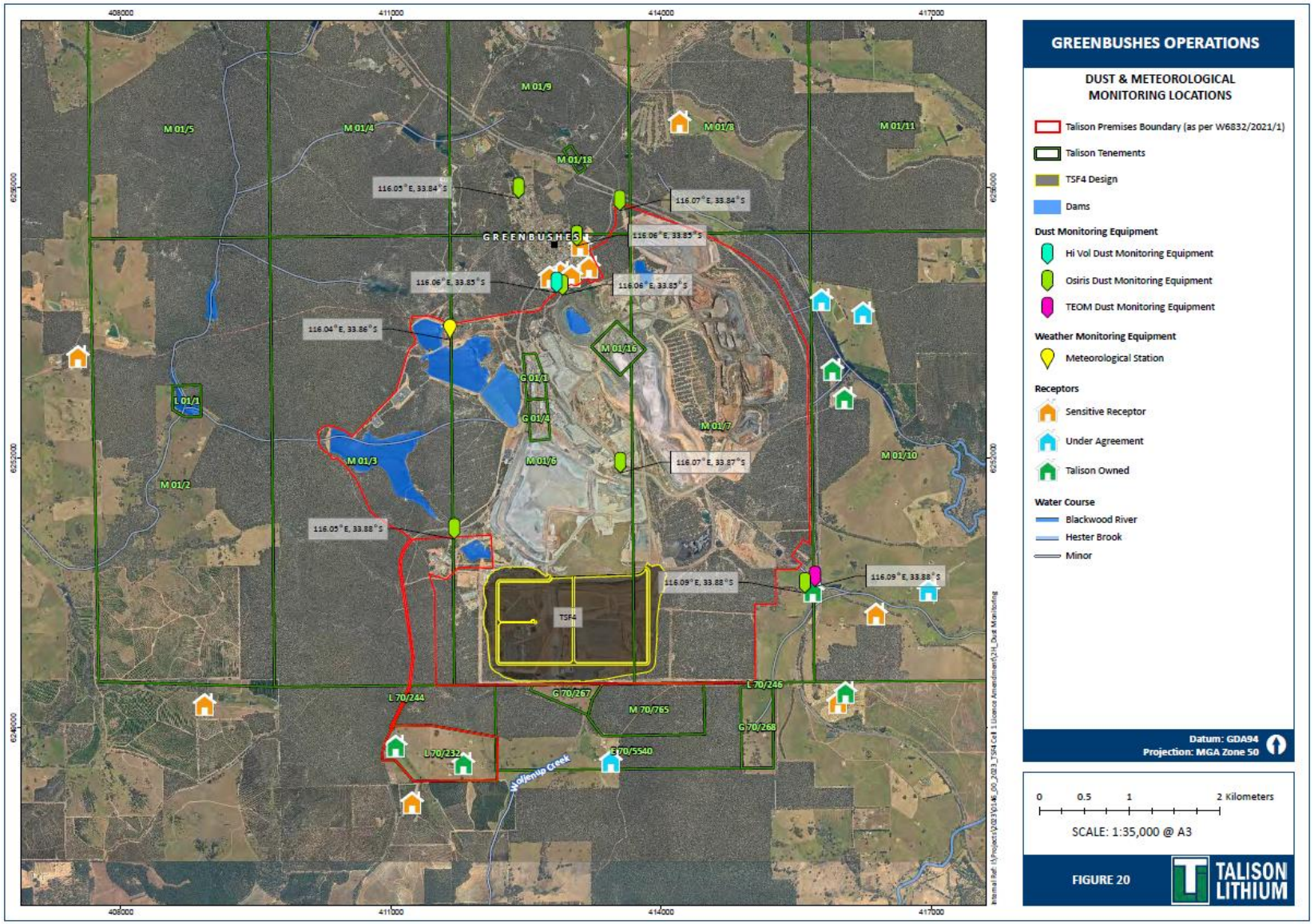

Figure 3: Distance to nearby residential receptors

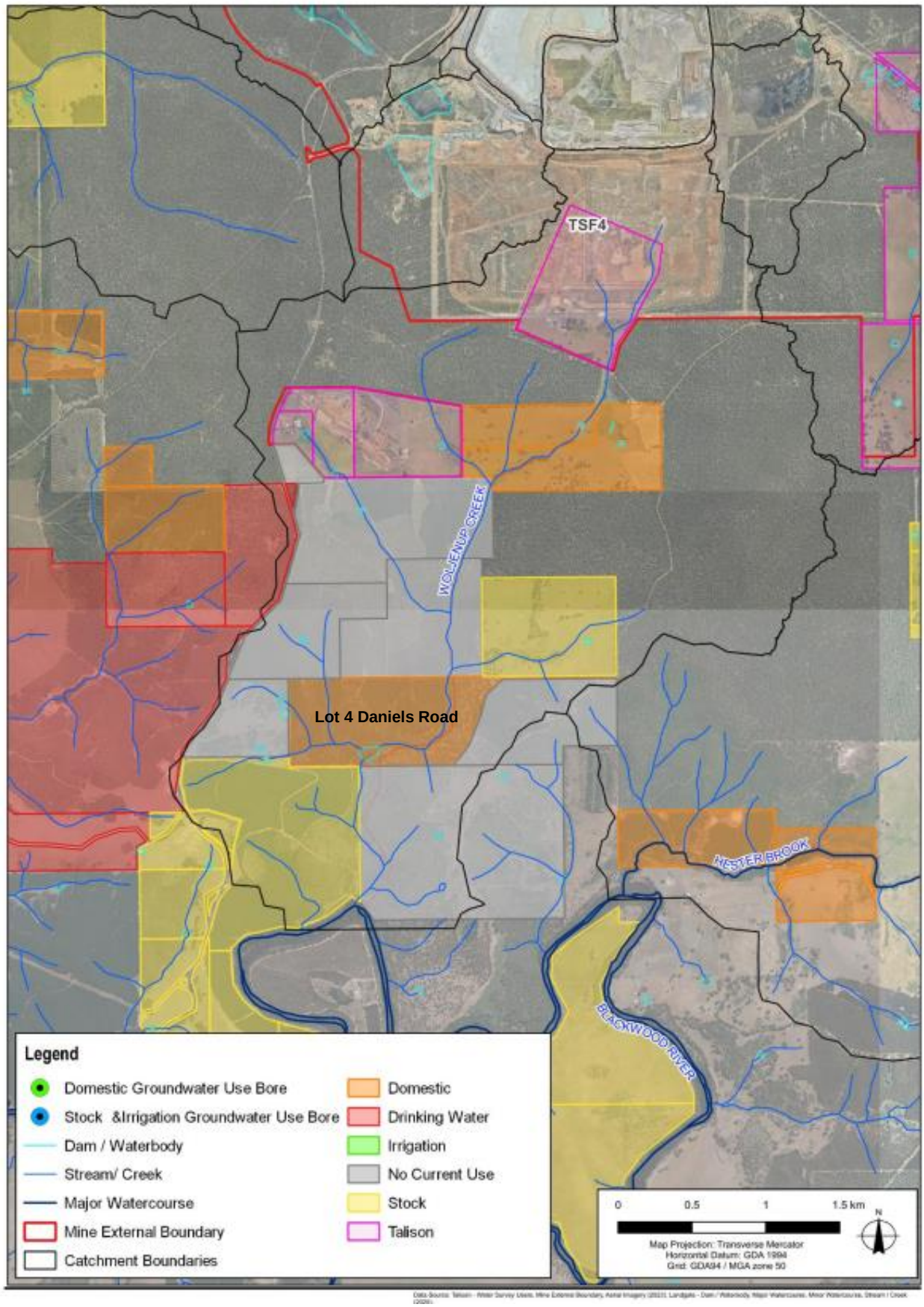

Figure 4 Sensitive receptors downstream of TSF4 (Talison, 2024)

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in section 3.1. Where linkages are incomplete 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 6.

Works approval W6901/2024/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 6 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to licence L4247/1991/13 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. TSF4 embankment height to 270 m AHD. 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.

Table 6: Risk assessment of potential emissions and discharges from the premises during construction and 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 activities associated with TSF4 embankment lift to 270 m AHD	Dust	Air/windborne pathway causing impacts to health, amenity and nearby native vegetation	Residential dwellings south of TSF 4 (closest 1 km south)	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1 - dust suppression with water cart	The applicant proposed control of dust suppression using water cart is considered sufficient to mitigate the risk. This is due to the short duration of construction associated with the embankment lift and that the closest residence to TSF4 is 1 km south. There are also conditions on the operational licence for monitoring and management of dust associated with the site.
Operation **(including time-limited-operations operations)**								
Additional tailings storage associated with TSF4 embankment lift to 270 m AHD and additional tailings deposition (100,000 tonne per year increase)	Tailings and contaminated water (metals / metalloids)	Increased seepage through base and embankments causing groundwater contamination and mounding and impacting the root zones of native vegetation	Adjacent native vegetation	Refer to Section 3.1 and Section 3.3	C = Moderate L = Possible **Medium Risk**	N	Condition 3 – monitoring well installation	Refer to section 3.3 for a detailed risk assessment for seepage. DWER has conditioned applicant proposed TSF4 southern perimeter bores. Internal technical advice (DWER ref A2287887) from the department's principal hydrogeologist indicates that if the water table is sufficiently shallow for the plant roots to access it for a long period of time, comparison with irrigation criteria is required even if the groundwater is fresh. For the Talison site, there would be a risk that lithium concentrations would exceed the short- and long-term irrigation criterion of 2.5 mg/L. Talison has proposed 2.5 mg/L lithium as a site-specific value in groundwater for irrigation. Given the longer term nature of the risk, The delegated officer considers that this risk is

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**				
								managed under an amendment to the licence to include a suite of water quality criteria which will (1) trigger management action and (2) represent an upper limit. Amendments to the licence will be actioned at the appropriate point in the future.
		Increased seepage through base and embankments causing groundwater contamination and mounding	Groundwater users (human receptors) – domestic, stock, irrigation	Refer to Section 3.1 and Section 3.3	C = Moderate L = Unlikely **Medium Risk**	N	Condition 3 – monitoring well installation	Refer to section 3.3 for the detailed risk assessment. DWER has conditioned applicant proposed TSF4 southern perimeter bores and associated monitoring. Following monitoring well installation the delegated officer considers that any potential on-going risk is managed under an amendment to the licence. The licence should be amended to include a suite of water quality criteria which will (1) trigger management action and (2) represent an upper limit.
		Seepage through base and embankments causing contamination of surface water	Surface water users (human receptors) – drinking water and consumption of fish/cray fish which may have been exposed to bioaccumulation	Refer to Section 3.1 and Section 3.3	C = Major L = Possible **High Risk**	N	Condition 3 – monitoring well installation (additional monitoring bore adjacent to SW23-02) Conditions 4 and 17 – groundwater monitoring Conditions 5 and 18 – surface water monitoring Condition 11 – derivation of	Refer to section 3.3 for the detailed risk assessment. Annual ecological monitoring required by the licence (L4247/1993/13) includes monitoring for bioaccumulation of contaminants within fish and cray fish species along Woljenup Creek which will help to provide detail regarding potential risk to downstream surface water users. The delegated officer has conditioned applicant proposed TSF4 southern perimeter bores to assist in understanding contaminant concentrations in groundwater adjacent to the TSF (which may eventually travel and express in surface water). The delegated officer has also conditioned applicant proposed surface water monitoring
		Seepage through base and embankments causing contamination of surface water	Surface water users (human receptors) – domestic use, stock, irrigation	Refer to Section 3.1 and Section 3.3	C = Moderate L = Possible **Medium Risk**	N		

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**				
							DAF derived values	points along Woljenup Creek <u>Additional regulatory control</u> The delegated officer has conditioned an additional monitoring bore adjacent to surface water monitoring location SW23-02 along Woljenup Creek – near Lot 4 Daniels Road). This will assist in informing the DAF derived values to protect downstream receptors - discussed in section 3.3.4 and Appendix 4.
		Seepage through base and embankments causing contamination of surface water	Water quality and ecology of creeklines and surface water bodies (Woljenup Creek and other tributaries of Blackwood River)	Refer to Section 3.1 and Section 3.3	C = Moderate L = Possible **Medium Risk**	Y	Conditions 5 and 18 – surface water monitoring	Refer to section 3.3 for the detailed risk assessment. Annual ecological monitoring required by the licence (L4247/1993/13) includes monitoring of surface waters surrounding the site for water quality, sediment chemistry and bioaccumulation of contaminants within fish and cray fish species along Woljenup Creek which will help to provide detail regarding potential risk to surface water ecology. The delegated officer has conditioned applicant proposed surface water monitoring points along Woljenup Creek. Given that this proposed monitoring is in addition to the annual ecological assessment, the delegated officer has not included the requirement for additional analytes/monitoring beyond those proposed by Talison.
		Increased risk of overtopping of TSF4 and discharge to land/surface water causing poor vegetation health/death and surface water	Adjacent native vegetation Surface water users (human receptors) Water quality and ecology of	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	N	Condition 2 - construction requirements relating to freeboard Condition 11 – operational requirements	To mitigate risk associated with overtopping, the applicant's proposed minimum freeboard and installation of vibrating wire piezometers, to monitor embankment saturation, will be placed on the approval as a regulatory control. <u>Additional regulatory control</u> The delegated officer has also conditioned

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**				
		contamination	creeklines and surface water bodies (Woljenup Creek and other tributaries of Blackwood River)				relating to freeboard inspection	daily visual inspections of freeboard.
		Pipeline leak/rupture and direct discharge to land/surface water causing vegetation poor health/death and surface water contamination	Adjacent native vegetation Surface water users (human receptors) Water quality and ecology of creeklines and surface water bodies (Woljenup Creek and other tributaries of Blackwood River)	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 2 – construction requirements for additional pipelines for embankment lift	The applicant's proposed controls for installation of additional pipelines associated with the embankment lift have been placed on the works approval as regulatory controls. On-going monitoring associated with tailings pipelines (i.e. process monitoring and alarms) are conditioned within the requirements of licence L4247/1991/13 for TSF4.
Additional decant water and tailings underdrainage deposited to mine water circuit (associated with TSF4 embankment lift to 270 m AHD and additional tailings deposition - 100,000 tonne per year increase)	Mine water circuit contaminated water (metals /metalloids)	Additional seepage from the mine water circuit causing groundwater contamination and mounding Migration of contaminated groundwater off-site causing adverse impacts to ecosystem health	Downstream surface water and groundwater users (human receptors) Water quality and ecology of creeklines and surface water bodies (Cowan Brook, Norilup Dam and	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	N/A	Specified actions to reduce seepage risk from the mine water circuit were placed on licence L4247/1991/13 as part of an amendment in December 2022. This included the requirement for Talison to: • Produce an emissions management plan for Clear Water Dam • Provide a detailed water balance for all inputs and outputs for Clear Water Dam • Submit a proposal for a revised annual ecological assessment for impacts to downstream sensitive surface water

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**				
		and human	Norilup Brook and other tributaries of Blackwood River) Nearby native vegetation					receptors. The department intends to undertake a detailed assessment of the emissions management plan at a later date. Revised annual ecological monitoring will be included as part of the licence amendment still under assessment as of 22 July 2024.
		Overtopping and discharge to land/surface water causing poor vegetation health/death and surface water contamination		Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	N/A	Talison have historically had issues with capacity of the mine water circuit, including overtopping events recorded at Cowan Brook Dam. Talison were granted works approval W6795/2023/1 on 28 June 2023 to lift the embankment height of Cowan Brook Dam to 1,229 metres relative level (m RL), which will provide between 0.7 – 0.8 GL additional capacity. The additional seepage and decant return associated with the embankment lift will be likely be a minimal addition to the mine water circuit (which has sufficient capacity). As detailed in section 2.2.3, the mine water circuit currently has additional capacity due to below average water levels and is unlikely to overtop in the near term.

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

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 storage facility seepage

The department has included a detailed risk assessment for the tailings storage facility embankment lift to 270 m AHD as:

- a seepage monitoring and management plan for TSF4 was included as part of this works approval application. Whilst a works approval is primarily an instrument for construction rather than on-going monitoring and management of the facility, an initial assessment of the plan has been undertaken as part of this approval. Conditions have subsequently been included in this instrument and, where not appropriate for inclusion as part of a works approval, recommendations made for the next licence amendment; and
- this risk assessment is intended to help inform the assessment of future embankment lifts.

3.3.1 Overview for potential risk events

Tailings storage facility seepage has the potential to impact groundwater quality, cause water table mounding and flow to downstream surface waters. The embankment lift to 270 m AHD has the potential to increase seepage risk. This following potential risk events will be further assessed in the sections below:

- flow of seepage impacted groundwater may result in contamination of downstream surface water causing impacts to surface water quality and ecology;
- flow of seepage impacted groundwater may result in contamination of downstream surface water causing impacts to down stream surface water users (drinking water, consumption of aquatic species, domestic use, stock, irrigation);
- flow of seepage impacted groundwater off-site may impact downstream groundwater users (domestic use, stock, irrigation); and
- groundwater contamination and water table mounding may adversely impact the health of adjacent native vegetation.

3.3.2 Source: characterisation of emission

Tailings characterisation

The leaching of chemical constituents from tailings materials into pore water and seepage of this water through the base of TSF4 into groundwater is considered to be a significant exposure pathway for environmental receptors near the tailings storage facility. Summarised below are the results of leach testing and an analysis of decant water quality taken from tailings storage facility 2, which are likely to be similar contaminants of concern for tailings storage facility 4 (i.e. the same ore and processing).

Decant water quality

Five decant water quality samples taken from TSF2 and used for derivation of site specific water quality guidelines (see section 3.3.4) indicate elevated levels of lithium (9.07 – 10.5 mg/L), arsenic (0.058 – 0.101 mg/L), rubidium (0.384 – 0.458 mg/L), antimony (0.004 – 0.035 mg/L) and caesium (0.074 – 0.109 mg/L), among others (see Table 7).

