Amendment Report

Application for Works Approval Amendment

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

Works Approval Number	W6618/2021/1
Works Approval Holder	Talison Lithium Australia Pty Ltd
ACN	139 401 308
File Number	DER2021/000628
Premises	Talison Lithium Mine Maranup Ford Road Part of mine tenements M01/6 and M01/7 As defined by the premises maps in Schedule 1 As defined by the Premises map attached to the Revised Works Approval
Date of Report	1 September 2023
Decision	Revised works approval granted

Carmen Standring

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

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1. Decision summary

Works approval W6618/2021/1 is held by Talison Lithium Australia (Talison; the works approval holder) for the Talison Lithium Mine (the premises[1]), located at Maranup Ford Road, Greenbushes and parts of mining tenements M01/6 and M01/7.

This amendment report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the construction and operation of the premises. As a result of this assessment, revised works approval W6618/2021/1 has been granted.

The revised works approval issued as a result of this amendment supersedes the existing works approval previously granted in relation to the premises.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this amendment report, the department has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary

On 5 July 2023, the works approval holder submitted an application to the department to amend works approval W6618/2021/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The proposed amendment is to modify a portion of the liner for tailings storage facility 4 (TSF4) cell 1, to bituminous geomembrane (BGM). Construction progress for the clay liner, originally authorised, has been impacted by winter rains. The clay liner will not be completed in time for TSF4 to begin accepting tailings, given the current tailings storage facility 2 (TSF2) will reach capacity in September 2023. Specifically, BGM will be installed across approximately 12.8 hectares (ha) of the ~80 ha floor of cell 1 (~16% of floor area) in the northern and north-eastern portions of cell 1 (the remainder already being lined by clay).

This amendment is limited only to changes to category 5 activities from the existing works approval.

The department is also assessing works approval W6832/2023/1 for a new wastewater treatment plant at the Talison accommodation village (at the time of writing). The proposal includes a discharge