Analytes are compared to the site specific water quality guidelines developed by GHD 2023. Refer to section 3.3.4 for additional information and discussion regarding the proposed guidelines.

Table 7: TSF2 decant water quality (2018 samples)

			Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Chloride	Sulfate (filtered)	Fluoride	Silicon as SiO2 (filtered)	Aluminium (total)	Antimony (total)	Arsenic (total)	Barium (total)	Beryllium (total)	Boron (total)
		Unit	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Talison Greenbushes site specific WQG, Drinking water						180	250	250	1.5		0.2	0.003	0.01			
Talison Greenbushes site specific WQG, Freshwater ecological								429	1.3		0.055*	0.09*	0.013*			
Talison Greenbushes site specific WQG, Irrigation									**1**		**5**		**0.1**			
Talison Greenbushes site specific WQG, Livestock								1000	2		5	0.15	0.5	2	0.06	4
Talison Greenbushes site specific WQG, Recreational									30		4	0.06	0.2			
Sample	Date	Lab report														
Decant 1	26/09/2018	EP1811787	35	18	192	9	198	206	0.6	5.54	0.03	0.035	**0.101**	0.003	<0.001	12
Decant 2	26/09/2018	EP1811787	30	19	204	9	226	155	0.5	5.55	-	0.004	0.058	0.005	<0.001	0.12
Decant 3	26/09/2018	EP1811787	31	19	201	9	213	177	0.6	5.51	0.02	0.014	0.074	0.004	<0.001	0.12
Decant 4	26/09/2018	EP1811787	32	18	196	9	206	196	0.6	5.79	0.02	0.027	0.09J	0.004	<0.001	0.11
Decant 5	26/09/2018	EP1811787	31	18	199	9	209	179	0.6	5.73	0.03	0.021	0.062	0.004	<0.001	0.11

			Cadmium (total)	Caesium (total)	Chromium (III + VI)	Cobalt (total)	Copper (total)	Iron (total)	Lead (total)	Lithium (total)	Manganese (total)	Mercury (total)	Molybdenum (total)	Nickel (total)	Rubidium (total)	Strontium (total)
		Unit	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Talison Greenbushes site specific WQG, Drinking water			0.002	0.07	0.05 (VI)		2			0.007	0.5		0.05	0.02	0.014	
Talison Greenbushes site specific WQG, Freshwater ecological			0.003*	0.50*			0.0014*			2*	1.9*		0.034*	0.049*	0.017*	
Talison Greenbushes site specific WQG, Irrigation			**0.01**		**0.1**		**0.2**			**2.5**	**0.2**		**0.01**	**0.2**		
Talison Greenbushes site specific WQG, Livestock			0.01	2	1		0.5	0.3		0.82	10		0.15	1	0.26	
Talison Greenbushes site specific WQG, Recreational			0.04	1.4	1		40			0.14	10		1	0.4	0.28	
Sample	Date	Lab report														
Decant 1	26/09/2018	EP1811787	<0.0001	0.109	0.002	<0.001	<0.001	0.1	<0.001	**9.96**	**0.314**	<0.0001	0.004	0.003	**0.458**	0.096
Decant 2	26/09/2018	EP1811787	<0.0001	0.074	0.001	<0.001	0.002	0.09	<0.001	**9.81**	0.132	<0.0001	0.003	0.003	**0.384**	0.091
Decant 3	26/09/2018	EP1811787	<0.0001	0.088	0.002	<0.001	0.001	0.05	<0.001	**10.5**	**0.265**	<0.0001	0.004	0.003	**0.424**	0.095
Decant 4	26/09/2018	EP1811787	<0.0001	0.101	0.004	<0.001	<0.001	0.08	<0.001	**8.98**	**0.457**	<0.0001	0.003	0.003	**0.456**	0.098
Decant 5	26/09/2018	EP1811787	<0.0001	0.094	0.001	<0.001	<0.001	0.08	<0.001	**9.07**	**0.392**	<0.0001	0.003	0.003	**0.434**	0.096

Note: IV is for hexavalent chromium only
* the value applies to the constituent in a filtered sample

Leach testing

Short term leach tests (GHD 2023b) and interim results from long-term kinetic leach tests (GHD 2024) have been provided.

Short term LEAF[1] leach tests were undertaken on tailings solids collected from four locations[2] at TSF2 in active tailings depositional areas (GHD 2023b). Metals leached at elevated concentrations included aluminium, antimony, arsenic, cadmium, caesium, chromium, copper, fluoride, lithium, manganese, molybdenum, nickel, rubidium, thallium, uranium, vanadium and zinc (Figure 17, Appendix 1). GHD 2023b state that, in general, metal concentrations (apart from iron and manganese) are stable across the pH range, supporting that tailings are not susceptible to increased dissolution outside of a neutral pH range. DWER notes that arsenic concentrations were elevated at the higher pH range (pH test 9) and lithium concentrations were elevated at lower pH range (pH test 5.5) for the tailings reprocessing plant (TRP) sample.

Higher concentrations of metals were found to leach from the TRP sample as compared to the other samples (Figure 17, Appendix 1). The TRP sample had a more acidic and saline initial leach as compared to the other samples (Table 8). GHD (2023b) state that reasons for the differing chemistry in the TRP sample are not immediately clear, but may reflect more localised evaporative concentration from exposure of previously saturated tailings to the atmosphere. It was recommended that further investigation be conducted to investigate the cause of the high salinity and acidic conditions.

Table 8 Summary of cumulative flow leach test results (first leaching event) GHD 2023b

Sample ID	pH	EC (uS/cm)	Salinity TDS mg/L[5]
CGP1	7.7	336	150
CGP2	6.9	24	16
TGP	6.9	52	25
TRP	1.3	37,300	10,697

GHD (2024) provided interim[3] results from long-term kinetic leach testing (August 2022 to December 2023) of tailings (from three drums, each with 100 kg samples):

- The leaching concentrations and analysis of trends for arsenic, aluminium, lithium, antimony, rubidium and thallium were above relevant guidelines and are considered likely to persist above the proposed guidelines for timeframes greater than a decade (apart from thallium which may persist for ~ 3 years);
- The concentrations of cadmium, caesium, molybdenum, nickel, uranium, vanadium and zinc did not return leaching results above proposed drinking water and freshwater ecology guidelines and GHD indicate these should not require management to reduce

[1] Leaching Environmental Assessment Framework (LEAF) method 1313 (for evaluating partitioning of constituents over a wide range of pH values) and method 1314 (to evaluate constituent releases from solid materials as a function of cumulative liquid-to-solid ratio). The aim of the leach testing is to mimic the leaching of contaminants of potential concern from the tailings under infiltrating rainfall conditions and under differing pH conditions should the pH of the tailings change over time.

[2] CGP1: Chemical grade plant 1 (spodumene ore processing)
CGP2: Chemical grade plant 2 (spodumene ore processing)
TGP: technical grade plant (spodumene ore processing)
TRP: Tailings reprocessing plant (reprocessing of historic tailings from TSF1)

[3] Kinetic leach testing will continue for a further 6 – 12 months to observe longer term trends for persistent chemicals of concern.

risks posed to the receiving environment; and

- Following flushing, a negligible risk for acid generation and occurrence of saline drainage is indicated (neutral pH, low sulfate, low salinity).

DWER assessment of leach testing

Internal technical advice indicates that the number of samples provided for short term leach testing is not sufficient to adequately characterise the leaching behaviour of the tailings materials. For example, guidance on the sampling of mine-waste materials that has been produced by the Swedish Geological Survey for mine regulators suggests that at least 15 - 30 tailings samples are required to assess the chemical properties and leaching characteristics of these materials across a TSF.

Given that long-term leach testing is also underway for which interim results have been provided, and that contaminants of concern from the facility are likely to be similar to those associated with operation of TSF2, the delegated officer will condition a requirement that results from the finalised long term leach tests, available in 6 – 12 months, be provided to DWER.

Estimated seepage

GHD (2023c) state that ~80% of the seepage from TSF4 is expected to migrate southwards and be collected by sump A, which is immediately adjacent to TSF4's southern embankment. Without continuous pump back[4] to the mine water circuit, seepage collected at the sump would overflow directly into the upper catchment of Woljenup Creek.

Time limited operations commenced for TSF4 cell 1a to 261 m AHD on 29 January 2024. TSF4 has been receiving tailings from Chemical Grade Plant 2, the tailings retreatment plant and technical grade plant. Densities and quantities for each of the tailings streams are given in Table 9 below[5]. Approximately 270 m^3 of water has been collected from sump A between 29 January 2024 and 17 March 2024 and represents only a short depositional period.

Table 9 Tailings deposited in TSF4 since commencement of time limited operations

Source	Slurry density % solids	Mass (tonnes) deposited 29 Jan 2024 to 17 March 2024
Chemical grade plant 2	25%	1,816
Tailings retreatment plant	32%	1,524
Technical grade plant	3%	398

GHD (2023g) conducted modelling for expected flow to the sumps surrounding the TSF4[6]. Modelled seepage collection from sump A ranges between 790 – 850 m^3/day for initial tailings deposition and 240 – 430 m^3 per day for on-going operation. The total seepage modelled to be

[4] Talison state that recirculation of this water back into the mine water circuit will continue after closure until the water is of suitable quality to be released to the environment.

[5] The target tailings slurry density as per the original TSF design report (2021) is 30% w/w for the chemical grade plant and TSF1 retreatment. For the Tech grade plant it is intended to be 4% w/w for the first 4 years and then the % solids will increase to 30%.

[6] These include flows from:

- Upper drains, including internal drains, above the liner, inside the embankment, at the base of the beach tailings and the external toe drain; and
- Lower drains which comprise drains below the TSF liner.

collected by all TSF4 sumps is expected to be ~3,500 m^3/day (Table 10). The sumps have been designed and constructed to accommodate 3 hours of seepage from the facility, perimeter embankment toe drain runoff and an additional 10% annual exceedance probability for a 24-hour storm event.

Table 10 Calculations from two models for simulated flow into TSF4 sumps (GHD 2023g)

TSF sump	Initial deposition to TSF	During TSF operation (peak)	As mg/L	Li mg/L	Fate of residual discharge at closure
	Model Talison2022NWT_024T				
Sump A (southern drain)	850 m^3/day	430 m^3/day	0.028	1.1	Woljenup Creek
Sump B (north-eastern drain)	Not provided	3,000 m^3/day	0.46	5.3	Open pit
Sumps C & D (north-western drains)	300 m^3/day	71 m^3/day	0.16	3.3	Cowan Brook Dam
	Model Talison2022NWT_025T				
Sump A (southern drain)	790 m^3/day	240 m^3/day	0.077	1.6	Woljenup Creek
Sump B (north-eastern drain)	Not provided	3,000 m^3/day	0.51	5.32	Open pit
Sumps C & D (north-western drains)	240 m^3/day	28 m^3/day	0.21	3.6	Cowan Brook Dam

Talison have stated that additional seepage associated with increased deposition (from 7,000,000 to 7,100,000) and the embankment lift from 265 m AHD to 270 m AHD will not increase relative to seepage already assessed and approved by DWER. They provide the justifications as summarised in Table 11 below. DWER's comments on these are also included.

Table 11 Talison and DWER comments regarding seepage associated with embankment lift and increased deposition.

Talison comment	DWER comment
Original seepage predicted (as predicted in the original 2021 design) was for a clay lined facility. Subsequent amendments to the original works approval W6618/2021/1 have involved partially lining the facility with BGM liner which will reduce the seepage from the facility.	GHD (2023e,f) indicate that the permeability of the BGM liner is 6 x 10^{-14}m/s, four orders of magnitude lower than the 1 x 10^{-9} estimated permeability of the clay liner. It was calculated that, assuming five defects per hectare (with a defect area of 1 cm^2), the vertical seepage would be reduced by 97%. Seepage, overall, for TS4 would consequently be reduced by ~16% for cell 1 (partially BGM lined) and ~97% for cell 2 (fully BGM lined). The department received internal technical advice during the September 2023 amendment to W6618/2021/1 (DWER reference A2195884) for how partial use of a BGM liner would modify the rate of seepage from TSF4 (for cell 1). Advice indicated that, while the seepage may not be reduced as much as calculated by GHD (GHD 2023e,f), it would still be much lower than from a compacted clay liner and should result in a reduction to the overall seepage rate from TSF4.
Seepage analysis to date has assumed a final height of 295 m AHD with tailings to final level, thus conservatively ignoring the gradual development and fill of the storage.	DWER notes that although Talison has previously provided seepage analysis and modelling which includes seepage at the final height of the TSF, the department has only assessed and approved tailings storage facility starter embankment construction to 261 m AHD and one embankment lift of 265 m AHD as authorised under W6618/2021/1.
The increased deposition from 7,000,000 tonnes per annum to 7,100,000 tonnes per annum represents only a 1.4% increase in total tailings deposited and will not exceed the reduction in seepage associated with the use of the BGM liner	-

3.3.3 Pathway

Hydrogeology

GHD 2022 state that seepage from TSF4 will flow predominantly in a southerly direction through saprolitic clays and underlying weathered bedrock[7] (Figure 5). Approximately 80% of shallow and deep groundwater is expected to flow with topography and discharge in a southerly direction into the upper catchment of Woljenup creek. GHD 2023c state that groundwater may discharge into Woljenup creekline approximately 750 m down gradient of TSF4. A smaller component of seepage, around 20%, is inferred to migrate to the north-west towards tin-shed dam.

The groundwater seepage rates in the geological profile beneath and surrounding TSF4 were calculated using aquifer parameters including porosity, hydraulic gradient and measured hydraulic conductivity (GHD 2022). GHD state that where seepage migrates through the saprolitic clay profile, it will be subject to long residence times[8] (>1,000 years) before discharging to the inferred Woljenup creek discharge location (~750 m south). Where seepage migrates through weathered bedrock, it will have a lower residence time (~250 years) before discharging to Woljenup creek.

Talison drilled approximately 400 sterilisation boreholes within and adjacent to the TSF4 footprint to confirm that there is no ore underlying the facility. Although the boreholes are understood to have been backfilled, these may still present a preferential flow path for TSF4 derived seepage to migrate downwards into weathered bedrock horizon (saprock), which is characterised as nearly five times more permeable. GHD indicate that it is likely that only a small increase in seepage flow (~2.5%) is likely from these boreholes.

The GHD study considered that groundwater contamination caused by seepage from the TSF4 facility is likely to be constrained in the immediate vicinity of this facility.

DWER assessment of seepage migration

Internal technical advice provided by the department's principal hydrogeologist indicates that groundwater flow rate between TSF4 and Woljenup Creek is likely to be much higher than indicated by GHD. Based on the results of slug tests that were undertaken on boreholes near TSF4, GHD appears to have assumed that the average hydraulic conductivity of the saprock/fractured bedrock aquifer in the area is about 10^{-3} m/d. However, this value is considered to be implausibly low, and is inconsistent with hydraulic conductivity results that have been measured in other saprock/fractured bedrock aquifers within Western Australia which typically lie in the range of about 0.1 to 0.6 m / day (Martin, 1989; George, 1992; Clarke *et al*., 2000; Wilkes *et al*., 2004). If an average hydraulic conductivity of 0.3 m/day for weathered bedrock aquifers is assumed, then groundwater should flow at about 10 metres per year and

[7] The hydrogeological profile beneath TSF4 comprises:

- A discontinuous surface layer of sands and lesser lateritic/ferricrete loams approximately 1 to 3 m thick. Within the footprint of the footprint of the TSF4, the sands have been excavated and removed, but remain in areas outside the TSF4 footprint;
- Low permeability saprolitic clays (highly oxidised bedrock) with an average thickness of ~20 m and which are deemed as continuous beneath the TSF4 footprint and the wider mine-site area, underlain by;
- A low/moderate permeability "saprock" transitional zone of weathered bedrock of ~2 m to ~4 m thickness, underlain by;
- Very low permeability fresh bedrock (not oxidised) (GHD, 2022).

[8] These calculations indicate that the groundwater flow velocities are relatively slow in the saprolitic clays at 0.5 m/yr and increase to close to 3 m/year in the underlying weathered bedrock horizon (saprock). The unoxidised bedrock is inferred to have low seepage rates at 0.02 m/yr to 0.4 m/year.

take about 75 years to flow from TSF4 to Woljenup Creek.

This calculated groundwater travel time does not consider the time it would take for contaminants to percolate from the land surface through the low-permeability saprolite that overlies the saprock/fractured bedrock aquifer near TSF4. However, published hydraulic information for saprolite elsewhere on the Yilgarn Craton (see *e.g*., Martin, 1989; George, 1992; Clarke *et al*., 2000) suggests that the hydraulic conductivity of saprolite near TSF4 will be about a factor of 10x higher than hydraulic conductivities for this material that have been measured by GHD.

Although the use of slug tests to measure hydraulic conductivity is a useful technique in some situations, this method of testing only provides an estimate of hydraulic conductivity of regolith within a few metres of each tested borehole and cannot provide estimates of this parameter at larger scales. For this reason, the estimates of hydraulic conductivity of saprolite and the saprock aquifer may not be correct at a broader scale in the subsurface near TSF4 – they are also not consistent with measurements made in these materials in the region by some other studies. Other studies on groundwater recharge to aquifers in granitic weathering profiles have indicated that the only effective way of identifying the effects of recharge through preferred pathways in saprolite is by using regionally extensive water-balance assessment methods (i.e. as referred to in Cuthbert and Tindimugaya (2010) and Grigg and Kinal (2020).

Additionally, published information (Dell et al., 1983) indicates that root channels created by trees can create preferred pathways through the saprolite to depths of up to 40 metres, and that these features can persist for long periods of time. As it is likely that these features would persist long after land clearing for agriculture, there would be a significant risk that contaminants could be rapidly transmitted from the land surface to groundwater through relict root-channels near TSF4.

It is also considered unlikely that preferred pathways through clayey saprolite would be detected in a standard drilling investigation (as undertaken by Talison). This is because their density in the landscape is very low (about 1% of a horizontal surface at a depth of 6 metres – refer to Dell et al., 1983). Consequently, it would be highly unlikely that a borehole would penetrate an old root channel. Even if a borehole were to directly penetrate an old root channel, it would not be detected due to clay smearing during drilling.

Given the uncertainty regarding the hydrogeological investigations and subsequent conceptual model developed by Talison, it is important that these consider the possibility that the hydraulic characteristics of the weathered granitic profile could be similar to results obtained from other studies in the region. The delegated officer will consequently take a precautionary approach to the assessment of hydraulic conductivity and potential seepage pathways and considers that hydraulic conductivity and the potential for seepage pathways may be higher than indicated by GHD and Talison.

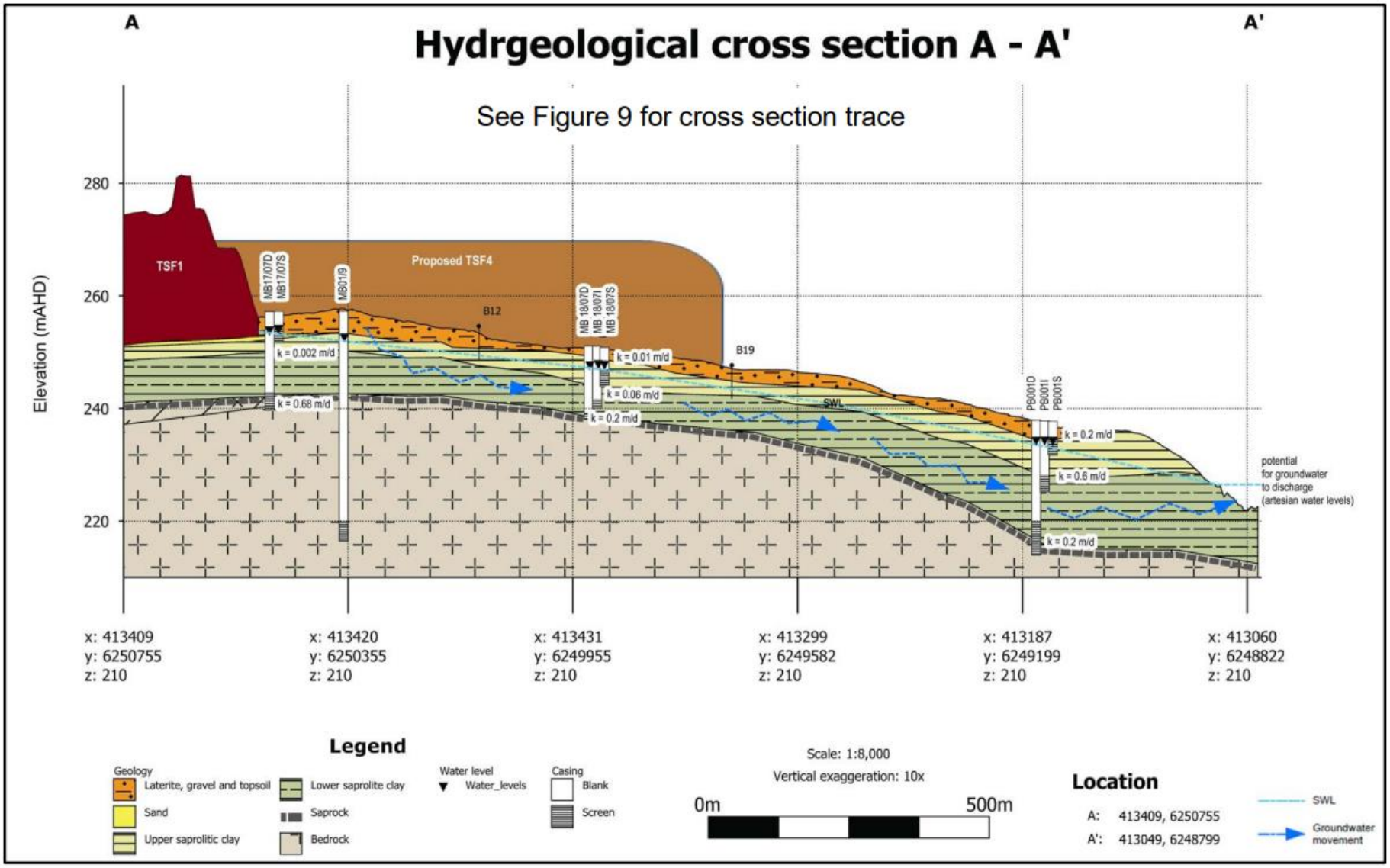

Figure 5 Hydrogeological cross section for TSF4

3.3.4 Groundwater and surface water data

Groundwater levels

The water table was recorded between 1 and 7 metres below ground level (m bgl) (Figure 6) in bores surrounding TSF4 (Figure 7) during baseline groundwater monitoring (GHD, 2023d) required by works approval W6618/2021/1. Groundwater flow direction was generally found to be southerly towards Woljenup Creek (Figure 7).

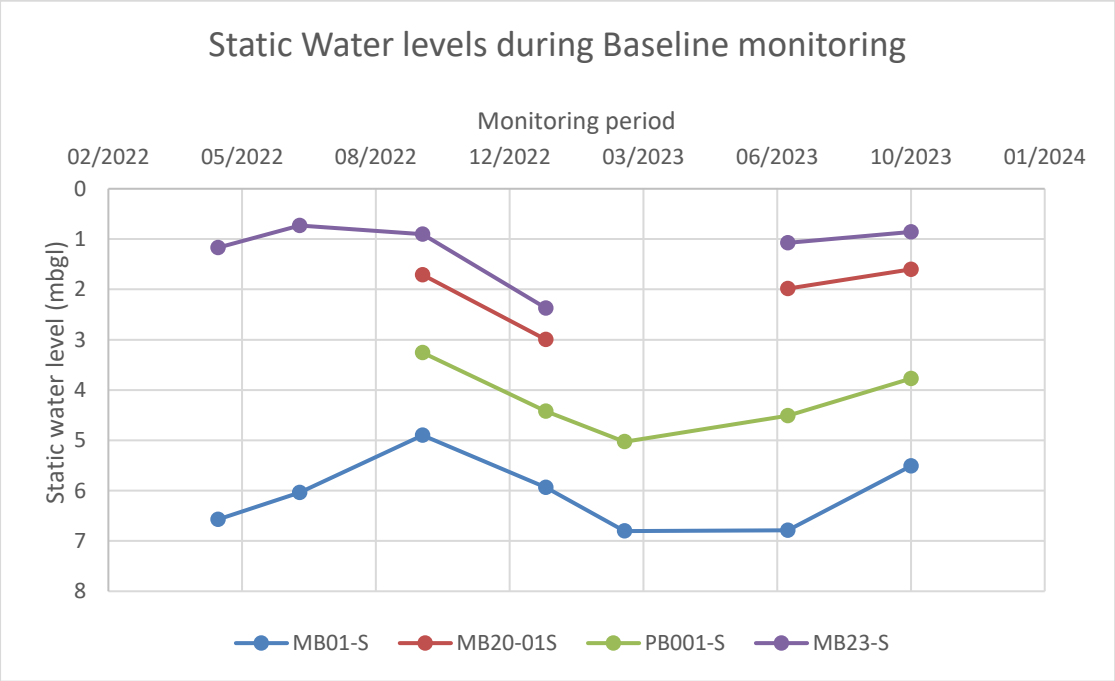

Figure 6 Static water level of shallow groundwater bores during baseline monitoring (m bgl)

Note 1: Bore MB23 recorded one value (data point omitted) above the top of the casing indicating artesian flow. This is consistent with recordings of the intermediate and deep bores at this location.

Note 2: Shallow, intermediate, and deep bores at locations MB08 and MB21 were dry throughout the sampling period.

Note 3: Note 2: Bores PB001 and MB20-01 were not monitored prior to October 2022.

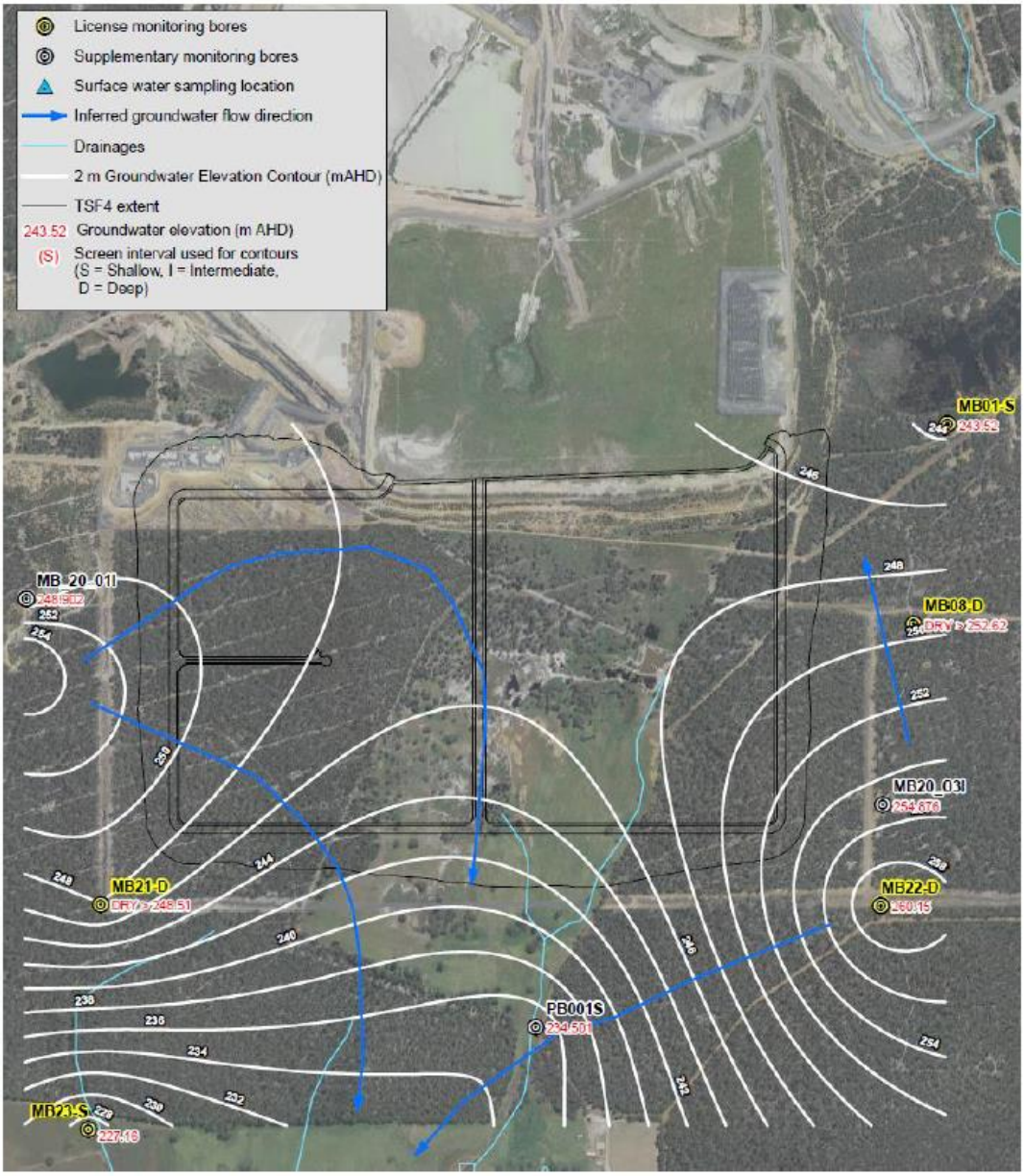

Figure 7 Inferred groundwater contours (GHD 2023d)

Site specific water quality guidelines

GHD 2023c has developed site specific water quality guidelines (SSWG) for acceptable mine discharges to off-site water ways (Table 12). These have been developed to be protective of the range of beneficial uses of these water ways including:

- Aquatic environments (aquatic organisms and ecological processes – rivers, creeks, and dams);
- Primary production (irrigation and stock watering – rivers, creeks, dams and groundwater);
- Potable use (access from rivers, creeks, dams and groundwater); and
- Non-potable use (recreational use of rivers, creeks and dams).

Table 12 Talison proposed site specific water quality guidelines[9]

Contaminant	Water quality guideline (mg/L)				
	Agricultural use - Livestock	Agricultural use - Irrigation	Aquatic Environment	Potable use	Non-potable use
Sample type	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered
Aluminium	5	5	0.055	0.2	NR
Antimony	0.15	NR	0.09	0.003	0.06
Arsenic	0.5	0.1	0.013 (as AsV) 0.024 (as AsIII)	0.01	0.2
Cadmium	0.01	0.01	0.0003	0.002	0.04
Caesium	2	NR	0.1	0.08	1.6
Chromium (III+VI)	1	0.1	0.14 (as Cr III) 0.001 (as Cr VI)	0.05 (as CrIV)	1.0
Copper	0.5	0.2	0.0014	2	40
Fluoride	2	2	1.3	1.5	30
Lithium	0.82	2.5	2.0	0.007	0.14
Manganese	10	0.2	1.9	0.5	10
Molybdenum	0.15	0.01	0.034	0.05	1.0
Nickel	1	0.2	0.05	0.02	0.4
Rubidium	0.39	NR	0.017	0.014	0.28
Thallium	0.13	NR	0.00003	0.00004	0.0008
Uranium	0.2	0.01	0.0005	0.02	0.4
Vanadium	0.1	0.1	0.0006	0.0002	0.004
Zinc	20	2	0.04	3	60
NR is not required					

DWER assessment of water quality guidelines

DWER assessed the suitability of the proposed site-specific water quality guidelines (SSWG) in a concurrent amendment to licence L4247/1991/13 (still under assessment as of 22 July 2024). The SSWG were accepted as interim values for the purpose of reporting and evaluation but are expected to be reviewed over time.

The department is currently undertaking work regarding lithium sensitivity for aquatic species in south Western Australia which may help to inform risk and upper lithium values for the site at a future date.

[9] GHD 2023b state that the above WQGs should generally be compared to the total metal concentrations in the receiving environment (as obtained from unfiltered surface water samples). The WQGs for the aquatic environment, however, should be compared to the dissolved concentrations in the receiving environment (as obtained from filtered surface water samples).

The bioavailability assessment predicted that, following release into downstream surface water, the key metal CoPCs would primarily occur as dissolved free cations, which are likely to be bioavailable to aquatic organisms. On this basis, bioavailability adjustments were not made to the WQGs recommended for the aquatic environment.

Groundwater

Baseline groundwater monitoring

Groundwater quality data collected during baseline monitoring (GHD 2023d) prior to tailings deposition into TSF4 are summarised below:

- pH ranging from weakly acidic to circumneutral, (i.e. field pH range from 4.47 to 6.82);
- variable salinity with total dissolved solids (TDS) ranging from 304 mg/L to 4,360 mg/L;
- arsenic was generally near or below the limit of reporting (LOR) apart from bores MB22-D and MB23-D with concentrations up to 0.042 mg/L recorded (Figure 8). GHD (2023d) inferred, that given shallower bores at these locations were below the LOR, that arsenic may be associated with metamorphic bedrock;

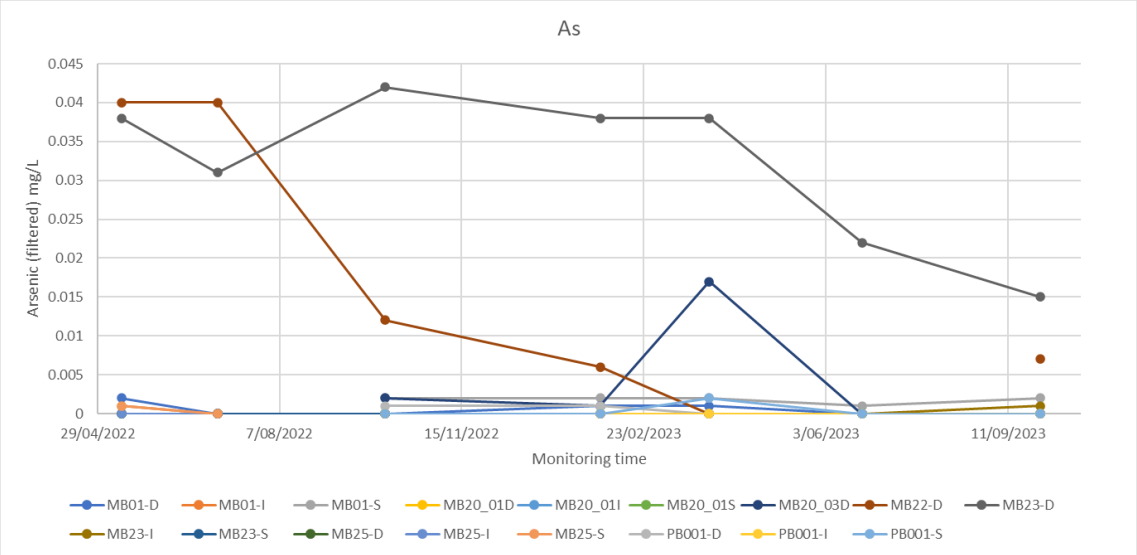

Figure 8: Arsenic (filtered) concentrations across monitoring program

- lithium concentrations above the LOR were detected for all monitored bores and ranged between 0.018 to 2.610 mg/L (Figure 9). Concentrations were found to be typically most elevated adjacent to the TSF1 seepage ponds. It was also inferred that some lithium contamination of other bores may have occurred during installation by using water from Norilup dam, which had lithium concentrations between 0.19 and 0.28 mg/L during the 2021-2022 reporting period; and

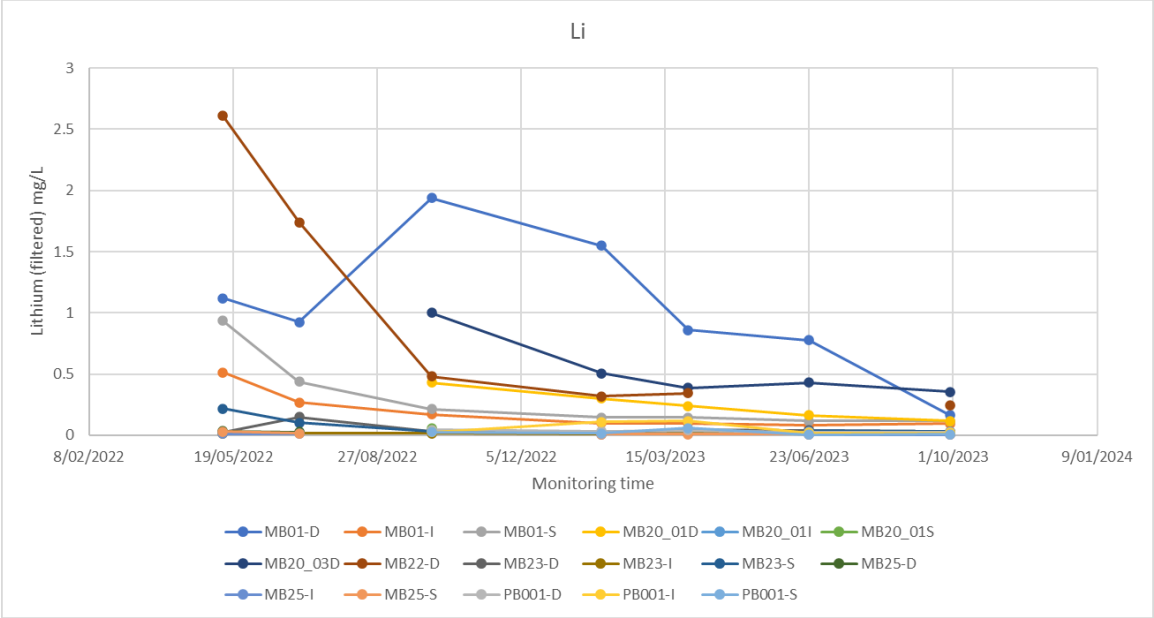

Figure 9: Lithium (filtered) concentrations across monitoring program

- elevated metal concentrations, exceeding the proposed water quality guidelines, are summarised in Table 13 below:

Table 13: Baseline groundwater quality comparison with proposed water quality guidelines

Water Quality Guideline		Total Dissolved Solids			Arsenic (filtered)			Lithium (filtered)			Rubidium (filtered)			Manganese (filtered)			Nickel (filtered)		
Units					mg/L			mg/L			mg/L			mg/L			mg/L		
LOR		10			0.001			0.001			0.001			0.001			0.001		
Drinking Water					0.01			0.007			0.014			0.5			0.002		
Freshwater Ecological					0.013			2			0.017			1.9			0.08		
Irrigation					0.1			2.5						0.2			0.2		
Livestock					0.5			0.82			0.39			10			1		
Recreational					0.2			0.14			0.28			10			0.4		
Bore ID[7]	No. of samples	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
MB01-D	7	3222	2120	4360	0.005	0.004	0.006	1.384	0.926	1.940	0.062	0.054	0.069	4.485	1.560	8.84	0.077	0.002	0.112
MB01-I	7	1039	556	1800	0.001	<0.001	0.002	0.262	0.098	0.512	0.013	0.007	0.019	1.131	0.874	1.430	0.047	0.015	0.072
MB01-S	7	831	702	994	0.0006	<0.001	0.001	0.433	0.146	0.936	0.006	0.004	0.010	0.123	0.103	0.146	0.018	0.006	0.030
MB20_01D[†]	5	319	304	334	0.002	0.002	0.002	0.364	0.299	0.429	0.016	0.015	0.016	0.040	0.036	0.044	0.008	0.002	0.013
MB20_01I[†]	5	826	821	830	<0.001	<0.001	<0.001	0.019	0.018	0.020	0.010	0.009	0.011	0.294	0.273	0.315	0.047	0.014	0.080
MB20_01S[†]	5	362	362	362	0.0005	<0.001	<0.001	0.054	0.054	0.054	0.004	0.004	0.004	0.055	0.055	0.055	0.009	0.009	0.009
MB20_03D[†]	5	404	398	410	0.0013	0.001	0.002	0.669	0.504	1.000	0.081	0.080	0.081	0.496	0.434	0.527	0.020	0.014	0.032
MB22-D	4	680	307	1250	0.0245	0.006	0.04	1.287	0.318	2.610	0.065	0.043	0.089	1.010	0.536	1.850	0.007	0.004	0.011
MB23-D	6	1312	1100	1490	0.0373	0.031	0.042	0.055	0.019	0.147	0.004	<0.001	0.015	1.017	0.800	1.640	0.041	0.031	0.058
MB23-I	6	1805	1730	1910	<0.001	<0.001	<0.001	0.014	0.012	0.017	0.022	0.020	0.023	0.592	0.464	0.757	0.031	0.027	0.039
MB23-S	6	1290	342	2150	<0.001	<0.001	<0.001	0.117	0.034	0.215	0.011	0.004	0.018	0.616	0.123	0.904	0.016	0.004	0.028
PB001_D[†]	5	620	612	628	0.001	0.001	0.001	0.037	0.032	0.042	0.002	0.002	0.002	0.722	0.716	0.727	0.012	0.001	0.023
PB001_I[†]	5	642	622	662	<0.001	<0.001	<0.001	0.067	0.025	0.108	0.004	0.002	0.006	0.462	0.433	0.491	0.008	0.002	0.013
PB001_S[†]	5	932	813	1050	<0.001	<0.001	<0.001	0.021	0.014	0.027	0.002	0.001	0.002	0.699	0.487	0.910	0.017	0.006	0.027

GHD 2023d advised that it is unlikely that the elevated concentrations of metals measured in groundwater sampled from bore MB01 could be related to mining activities due to the large distance and the slow rate of groundwater aquifer flow in the saprock and bedrock fractures. However, as noted in though in section 3.3.3, the delegated officer considers that due to possible underestimation of the hydraulic conductivity of the area, that elevated metal concentrations measured in this bore and others could potentially be derived from mining activities in the area.

Elevated lithium concentrations in groundwater can be considered an indicator for the presence of lithium mineralisation in pegmatites. This occurs due to the ease at which lithium can be leached from lithium-rich mica minerals in granitic rocks (Jancsek *et al*., 2023) and the general high mobility of lithium ions in groundwater. As lithium is not commonly measured in groundwater samples outside a mine project area, it is difficult to determine the natural

background levels of lithium in the area. Limited data (Matthess, 1982) suggests that lithium concentrations in natural groundwater rarely exceed 0.5 mg/L even in regions that are known to be underlain by lithium-bearing pegmatites (Kavanagh *et al.,* 2017). By contrast, lithium concentrations in groundwater near TSFs and other mine waste landforms at spodumene mines commonly exceed 1 mg/L (Roy *et al*., 2022) and may exceed 10 mg/L at some mine sites (USGS, 2010).

Given the baseline data provided, and noting the above considerations regarding likely or expected lithium concentrations in the environment, the delegated officer considers that the high concentrations observed in Table 13 are more likely due to the effects of mining activities rather than natural background levels, however there is currently insufficient data to determine this with certainty.

Surface water

Noting the high connectivity between groundwater and surface water in the area, and the potential for seepage from TSF4 to disperse contaminants into the groundwater, the delegated officer has considered the impacts from the operation of TSF4 to surface water receptors. The Delegated Officer has considered several downstream surface water receptors, more specifically those along Woljenup Creek which is directly downstream from TSF4 and is a tributary to the larger Blackwood River and other connected river systems. It is noted that there are several downstream water users from Woljenup Creek that use this source for livestock, irrigation, household uses, with one resident indicating the water is used for drinking water purposes.

GHD 2023c collected surface water quality data (Table 14) from Woljenup Creek (SW01-04) and Blackwood River (SW05-SW08) (Figure 10). For the purposes of developing site specific water quality guidelines, GHD characterised surface water receptors as:

- “a highly disturbed system” for the upper Woljenup Creek Catchment (immediately downstream of TSF4), indicating a lower level of species protection may be appropriate.
- “moderately disturbed” for the middle and lower reaches of Woljenup Creek and for the middle Blackwood River, downstream of the confluence with Woljenup creek. Blackwood River, having a predominantly cleared rural catchment was characterised as having a degraded foreshore condition with high salinity levels, influenced by flow from the extensively cleared upper catchment.

Table 14: Results from single monitoring event (July 2022) along Woljenup Creek and Blackwood River (GHD 2023c)

Parameter (mg/L)		Sampling Locations							
	LOR	SW01	SW02	SW03	SW04	SW05	SW06	SW07	SW08
pH (pH units)	-	7.71	7.68	7.61	7.55	8.00	8.00	7.98	8.00
Total dissolved solids	10	524	750	780	872	8260	8150	8190	7960
Ammonia as N	0.01	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate (as N)	0.01	2.44	0.32	0.45	0.14	0.01	0.02	0.02	0.02
Nitrite (as N)	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrogen (Total Ox) (as N)	0.01	2.46	0.32	0.45	0.14	0.01	0.02	0.02	0.02
Nitrogen (Total)	0.1	3.3	0.6	0.8	0.3	1	1	1	1
Kjeldahl Nitrogen Total	0.1	0.8	0.3	0.4	0.2	1	1	1	1
Phosphorus (Total)	0.01	0.01	0.02	<0.01	<0.01	0.01	0.02	0.01	0.02
Sulfur as S	1	23	26	27	29	118	115	118	118
Dissolved Organic Carbon	1	5	4	5	4	18	18	19	19

Total Organic Carbon	1	5	4	5	4	19	19	18	19
Aluminium (Filtered)	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony (Filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic (Filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium (Filtered)	0.001	0.047	0.036	0.04	0.054	0.161	0.16	0.153	0.164
Boron (Filtered)	0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.07	0.09	0.08
Caesium (Filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (III+VI) (Filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (VI) (Filtered)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (III)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (III) (Filtered)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (Filtered)	0.001	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Filtered)	0.001	0.004	0.003	0.004	0.004	0.005	0.006	0.003	0.007
Iron (Filtered)	0.05	0.16	0.05	<0.05	<0.05	0.08	0.05	<0.05	<0.05
Lithium (Filtered)	0.001	0.006	0.002	0.002	<0.001	0.004	0.004	0.004	0.004
Manganese (Filtered)	0.001	0.58	0.046	0.044	0.01	0.028	0.025	0.026	0.025
Molybdenum (Filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (Filtered)	0.001	0.004	<0.001	<0.001	<0.001	0.002	0.001	0.001	0.001

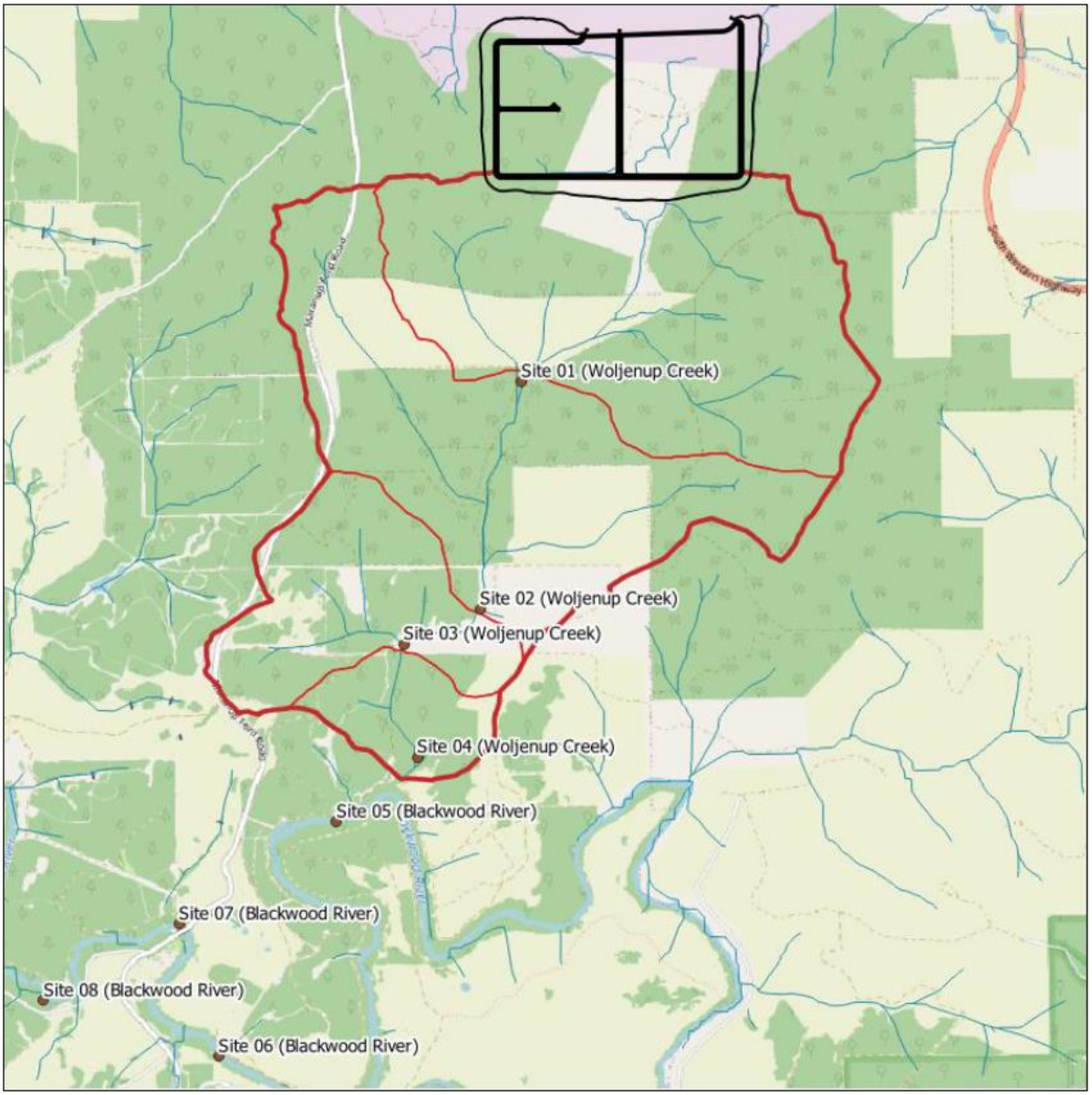

Figure 10: Surface water quality sampling locations (GHD 2023c)

Baseline monitoring (under W6618/2021/1) included sampling “Jones Dam” at a residential farm property located ~960 m south of the TSF4 cell 1 (labelled as SW20/02 in Figure 18 of Appendix 2). Of the sampling results (summarised in Table 15) values for filtered copper and manganese exceeded the proposed site-specific water quality guidelines.

Table 15: Water quality results from sampling at Jones Dam (GHD, 2023d)

Analyte (mg/L)	LOR	12/05/2022	5/07/2022	5/10/2022	1/02/2023	30/03/2023	26/06/2023
pH (pH units)	-	7.41	6.50	6.97	7.47	-	-
Total Dissolved solids	10	496	289	152	472	612	594
Aluminium (filtered)	0.01	0.04	0.01	0.02	0.04	0.03	<0.01
Antimony (filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic (filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium (filtered)	0.001	0.104	0.052	0.009	0.093	0.146	0.078
Boron (filtered)	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Caesium (filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt (filtered)	0.001	0.003	0.001	<0.001	0.003	0.003	0.002
Copper (filtered)	0.001	0.001	0.005	0.002	0.001	0.002	0.001
Iron (filtered)	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (filtered)	0.001	0.005	0.005	0.004	0.004	0.004	0.006
Manganese (filtered)	0.001	1.1	0.242	0.004	1.69	1.56	0.325
Molybdenum (filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (filtered)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Rubidium (filtered)	0.001	0.009	0.004	0.003	0.01	0.011	0.006
Silicon (filtered)	0.05	5.61	3.86	1.81	3.06	4.16	6.05
Strontium (filtered)	0.001	0.133	0.073	0.049	0.136	0.16	0.116

DWER assessment regarding surface water characterisation

DWER assessed characterisation of the surface water and the suitability of the proposed site-specific water quality guidelines (SSWG) in the concurrent amendment to licence L4247/1991/13 (still under assessment as of 22 July 2024). The delegated officer considered that assigning a separate disturbance category to these upper reaches section of the creek line was arbitrary given the high connectivity with the lower reaches, especially considering the assigned disturbance category was being used to set water quality thresholds.

Advice from internal technical experts suggested that results from the GHD 2023d investigation are considered more appropriate for informing future risk and management instead of the current risk, noting that the limited spatial-temporal dataset for water quality (one sample per site, for one winter sampling period) is not considered sufficient to confidently assess current surface water quality, and the benefit will lie in ongoing monitoring efforts. This includes data on toxicity modifiers (e.g., hardness), which (as with several other contaminants) may vary significantly with rainfall (dilution/runoff/sediment disturbance). Notwithstanding, current levels of some contaminants are elevated, and some exceed environmental guidelines (Cu, Al, Mn).

Annual ecological monitoring has been included within a concurrent licence amendment (still under assessment as of 22 July 2024)., which includes sampling two locations within Woljenup Creek for water quality, sediment chemistry and for bioaccumulation of contaminants within fish and cray fish.

3.3.5 Proposed seepage monitoring and management plan

In addition to the proposed controls summarised in section 3.1.1, the applicant has provided a “seepage monitoring and management plan” developed by GHD (2024b) which includes monitoring and controls for groundwater and surface water, summarised in the following sections.

Monitoring:

Groundwater

The following groundwater monitoring is proposed as part of the "seepage monitoring and management plan":

- Continued monitoring of TSF4 existing "baseline" monitoring bores (Figure 7) for field parameters, contaminants of concern and major ions (Table 19 in Appendix 3)
- Installation and monitoring of TSF4 perimeter bores (Figure 11) for field parameters, contaminants of concern and major ions (Table 20 in Appendix 3). These will comprise shallow, intermediate and deep bores at locations along the southern embankment of TSF4. Talison advised DWER during this assessment that they had commenced installation of these bores.
- Data will be compared against "trigger values" (Table 21 and Table 22 in Appendix 3), which trigger further seepage management (as discussed in the "Controls" section below). These values are designed to trigger management and are generally set at lower values than the "site specific water quality guidelines" developed by GHD 2023c:
  - for existing "baseline" monitoring bores, the trigger levels are based on a 30% increase above the baseline concentrations (seasonal maximum), for the key chemicals of concern at each monitoring bore; and
  - for proposed additional monitoring bores (given that they will be installed along the perimeter after the commencement of TSF4 operation), the trigger levels are based on an interim 30% increase above the averaged trigger levels for the baseline monitoring bores. These trigger levels will be updated once the bores have been installed and a first monitoring event undertaken.
- Data will also be compared to site specific water quality guidelines, as developed by GHG 2023c. These have been reviewed by DWER and are considered acceptable as interim values (for further detail see the amendment report for L4247/1991/13 after finalisation [still under assessment as of 22 July 2024]).
- During the initial year following commencement of operations (including time limited operations), higher frequency monitoring is proposed (monthly to biannual). Talison then propose to monitor at a lower frequency (quarterly to annually).

If, after preliminary operations (i.e. 2 to 5 years), local groundwater mounding shows an outward radial flow from TSF4, Talison proposes additional TSF4 monitoring bores along the western and eastern toes. This is to assist monitoring in the event there is a localised reversal of the dominant southerly groundwater flow direction. Groundwater flow will be assessed using monitoring data during annual reporting.

Woljenup Creek

The following surface water monitoring is proposed as part of the "seepage monitoring and management plan":

- Monitoring to the north of Jones Dam[10] (SW24-01) and two additional monitoring points (SW23/01 and SW23/02) along Woljenup Creek (Figure 12) for field parameters, contaminants of concern and major ions (Table 25 in Appendix 3)
- Data will be compared to "trigger values" (Table 26, appendix 3), which trigger further

[10] SW20/02 (Jones Dam) was monitored originally under W6618/2021/1, but a new location to the north of Jones Dam (SW24-01) is proposed here as Talison is no longer able to access Jones Dam.

management (as discussed in the “controls” section below). These trigger values will be set at a level 30% above the seasonal baseline maximum concentrations at SW20/02, or where unavailable, the site-specific water quality guidelines have been adopted.

- Data will also be compared to site specific water quality guidelines, as developed by GHG 2023c. These have been reviewed by DWER and are considered acceptable as interim values (for further detail see amendment report for L4247/1991/13 after finalisation [still under assessment as of 22 July 2024]).

TSF4 sumps - monitoring

To help inform the design of a passive seepage management system at closure, Talison propose monitoring of TSF4 drainage into the external sumps to detect water quality and/or flow rates either exceeding or less than the predicted modelled values. Differences in water volumes will be incorporated into a passive management system, to be implemented post closure (active pump-back to the mine water circuit to cease). Monitoring will include:

- quality of the drainage the sumps (A, B, C & D) (Figure 12) including field parameters, flow rates, contaminants of concern (metals) and major-ions; and
- monthly to bi-annual monitoring in the year following commencement of operations (including time limited operations), with subsequent monitoring occurring less frequently (quarterly to annually).

Controls:

Groundwater

Monitoring data for the perimeter and baseline bores will be compared to trigger levels. Where trigger levels are exceeded Talison will implement the following (also summarised in Table 19 and Table 20 in Appendix 3):

- Action 1: additional confirmatory monitoring within one month. Where TSF4 impacts to groundwater and surface water are supported, report to DWER and implement action 2.
- Action 2: update the TSF4 risk assessment. Where there are impacts to the beneficial use of groundwater at the premises boundary or by discharge into Woljenup Creek and risk to receptors (human health and the environment) is considered unacceptable, then implement action 3:
- Action 3: remediation which may include, but is not limited to, the following:
  - control of TSF4 source including:
    - reduction in tailings water content; and
    - reduction in the rate of tailings deposition.
  - pump back of impacted groundwater (abstraction / recovery bores);
  - capture and management of impacted surface water within Woljenup Creek;
  - optimisation of tailings deposition to reduce duration, extent and storage of decant; and
  - Early closure and capping of the TSF4 facility.

Surface water – Woljenup Creek

Monitoring data will be evaluated against trigger levels. Where trigger levels are exceeded Talison will implement the following (also summarised in Table 25 in Appendix 3):

- Action 1: additional confirmatory monitoring within one month. Where the creek is

deemed to be impacted by TSF4 seepage and/or drainage report to DWER and implement action 2.

- Action 2: update the risk assessment and consider if there are receptors which may be impacted (e.g. stock water, domestic use, drinking water and aquatic ecology). Where risks to receptors are deemed unacceptable, implement action 3:
- Action 3: remediation including:
  - control TSF4 discharge:
    - reduction in tailings water content; and
    - reduction in the rate of tailings deposition.
    - remedial works to reduce seepage
  - capture and management of impacted surface water within Woljenup Creek (e.g. pump back to the mine water circuit).

TSF4 sumps

Given the likely variation of quality, trigger levels will not be applied to sumps for the first two years of operation. Subsequent trigger levels (Table 24 in Appendix 3) will be based on data showing 100% exceedance of modelled lithium concentrations and/or a 50% exceedance of modelled flow rates. Where trigger levels are exceeded, an update to the model will be made. Modelling will be updated at three yearly intervals, until the passive management strategy has been implemented and is operational (the passive management system is to be implemented post closure).

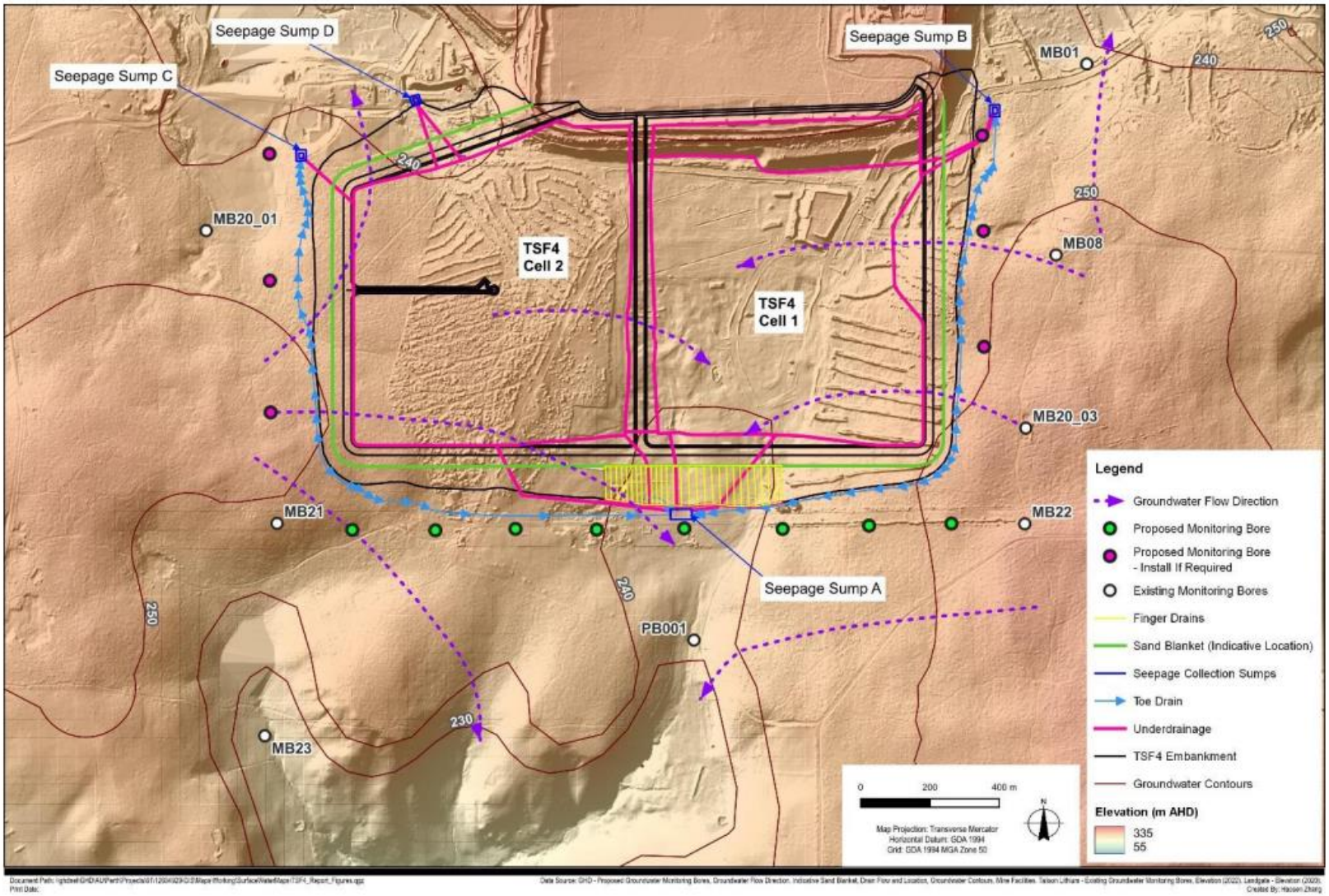

Figure 11: Location plan of existing (white) and proposed (green) groundwater monitoring bores. Locations in pink are those proposed for installation at a later time if required.

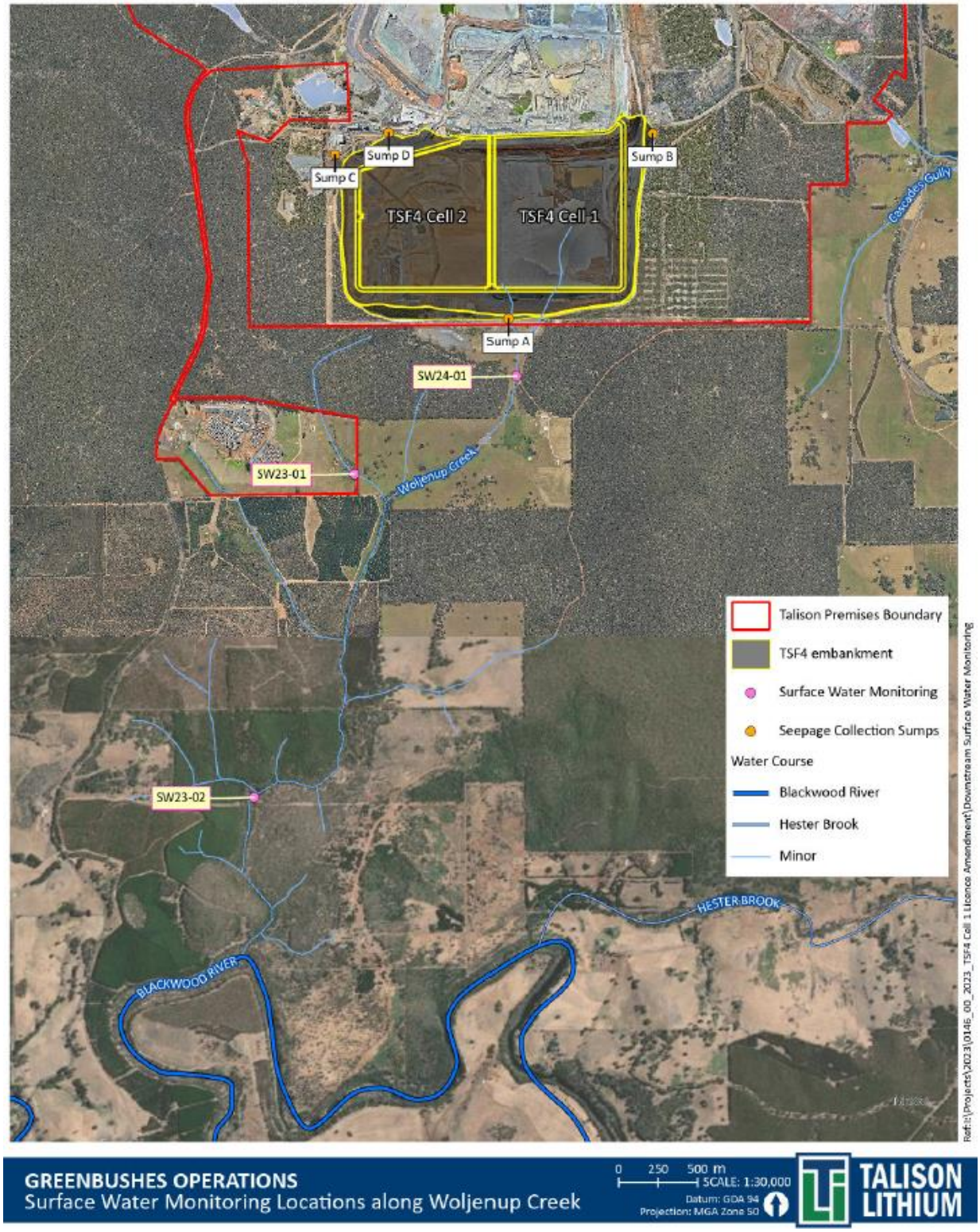

Figure 12: Proposed surface water and sump monitoring locations

DWER assessment of proposed seepage management and monitoring

Internal technical advice (DWER reference A2284366) was sought regarding the suitability of the seepage management and monitoring plan to manage impacts to Woljenup Creek and associated receptors.

Advice recommended that the proposed trigger values should be used in conjunction with dilution attenuation factor (DAF) derived values:

- Trigger values should be used to determine a point at which the parameter is no longer considered to be at background levels (called an “assessment level” by the UK Environment Agency). The proposed trigger values for key analytes in each bore appear reasonable, and could be used for regulatory purposes.
- DAF values can be used to determine the highest concentration that would be permissible in groundwater at the TSF that would still meet the required concentration to protect a more distant receptor. This is done by multiplying the DAF value by the required concentration at the receptor to determine the maximum permissible concentration in pore-water or groundwater near the contamination source. In this approach, the DAF-derived level indicates a groundwater concentration where environmental impacts could take place when the contaminated groundwater arrives at Woljenup Creek.

  The department’s principal hydrogeologist determined that a suitable DAF value for TSF4 and downstream receptors would be 6 (see Appendix 4 for further information regarding this calculation). This value is likely to be conservative, however, given the absence of information regarding likely natural attenuation for the aquifer, it should not be assumed that aquifer sorption of key contaminants takes place near TSF4. There is currently also insufficient information available to relate concentrations in groundwater to those in the water column in Woljenup Creek after mixing and dilution with surface water flows.

  To help inform the DAF value, it is recommended that a background monitoring bore is constructed next to Woljenup Creek downgradient of TSF4, near a surface water monitoring site. This bore should be sampled to determine background concentrations of key analytes in groundwater near the surface water monitoring site. The department has determined that a monitoring bore adjacent to proposed surface water monitoring location SW23-02 would be suitable for this purpose.

To meet the long-term goal of ensuring that groundwater that flows from TSF4 to Woljenup Creek will not have the potential to cause environmental harm to the creek, the department’s principal hydrogeologist recommended that the following measures are implemented:

- Once both the trigger and DAF limits have been appropriately established, routine monitoring should commence until the trigger values are exceeded and there is a statistically significant trend for increasing contaminant concentrations. At this point, the bore may be resampled to confirm the trend, and DWER may require the sampling frequency and the suite of analytes to be increased.
- If the increased sampling confirms the upward concentration trend (and as concentrations approach the upper DAF limit), the sampling of the bore is no longer considered to be routine.

  At this stage the focus should be on identifying and managing the source of contamination and developing strategies to prevent offsite impacts on environmental receptors taking place. This may require additional site investigations, environmental risk assessment and developing and implementing measures to mitigate impacts, including a groundwater recovery program. Additional investigations may include:

  - Undertaking solute transport modelling and an ecological risk assessment to

determine the potential magnitude of the impacts of the contamination on Woljenup Creek; and

- Geophysical and drilling investigations to better define the spatial distribution and extent of groundwater contamination.

In situations where monitoring bore trigger values exceed the background values by more than a factor of 6, additional downgradient bores may need to be installed and monitored to further assess the extent to which groundwater contaminants are attenuated with distance and transit time in the aquifer.

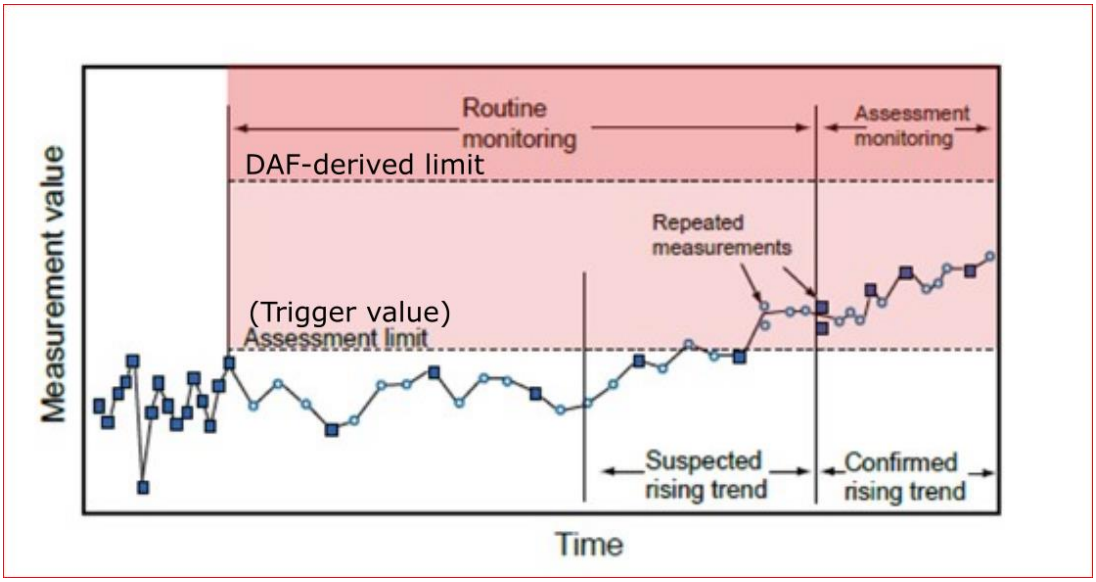

Figure 13: Control chart for a hypothetical monitoring bore using two regulatory limits: a trigger value, and a DAF-derived compliance limit to protect an environmental receptor

3.3.6 DWER assessment and regulatory controls

Given the data provided regarding source and pathway linkages:

- Source: decant water quality and leach test data indicate that seepage from TSF4 will contain elevated levels of metals and metalloids (i.e. lithium, arsenic, rubidium etc.) as discussed in section 3.3.2.

  The department notes that the seepage from additional tailings deposition (increase from 7,000,000 to 7,100,000) and seepage associated with the lift from 265 m AHD to 270 m AHD will likely be reduced by the presence of BGM liner, though not as much as indicated by the applicant. The department notes that cell 1 is only covered with 16% BGM liner and that scouring of the clay liner during deposition into the TSF4 has previously taken place.

  Even with the presence of the liner and other seepage recovery mechanisms (underdrainage and pump back from sumps), some seepage will bypass the facility. Whilst GHD (2023g) have modelled the extent to which seepage will flow to sumps surrounding TSF4, the extent to which seepage will bypass the facility at full operation is not yet known. This will be determined by on-going water balance monitoring to be undertaken for the facility. Water balance monitoring for TSF4 is conditioned under licence L4247/1991/13 and won't be duplicated within the works approval.

- Pathway: The expected hydraulic conductivity of the geology underlying the facility is likely to be higher than modelled, and potential preferential pathways (i.e. geological faults or other paleo-drainages) are not well understood (as discussed in section

3.3.3);

the department has assessed the risk pathways for the following receptors:

- flow of seepage impacted groundwater resulting in contamination of downstream surface water causing impacts to surface water quality and ecology

  The consequence rating for contamination of downstream surface waters with seepage (containing elevated metals and metalloids) is considered **moderate** for potential impacts to aquatic ecology (species and habitats).

  Given the close proximity of Woljenup creek and that:

  - the southern portion of TSF4 is within the creek catchment area; and
  - groundwater is likely to discharge to surface water within the creek ~750m south of TSF4;

  the department has assigned a precautionary likelihood rating of **possible**.

  The overall risk rating for potential impacts to downstream surface water ecology is therefore **medium**.

- flow of seepage impacted groundwater off-site may impact downstream surface water users (drinking water and consumption of aquatic species)

  The consequence rating for contamination of downstream surface waters with seepage (containing elevated metals and metalloids) is considered **major** for potential impacts to surface water users downstream who may use the creek for drinking water (i.e. Lot 4 Daniels Road, Greenbushes) or may consume species which have been exposed to bioaccumulation. The extent to which fishing / cray-fishing may take place in Woljenup Creek is unknown.

  Given:

  - the distance to downstream surface water users who may use the creek for drinking water (~2.5 km south of TSF4);
  - uncertainty regarding hydraulic conductivity beneath the TSF and likely high connectively between the upper and lower sections of the creek line;
  - the lack of information regarding possible consumption of aquatic species which may have been exposed to bioaccumulation;

  the department has assigned a precautionary likelihood rating of **possible**.

  The overall risk rating for potential impacts to downstream surface water users (drinking water / consumption of aquatic species) is therefore **high**.

- flow of seepage impacted groundwater off-site may impact downstream surface water users (domestic use, stock, irrigation)

  The consequence rating for contamination of downstream surface waters with seepage (containing elevated metals and metalloids) is considered **moderate** for potential impacts to surface water users downstream who use surface water for domestic purposes, stock or irrigation.

  For the same conclusions discussed above, the likelihood for this rating is **possible**.

  The overall risk rating for potential impacts to downstream surface water users is therefore **medium**.

- flow of seepage impacted groundwater off-site may impact downstream groundwater users (domestic use, stock, irrigation)

  The consequence rating for contamination of downstream groundwater with seepage

(containing elevated metals and metalloids) is considered **moderate** for potential impacts to groundwater users downstream who use the water for domestic purposes, stock or irrigation.

The distance to closest downstream groundwater user is 3.2 km south east for stock/irrigation and 3.6 km south east for domestic purposes. Given that these are south-east and not directly down-gradient within the area of Woljenup Creek, the likelihood for this rating is **unlikely**.

The overall risk rating for potential impacts groundwater users is therefore **medium**.

- water table mounding may adversely impact the health of adjacent native vegetation.

  Baseline results indicate that the water table within the site is already shallow and seepage from TSF4 could increase water table around the vicinity of the facility. Due to the potential for plant roots to access groundwater for long periods of time and contamination of this water as a result of TSF4 seepage (containing elevated levels of contaminants), the consequence rating for water table mounding is considered **moderate.**

  Considering the current water table, the likelihood of seepage and close proximity to vegetation, the likelihood to impact native vegetation is **possible**.

  The overall risk rating for potential impacts to native vegetation from mounding is therefore **medium**.

Given the above risk ratings for seepage impacts to nearby receptors, the following regulatory controls will be placed on the works approval. Given that the intent of the works approval is to authorise construction rather on-going monitoring and management (as proposed by the seepage monitoring and management plan) - the delegated officer has also included recommendations for the next amendment to licence L4247/1993/13 within section 5.1.1.

Table 16: DWER regulatory controls (seepage)

Condition/control	Justification
Embankment construction Condition 2 – construction requirements Condition 14 – time limited operations	The applicant proposed controls for embankment lift construction specifications, seepage collection, BGM lining and tie in have been placed on the works approval as regulatory controls.
Tailings: Condition 15 – authorised emissions	DWER control Tailings from other ore sources may present additional risk associated with potential contaminants which have not been considered or risk assessed within this approval. Only tailings from the Talison Greenbushes Lithium Mine are therefore permitted to be deposited into TSF4 during time limited operations following construction of the embankment lift. To deposit tailings from other ore sources, a works approval amendment would be required.

Tailings: Condition 16 – provide results of long term kinetic leach testing	DWER conditioned provision of data The delegated officer has placed a condition requiring that the completed results from long-term kinetic leach testing be provided. Interim results have been provided to DWER and the remaining leach testing is currently being undertaken by GHD. Results will assist in the understanding of contaminants leaching from tailings over time.
Groundwater monitoring and well installation Condition 3 – installation of TSF4 southern perimeter monitoring bores and a monitoring bore adjacent to SW23-02 Conditions 4 and 17 – groundwater monitoring Conditions 6 and 19 – minimum QAQC requirements for monitoring Conditions 11 and 21 – monitoring reports	Applicant proposed groundwater well installation and monitoring along the southern TSF4 perimeter will be included within the works approval as regulatory controls. DWER conditioned monitoring Internal technical advice was sought regarding the suitability of the groundwater monitoring network surrounding TSF4. The department's principal hydrogeologist recommended installing a groundwater monitoring bore adjacent to a surface water monitoring location along Woljenup Creek to help inform DAF derived values (see section 3.3.5 for further detail). A monitoring bore adjacent to location SW23-02 was determined to be suitable. Condition 11 will include a requirement for Talison to propose DAF derived values from a suitable background monitoring bore.
Surface water monitoring Conditions 5 and 18 – surface water monitoring Conditions 6 and 19 – minimum QAQC requirements for monitoring Conditions 11 and 21 - monitoring report	Applicant proposed surface water monitoring has been placed on the works approval. The delegated officer considers that on-going monitoring of these locations, including comparison with proposed trigger levels to be included within the next licence amendment. Given that this proposed monitoring is in addition to the annual ecological assessment required by licence L4247/1991/13, the delegated officer has not included the requirement for additional analytes beyond those proposed by Talison. Annual ecological monitoring required by the licence also includes monitoring for bioaccumulation of contaminants within fish and cray fish species which will help to provide detail regarding potential risk to downstream surface water users.

4. Consultation

Table 17 provides a summary of the consultation undertaken by the department.

Table 17: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 22 April 2024	None received	N/A
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) advised of proposal 18 April 2024	Refer to section 2.3.1	Noted.

Applicant was provided with draft documents on 11 July 2024	Refer to Appendix 5	Refer to Appendix 5

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.

Given that the intent of the works approval is to authorise construction, rather on-going monitoring and management (as proposed by the seepage monitoring and management plan), the department has also included recommendations for the next amendment to licence L4247/1993/13.

5.1.1 Recommendations for next licence amendment

The delegated officer recommends the following for inclusion within the next licence amendment (if an amendment to licence occurs sooner than the completion of works required by W6901/2024/1):

Groundwater and surface water

It is recommended that groundwater and surface water monitoring and evaluation be revised to include:

- new southern perimeter TSF4 monitoring bores (conditioned as part of this works approval W6901/2024/1) and the monitoring bore adjacent to SW23-02. It is considered appropriate that these bores be included for on-going monitoring on the operational licence as soon as they are constructed and initial monitoring has been undertaken (as required by this works approval);
- the analytical suite be revised to include antimony and thallium (detected at elevated levels during kinetic leach testing);
- a suite of groundwater and surface water quality values which will trigger management and include provision for upper limits using an appropriate combination of:
    - Talison proposed water quality triggers from the seepage monitoring and management plan, including provisions for identifying statistically significant increasing contaminant concentrations (i.e. using a Mann-Kendall test);
    - Talison proposed site specific water quality guidelines (for protection of different types of receptors including aquatic ecology, human users, vegetation); and
    - DAF derived values (appropriately derived from a background monitoring bore), including provisions for management action in the event values are exceeded (see DWER's assessment of seepage management in section 3.3.5 and DWER technical advice A2284366).
- it is recommended that surface water monitoring points proposed by Talison, SW24-01, SW23-01 and SW23-02, be included within the next licence amendment after initial monitoring has been undertaken (as required by this works approval).

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Appendix 1: Bituminous Geomembrane Properties

Table 18 Bituminous Geomembrane Properties and associated standards (GHD, 2023)

Property	Value	Standard
Nominal thickness	3.5 - 5.6 mm	ASTM D5199
Mass per unit area	4.2 - 5.8 kg/m^2	ASTM D5261
Unit weight of incorporated non-woven geotextile	200 g/m^2 - 400 g/m^2	n/a
Roll width	5.10 m	n/a
Roll length	100 m - 65 m	n/a
Tensile strength (maximum) – MD	35 kN/m	ASTM D7275
Tensile strength (maximum) – XD	30 kN/m	ASTM D7275
Elongation at break – MD	50 %	ASTM D7275
Elongation at break – XD	50 %	ASTM D7275
Tensile tear resistance – XD (maximum)	1225 N	ASTM D4073
Tensile tear resistance – MD (maximum)	1025 N	ASTM D4073
Static puncture	650	ASTM 4833
Permeability	6 X 10^{-14} m/s	ASTM E 96
Coefficient of thermal expansion	-0.1% (MD) 0.3% (XD)	ASTM D 696
Interface friction angle	~35 degrees	-

Appendix 2: Additional figures

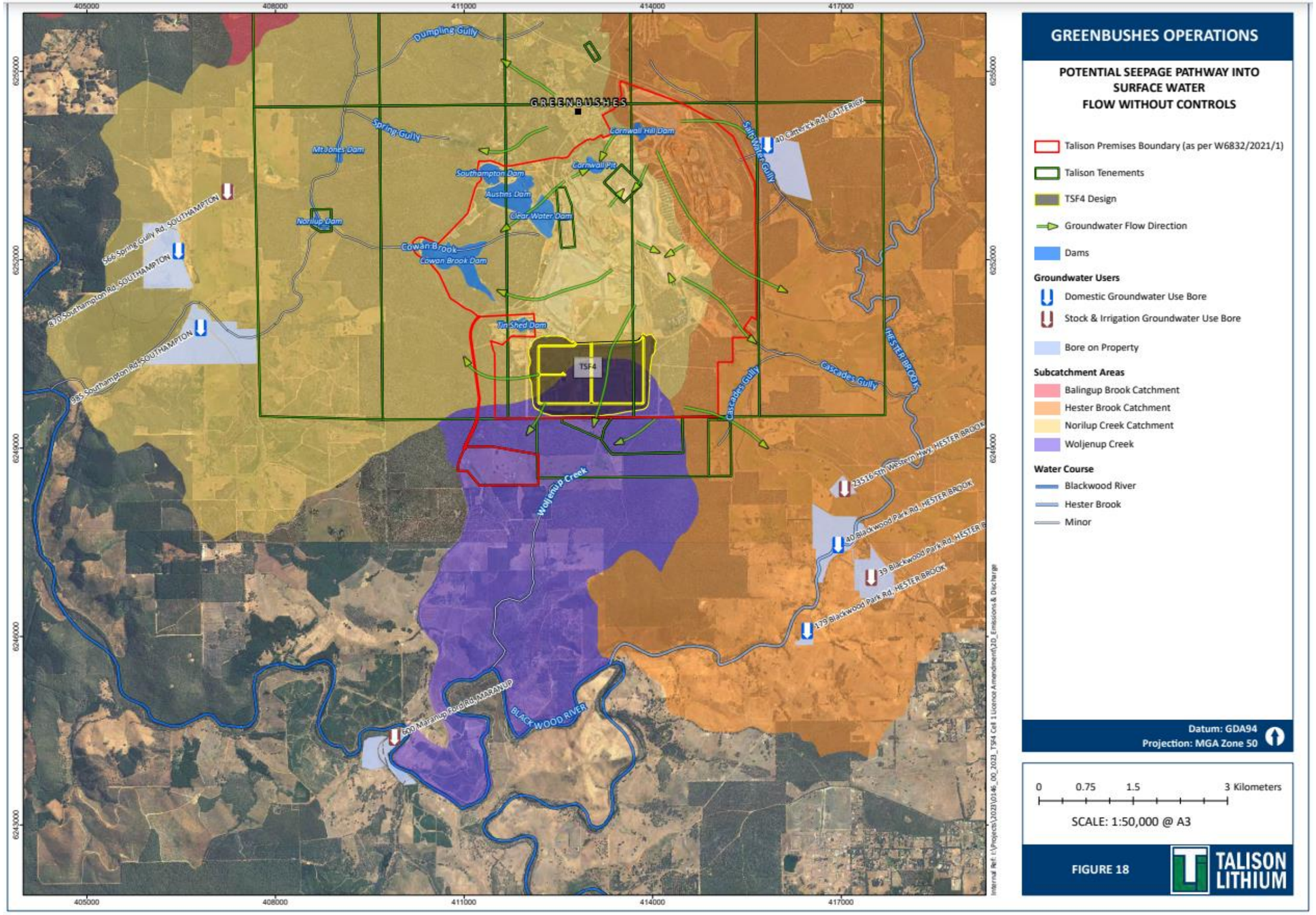

Figure 14 Sensitive receptors downstream of TSF4 (Talison, 2024)

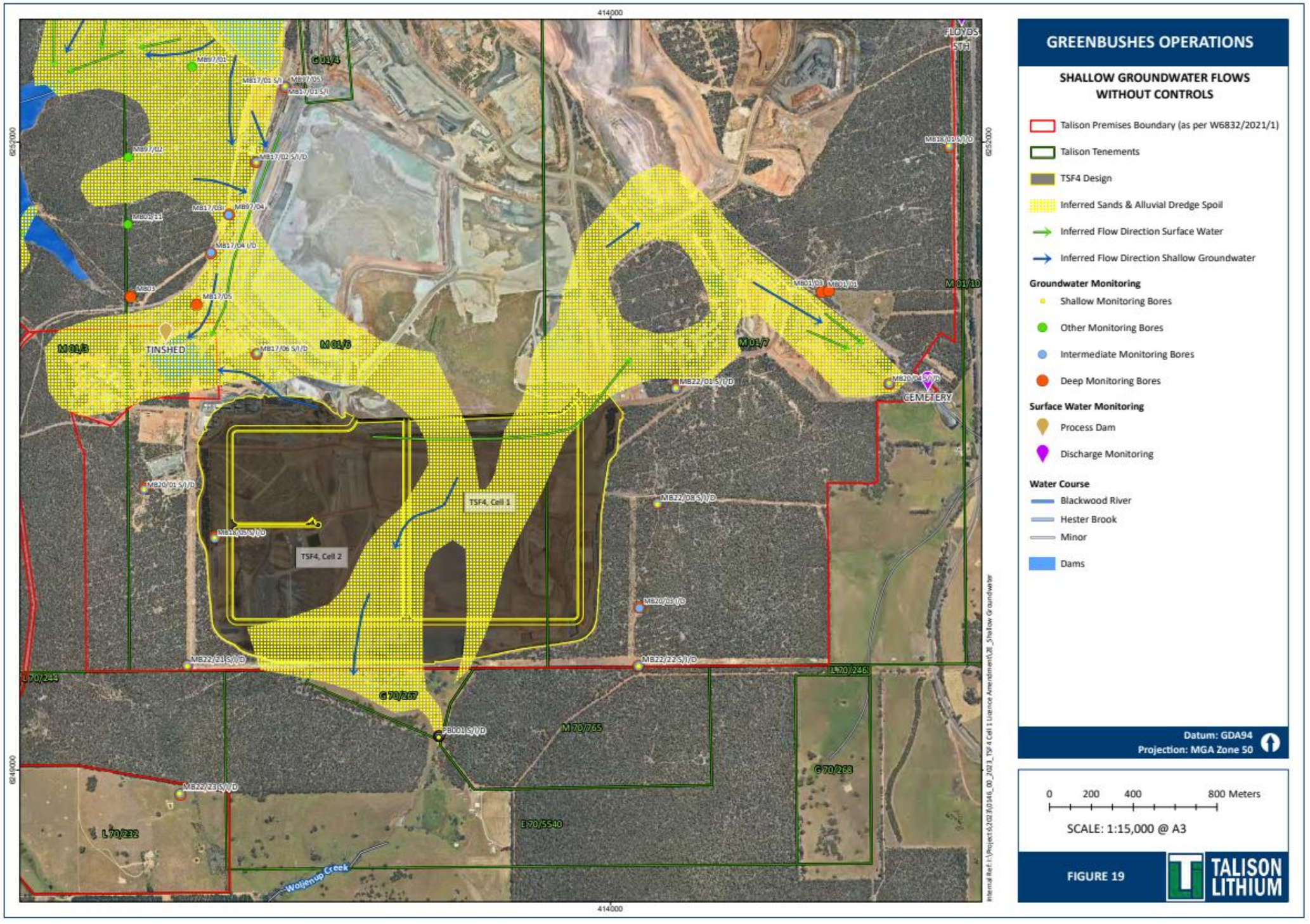

Figure 15 Inferred flow direction of shallow groundwater

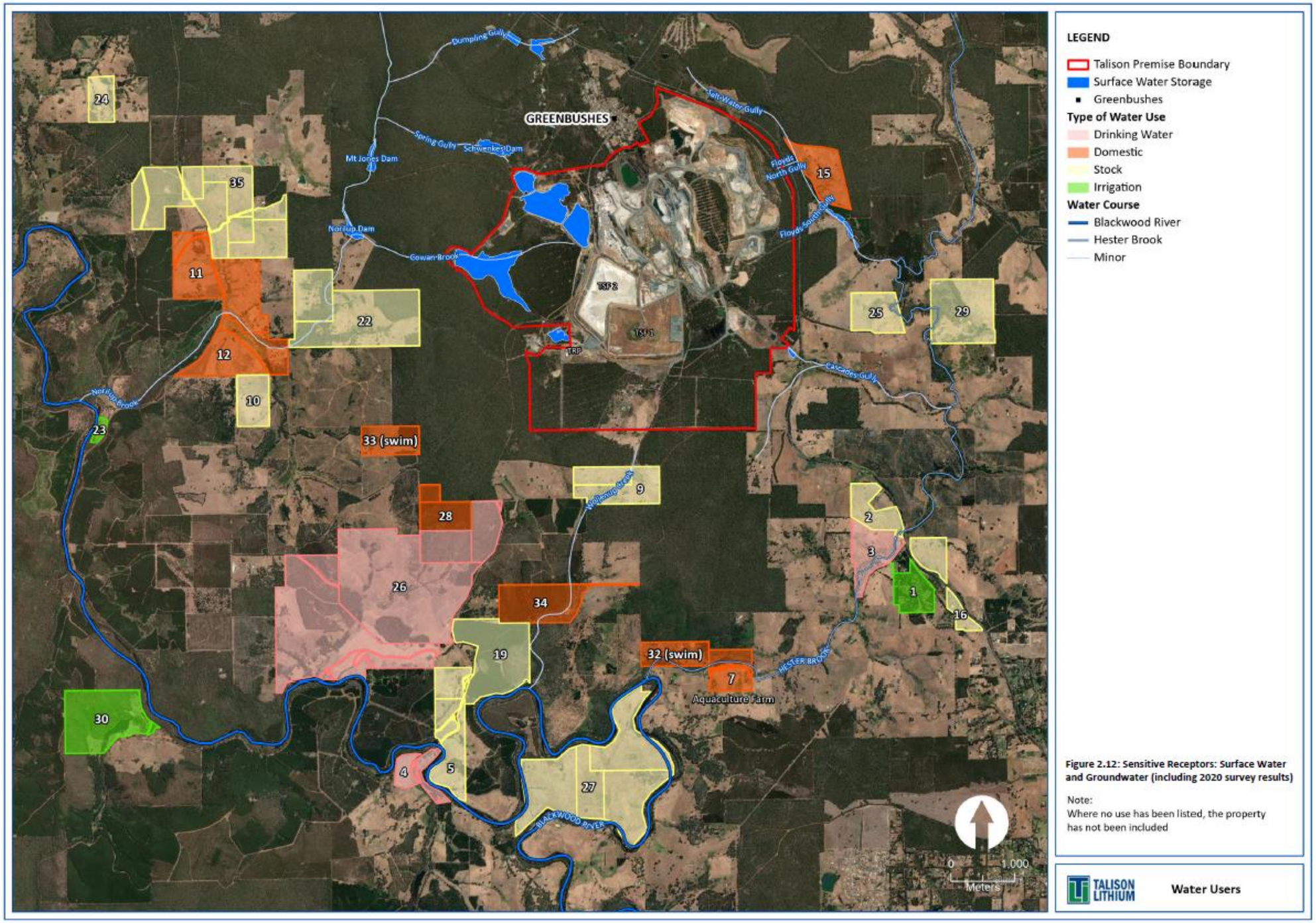

Figure 16 Nearby surface and groundwater users (based on Talison 2021 survey)

Figure 17 Graphs of cumulative flow leach testing results (LEAF 1314) for select metals – logarithmic scale in mg/L

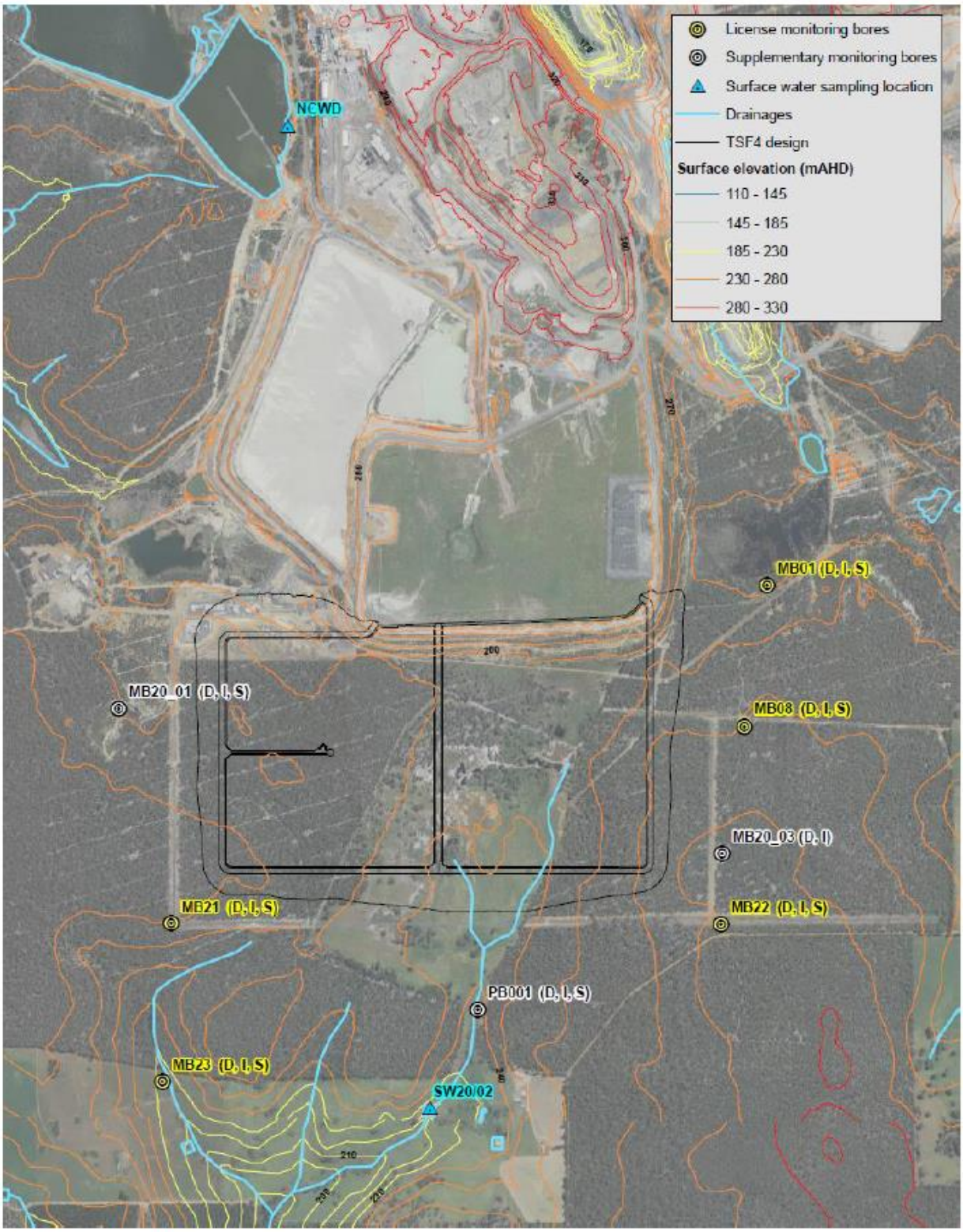

Figure 3: Locations of Monitoring Sites

Figure 18: Sampling locations in baseline monitoring program for groundwater location (yellow and white locations) and surface water locations (blue locations)

Appendix 3: Groundwater and surface water monitoring and management

Table 19 Groundwater monitoring and management – baseline monitoring bores

Bore Suite	Monitoring Location	Frequency		Analytes[4]	Trigger Levels	Action 1: Monitoring and Review	Action 2: Risk Assessment	Action 3: Remediation
		Year 1 (includes TLO Period)	Year 1 End to Operations End					
Baseline Monitoring Bores:								
Shallow monitoring bores	– MB01-S – MB08-S (dry) – MB21-S (dry) – MB22-S (dry) – MB23-S (artesian) – MB20-01-S – PB001-S	monthly	quarterly	**Field parameters**: Water Level (m BTOC), EC, DO, ORP, Temp **Metals:** Al, As, Cd, Co, Cs, Cr, Cu, Fe, Li, Mn, Ni, U Mo, Rb, Sb, Th, Tl, Vn, **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4	The trigger levels are presented in **Appendix A Table 2.** Trigger levels are based on 30% above seasonal maximum concentrations for key CoCPs: – As, Cs, Li, Rb, Sb, U[5]	**Sub-action 1):** – Confirm CoCP occurrence/concentration (>30%) via next monthly monitoring. – If confirmed, then implement Sub-action 2. **Sub-action 2**): – Assess groundwater for TSF4 decant signature (source) via assessment of concentrations of SO4, Na, HCO3 (displayed as Cl ratios). – If CoPC and decant source signature support TSF4 impacts to groundwater, then implement Sub-action 3. – Otherwise implement Sub-action 4. **Sub-action 3):** – Confirm CoCP and decant source occurrence/concentration via next monthly monitoring. – If confirmed, then implement Action 2. – If CoCP concentrations are below 30% of the seasonal maximum, implement Sub action 4. **Sub-action 4):** – Return to routine monitoring, CoPC concentrations deemed to reflect natural variation (reset/review natural seasonal variation range).	– Investigate impacted groundwater extent, migration direction and fate to include additional installation of groundwater monitoring bores and additional monitoring, where required; and/or – Predict impacts at the receptors (e.g.: groundwater modelling to predict discharges to creek of CoPCs)[6]. – Where the beneficial use of the groundwater is diminished (above baseline concentrations, and above site specific WQGs) at the premises boundary and/or discharges into Woljenup Creek, then present an understanding of exposure scenarios to the receptors (human health and the environment). – If exposure scenarios are complete, then the risk to the receptors is deemed unacceptable and implement Action 3. – Otherwise develop/update monitoring schedule and network, as required.	Design and implement remediation strategy, such as: – Pump-back of impacted groundwater (abstraction bores); and/or – Pump-back of impacted creek waters; and/or – Implement source control, including mitigation of TSF4 seepage and discharge.
Intermediate and deep monitoring bores	– MB01-I & D – MB08- I & D (dry) – MB21-I & D (dry) – MB22-I & D (dry) – MB23-I & D (artesian) – MB20-01-I & D – MB20-03- I & D – PB001- I & D	quarterly	Bi-annual	As above	As above	As above	As above	As above

Table 20 Groundwater monitoring and management - perimeter bores

Bore Suite	Monitoring Location	Frequency		Analytes[7]	Trigger Levels	Action 1: Monitoring and Review	Action 2: Risk Assessment	Action 3: Remediation
		Year 1 (includes TLO period)	Year 1 End to Operations End					
Perimeter Bores:								
Shallow monitoring bores	Southern Perimeter Bores: – MB24-01 S – MB24-02 S – MB24-03 S – MB24-04 S – MB24-05 S – MB24-06 S – MB24-07 S – MB24-08 S Western and Eastern Perimeter Bores (only if required): – MB24-09 S – MB24-10 S – MB24-11 S – MB24-12 S – MB24-13 S – MB24-14 S	monthly	quarterly	**Field parameters**: Water Level (m BTOC), EC, DO, ORP, Temp **Metals:** Al, As, Cd, Co, Cs, Cr, Cu, Fe, Li, Mn, Ni, U Mo, Rb, Sb, Th, Tl, Vn, **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4	The interim trigger levels are presented in **Appendix A Table 2.** Trigger levels are based on 30% above seasonal maximum concentrations[8] for key CoCPs: – As, Cs, Li, Rb, Sb, U[9 1],	**Sub-action 5):** – Confirm CoCP occurrence/concentration (30%) via next monthly monitoring. – If confirmed, then implement Sub-action 6. **Sub-action 6):** – Assess groundwater for TSF4 decant signature (source), includes assessment of concentrations of So4, Na, HCo3 (displayed as Cl ratios). – If TSF4/decant impacts confirmed, then implement Sub-action 7. – If decant signature not supported, then implement Sub-action 8. **Sub-action 7)**. – If groundwater quality at the impacted groundwater bore(s) exceeds the predicted WQG at that bore(s), then implement Action 2. – Otherwise implement Sub-action 8. **Sub-action 8):** – Return to routine monitoring, as CoPC concentrations deemed to reflect natural variation.	**Sub-action 9:** – Recalibrate existing groundwater model with new/updated concentrations. – Present updated understanding of impacted groundwater extent, migration direction and fate[10]. – If adverse risk of impacts to receptor(s) confirmed (eg.: discharge to creek above guidelines) then implement Action 3, otherwise implement Sub-action 10. **Sub-action 10:** If required, updated monitoring network to include installation of groundwater monitoring bores to define extent of impacts and to validate the predictive modelling, otherwise continue monitoring as per regular schedule.	Design and implement remediation strategy, such as: – Pump-back of impacted groundwater (abstraction bores), and/or – Pump-back of impacted creek waters, and/or – Implement source control to mitigate TSF4 seepage and discharge to groundwater.
Intermediate and deep monitoring bores	Southern Perimeter Bores: – MB24-01 I & D – MB24-02 I & D – MB24-03 I & D – MB24-04 I & D – MB24-05 I & D – MB24-06 I & D – MB24-07 I & D – MB24-08 I & D Western and Eastern Perimeter Bores (only if required): – MB24-09 I & D – MB24-10 I & D – MB24-11 I & D – MB24-12 I & D – MB24-13 I & D – MB24-14 I & D	quarterly	Bi-annually	as above	as above	as above	as above	as above

Table 21 Talison proposed groundwater quality (*italics*) and adopted trigger levels (bold)

Bore ID11	Antimony	Arsenic	Caesium	Lithium	Rubidium	Uranium
Baseline monitoring bores (mg/L):						
MB01-D*	*<0.001*	*0.006*	*0.006*	*1.94*	*0.065*	*0.02*
	0.002	**0.0075**	**0.0075**	**2.43**	**0.081**	**0.025**
MB01-I*	*<0.001*	*0.002*	*<0.001*	*0.51*	*0.019*	*0.009*
	0.002	**0.002**	**0.002**	**0.64**	**0.024**	**0.011**
MB01-S*	*<0.001*	*0.001*	*<0.001*	*0.94*	*0.01*	*<0.001*
	0.002	**0.002**	**0.002**	**1.17**	**0.013**	**0.002**
MB20_01D	*<0.001*	*0.002*	*0.001*	*0.43*	*0.016*	*<0.001*
	0.002	**0.003**	**0.002**	**0.54**	**0.02**	**0.002**
MB20_01I	*<0.001*	*<0.001*	*<0.001*	*0.018*	*0.01*	*0.002*
	0.002	**0.002**	**0.002**	**0.023**	**0.013**	**0.0025**
MB20_01I	*<0.001*	*<0.001*	*<0.001*	*0.054*	*0.004*	*<0.001*
	0.002	**0.002**	**0.002**	**0.068**	**0.005**	**0.002**
MB20_03D	*<0.001*	*0.017*	*0.013*	*1.0*	*0.08*	*<0.001*
	0.002	**0.021**	**0.016**	**1.25**	**0.10**	**0.002**
MB22-D	*<0.001*	*0.04*	*0.006*	*1.74*	*0.08*	*<0.001*
	0.002	**0.050**	**0.008**	**2.18**	**0.10**	**0.002**
MB23-D	*<0.001*	*0.042*	*<0.001*	*0.047*	*0.005*	*<0.001*
	0.002	**0.053**	**0.002**	**0.059**	**0.006**	**0.002**
MB23-I	*<0.001*	*<0.001*	*0.001*	*0.017*	*0.023*	*<0.001*
	0.002	**0.002**	**0.002**	**0.021**	**0.029**	**0.002**
MB23-S	*<0.001*	*0.002*	*<0.001*	*0.101*	*0.018*	*<0.001*
	0.002	**0.002**	**0.002**	**0.126**	**0.023**	**0.002**
MB25-D	*<0.001*	*0.002*	*<0.001*	*0.031*	*0.002*	*0.001*
	0.002	**0.002**	**0.002**	**0.039**	**0.003**	**0.002**

Table 22 Talison proposed groundwater quality (*italics*) and adopted trigger levels (bold) – continued

Bore ID11	Antimony	Arsenic	Caesium	Lithium	Rubidium	Uranium
Baseline monitoring bores (mg/L):						
MB25-I	*<0.001*	*0.002*	*<0.001*	*0.011*	*0.001*	*<0.001*
	0.002	**0.002**	**0.002**	**0.014**	**0.002**	**0.002**
MB25-S	*<0.001*	*0.002*	*<0.001*	*0.029*	*<0.001*	*<0.001*
	0.002	**0.002**	**0.002**	**0.036**	**0.002**	**0.002**
PB001_D	*<0.001*	*0.002*	*<0.001*	*0.042*	*0.002*	*<0.001*
	0.002	**0.002**	**0.002**	**0.053**	**0.002**	**0.002**
PB001_I	*<0.001*	*0.002*	*<0.001*	*0.117*	*0.006*	*<0.001*
	0.002	**0.002**	**0.002**	**0.146**	**0.008**	**0.002**
PB001_S	*<0.001*	*0.002*	*0.001*	*0.058*	*0.008*	*0.012*
	0.002	**0.003**	**0.003**	**0.073**	**0.010**	**0.015**
TSF4 perimeter monitoring bores mg/L (Interim Trigger levels)[12]:						
MB24 -1 to 14	**0.002**	**0.01**	**0.004**	**0.28**	**0.021**	**0.005**

Table 23 TSF4 sump monitoring and management.

Monitoring Location	Frequency	Analytes[13]	Trigger level	Action
Monitoring Period: Year 1				
Sumps A, B, C & D	Monthly	**Field Parameters:** Flow rates, EH, Ph, EC	The trigger levels are shown in **Appendix A Table 4.** Trigger levels are based on Sump A. Trigger levels based on 200% increase of the modelled lithium concentrations and/or 150% increase of the modelled flow rates[14]. The Sump A monitoring data to be averaged over 12 months.	Where triggered, the existing predictive model will be updated after 3 years. The results of the updated model will be used to review and set new trigger levels. Where new trigger levels are exceeded, the modelling will be updated at three yearly intervals, until the passive management strategy has been implemented and is operational.
	Quarterly	**Field Parameters:** Flow rates, EH, Ph, EC **Selected metals:** As, Cs, Li, Rb, Sb, U		
	Bi-annual	**Field Parameters:** Flow rates, EH, Ph, EC **Selected metals:** As, Cs, Li, Rb, Sb, U **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4		
	Annual	**Field Parameters:** Flow rates, EH, Ph, EC **Full Suite Metals:** Al, As, Cd, Co, Cs, Cr, Cu, Fe, Li, Mn, Ni, U Mo, Rb, Sb, Th, Tl, Vn, **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4		
Monitoring Period: Year 1 End to Operations End				
Sumps A, B, C & D	Quarterly	**Field Parameters:** Flow rates, EH, Ph, EC	As above	As above
	Bi-annual	**Field Parameters:** Flow rates, EH, Ph, EC **Selected metals:** As, Cs, Li, Rb, Sb, U		
	Annual	**Field Parameters:** Flow rates, EH, Ph, EC **Full Suite Metals:** Al, As, Cd, Co, Cs, Cr, Cu, Fe, Li, Mn, Ni, U Mo, Rb, Sb, Th, Tl, Vn, **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4		

Table 24 Sump A predictive water quality and Talison proposed trigger levels.

Year	Predictive Modelling Results		Trigger Levels15	
	Flow Rate (m3/d)	Lithium (mg/L)	Flow Rate (m3/d)	Lithium (mg/L)
2024	121	0.1	181	0.3
2025	113	0.3	169	0.5
2026	117	0.5	176	0.9
2027	122	0.7	183	1.3
2028	128	0.9	192	1.8
2029	135	1.1	202	2.2
2030	143	1.3	215	2.6
2031	154	1.5	231	3.0
2032	165	1.7	247	3.3
2033	174	1.8	261	3.7
2034	183	2.0	275	4.0
2035	195	2.1	292	4.3
2036	208	2.3	312	4.6
2037	217	2.4	326	4.9
2038	204	2.4	306	4.8
2039	191	2.2	287	4.3
2040	182	2.0	273	4.0
2041	177	1.9	265	3.9
2042	170	1.8	255	3.7
2043	163	1.8	244	3.6
2044	156	1.7	234	3.5
2045	149	1.7	224	3.4
2046	143	1.7	214	3.4
2047	137	1.7	206	3.3
2048	131	1.6	197	3.3
2049	126	1.6	189	3.2
2050	121	1.6	182	3.2
2060	87	1.6	130	3.2
2070	66	1.7	99	3.4
2080	52	1.8	79	3.6
2090	44	1.9	66	3.8
2100	38	2.0	57	4.0

Table 25 Woljenup Creek Proposed Monitoring and Management

	Monitoring Location	Frequency	Analytes[16]	Trigger Levels	Action 1: Monitoring and Review	Action 2: Risk Assessment	Action 3: Remediation
Monitoring period: Year 1 (includes period of TLO)							
Woljenup Creek	– SW20-02 – SW23-01	Monthly	**Field Parameters:** Flow rates, EH, Ph, EC **Selected metals:** As, Cs, Li, Rb, Sb, U	The trigger levels are presented in **Appendix A Table 6.** Trigger levels are based on 30% increase above the seasonal baseline maximum concentrations at SW20/02, or where baseline concentrations absent, adopt WQGs.	**Sub-action 1:** – Confirm CoCP concentration (>30%) via next monthly monitoring. – If confirmed, then implement Sub-action 2. **Sub-action 2**: – Evaluate creek waters for TSF4 decant source signature (SO_4, Na, HCO_3). – If the impacts to the Creek are deemed to reflect TSF4 source, then implement Sub-action 3 and **Action 2**. – If a TSF4 source is not supported implement sub-action 4. **Sub-action 3**: – Increase the frequency of monitoring of the Woljenup creek waters to monthly. – Review the requirement for monthly monitoring after six months. **Sub-action 4**: – Update baseline concentrations with new information and adjust trigger levels accordingly.	– Compare of the Woljenup Creek water quality to the site derived WQGs. – Where TSF4 impacts cause water quality to exceed guidelines, then present an understanding of risks by identifying site-specific receptors and potential exposure scenarios of Woljenup Creek (human health and the environment). – Where risks to the receptors are deemed unacceptable, implement **Action 3**.	Remedial options will be designed and implemented based on – Control of TSF4 source discharge (mitigation of surface water runoff and/or groundwater seepage),and/or – Capture and management of impacted surface water within Woljenup Creek (e.g.: pump-back to mine water circuit).
	– SW20-02 – SW23-01	quarterly	**Field Parameters:** Flow rates, EH, Ph, EC **Selected metals:** As, Cs, Li, Rb, Sb, U **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4				
	– SW20-02 – SW23-01 – SW23-03	Bi-annual	**Field Parameters:** Flow rates, EH, Ph, EC **Full Suite Metals:** Al, As, Cd, Co, Cs, Cr, Cu, Fe, Li, Mn, Ni, U Mo, Rb, Sb, Th, Tl, Vn. **Major ions/nutrients**: Ca, Mg, Na, K, HCO_3, Cl, SO_4, Total N, NO_3, PO_4				
Monitoring period: Year 1 end to operations end							
Woljenup Creek	– SW20-02 – SW23-01 – SW23-03	quarterly	**Field Parameters:** Flow rates, EH, Ph, EC **Selected metals:** As, Cs, Li, Rb, Sb, U	As above	As above	As above	As above
	– SW20-02 – SW23-01 – SW23-03	Bi-annual	**Field Parameters**: Flow rates, EH, Ph, EC **Full Suite Metals**: Al, As, Cd, Co, Cs, Cr, Cu, Fe, Li, Mn, Ni, U Mo, Rb, Sb, Th, Tl, Vn, **Major ions/nutrients**: Ca, Mg, Na, K, HCO3, Cl, So4, Total N, NO3, PO4				

Table 26 Woljenup Creek (SW20/02) proposed water quality and adopted trigger levels.

Analyte	Maximum seasonal 2022/2023 (mg/L)	Trigger level (mg/L)[17]
List of CoCPs:		
Sulfate (filtered)	32	50
Nitrate (as N)	1.7	2.2
Aluminium (filtered)	0.04	0.05
Antimony (filtered)	<0.001	0.002
Arsenic (filtered)	<0.001	0.002
Cadmium	Not Analysed	0.001[18]
Caesium (filtered)	<0.001	0.002
Lithium (filtered)	0.006	0.008
Manganese (filtered)	1.56	2.0
Rubidium (filtered)	0.011	0.014
Thallium (filtered)	<0.001	0.00003[17]
Uranium (filtered)	<0.001	0.0005[17]
Vanadium*	Not analysed	0.0006[17]
Zinc*	Not analysed	0.04[17]
Major-ions (for assessment of TSF4 decant source):		
Total Dissolved Solids	612	Not applicable (not a CoPC)
Alkalinity (total as CaCO3)	184	Not applicable (not a CoPC)
Sodium (filtered)	131	Not applicable (not a CoPC)
Chloride	267	Not applicable (not a CoPC)
Total Dissolved Solids	612	Not applicable (not a CoPC)

Appendix 4: Dilution Attenuation Factor Calculation

The departments principal hydrogeologist used two different methodologies to determine, conservatively, a site-specific DAF value for the aquifer in this area (DWER reference A2284366). These are discussed below:

Determining a DAF value using the Domenico analytical solution for solute transport in groundwater

Domenico (1987) published an analytical solution that determined the transport of dissolved solutes in groundwater with distance and time from a rectangular-shaped contamination source in an aquifer. Although this analytical solution is widely used in groundwater solute transport models, it can often be difficult to determine DAF values using these models. Consequently, Abranoic *et al*. (2001) developed a simplified graphical approach to solve the Domenico equation and to determine DAF values. This approach was used to develop a site-specific DAF value for the saprock/fractured bedrock aquifer near TSF4.

A full discussion of how the graphical solution of the Domenico equation can be used to determine DAF values is provided in the copy of the Abranoic *et al*. (2001) paper and so this information will not be repeated here. However, the main assumptions that were made to apply this methodology to the Greenbushes mine site were:

- The effective width of TSF4 that is providing contamination to groundwater is of the order of 800 metres;
- Initially, contamination has penetrated about 1 metre into a saprock/fractured basement rock aquifer that has a total thickness of about 10 metres;
- Contaminants in the aquifer are not affected by sorption processes *(i.e*., hydrodynamic dispersion is the only natural attenuation process);
- The receptor is located 400 metres downgradient of TSF4; and
- The longitudinal dispersivity of the aquifer between the source and receptors is 40 metres, the lateral dispersivity is 12 metres, and the vertical dispersivity is 4 metres.

Using these data, the DAF value for the aquifer was determined to be about 6.

Determining the DAF using a US EPA analytical solution

According to the US EPA (1996), the DAF of an aquifer can be approximated by the following equations:

$$DAF = 1 + \frac{Kid}{IL}$$ **Equation 1**

where

i = gradient (m/m)
d = mixing zone depth (m), calculated below (Equation 2)
I = infiltration rate (m/yr)
L = length of area of concern parallel to ground water flow (m)
K = aquifer hydraulic conductivity (m/yr)

Equation for calculating the aquifer mixing zone depth, d:

$$d = (0.0112L^2)^{0.5} + d_a\{1 - \exp[(-LI)/(Kid_a)]\}$$ **Equation 2**

where

d_a = aquifer thickness (m)

Using these equations, the DAF for the aquifer near TSF4 can be calculated using the following assumptions:

- The hydraulic gradient near TSF4 is 0.03;
- The hydraulic conductivity of the aquifer is 0.5 m/day;
- The length of the TSF that contributes contamination to the aquifer is 800 metres; and
- The infiltration rate of water from the TSF to groundwater is about 1% of average rainfall (about 3 x 10^{-5} m/day);

Using these equations, the thickness of the contamination mixing zone was determined to be the same as the aquifer thickness (about 10 metres), and the DAF value was determined to be about 7.

Appendix 5: Summary of applicant's comments on draft conditions

Table 27: Summary of applicant's comments on draft conditions

Condition	Summary of Applicant's comment	Department's response
Condition 5, Table 4 Condition 18, Table 8	Talison has been unable to secure access to the SW20-02 (Jones Dam) monitoring site (the landholder refuses access). Talison proposes that SW20-02 is replaced with one of the annual ecological monitoring sites at Woljenup Creek (Wol-A), to be designated SW24-01 (north of Jones Dam): Easting: 413180 Northing: 6249160	The monitoring location is between Jones Dam and TSF4 and considered an acceptable location in place of the Jones Dam monitoring point. The condition has been revised to reflect the new monitoring point.
Condition 12	Talison requests that the condition for time limited operations be modified to allow TLO to commence 30 business days after CCIR submission as per W6618/2021/1, to provide increased certainty around commissioning on TLO.	The department has modified the condition to allow TLO commencement 45 days after the CCIR has been submitted to the CEO – in accordance with current standard timeframes for CCIR reviews.
Condition 13	Talison requests extended Time Limited Operation (TLO) of the TSF4 embankment lift to 270m AHD. This is due to concerns regarding timing of other amendments and applications conflicting with submission and assessment of the CCIR. The new proposed condition is: *for a period commencing the day the works approval holder meets the requirements of condition 12 for that item of infrastructure and ending on 1 June 2026*	The department notes that a fixed date for completion of TLO can lead to additional administrative challenges. The department is mindful of TLO periods and can coordinate applications and submissions with Talison accordingly. To assist with timing, the department has revised the TLO period from 180 days to 270 days (i.e. an additional 90 days).
Condition 14	Talison indicates that operating a TSF with a decant pond area <300m^2 impractical and proposes that the condition read no larger than 50,000m^2	The department has revised the condition and requires that Talison minimise the size of the decant pond as much as practicable. Under the *Mining Act 1978* Talison also have an environmental outcome requiring that they operate the TSF to minimise the decant pond size.

Appendix 6: Application validation summary

SECTION 1: APPLICATION SUMMARY		
Application type		
Works approval	☒	
Date application received	28/2/2024	
Applicant and Premises details		
Applicant name/s (full legal name/s)	Talison Lithium Australia Pty Ltd	
Premises name	Talison Lithium Mine	
Premises location	Maranup Ford Road, Greenbushes	
Local Government Authority	Shire of Bridgetown-Greenbushes	
Application documents		
HPCM file reference number:	DER2024/000099	
Key application documents (additional to application form):	Detailed Design Report – GHD 2021 TSF Cell 1 and 2 Technical Specification – GHD 2023a TSF4 Supporting information for staged commissioning – GHD 2023b (page 332 of application supporting document) TSF4 cell 1 – supporting information for replacing clay liner with BGM – 2023d Substituting the clay liner with BGM in TSF4 cell 2 – GHD 2023d TSF4 Seepage assessment – conceptual hydrological model – GHD 2023f TSF4 Seepage assessment: Site specific water quality guidelines – GHD 2023g TSF4 Seepage Assessment: Seepage monitoring and management plan – GHD, 2023b	
Scope of application/assessment		
Summary of proposed activities or changes to existing operations.	<u>Works approval</u> A 5m lift/raise of the approved TSF4 cells 1 and 2 from 265m Australian Height Datum (AHD) (1,265 m Reduced Level) to 270m AHD (1,270 RL) No change to throughput requested.	

Category number/s (activities that cause the premises to become prescribed premises)

<u>Table 1: Prescribed premises categories</u>

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5: Processing of beneficiation of metallic or non-metallic ore	7,100,000 tonnes beneficiated per annual period. 5,000,000 tonnes of tailings deposited per annual period	*No change to throughput requested*

Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes ☒ No ☐	Referral decision No: (noting - not for this specific assessment but overall project - assessment no. 2172)
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☒ No ☐	Ministerial statement No: MS 1111 EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☒ No ☐	Reference No: EPBC 2018/8206 EPBC 2013/6904.

Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Mining lease / tenement ☒ Expiry: See Attachment 1A of application form
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	LGA planning approvals not required for activities regulated under Mining Act 1978. Mining Proposal 80328 provides approval under the Mining Act to undertake the expansion activities
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☒ No ☐	CPS No: N/A For noting – not specifically in relation to this proposal, but clearing for the area of TSF4 has been approved under MS 1111.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	Application reference No: N/A Licence/permit No: N/A
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☐ No ☒	Application reference No: Licence/permit No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes ☐ No ☒ N/A ☐ Regional office: South West (Bunbury) Dumpling Gully Surface Water Area (RIWI Act) about 3 km north and up-hydraulic gradient to TSF4, therefore no realistic risk of potential seepage discharge to this designated area.
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes ☐ No ☐ N/A ☒
Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☒ No ☐	Part IV of the EP Act (MS 1111) *Environmental Protection (Noise) Regulations 1997*, Regulation 17 exemption Part V of the EP Act, Native Vegetation Clearing permit DCCEEW - EPBC 2018/8206 *Mining Act 1978* *Contaminated Sites Act 2003*
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	N/A
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	N/A
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☒ No ☐	Classification: contaminated – restricted use (C–RU) ID 34013 Date of classification: June 2007, and classified again October 2020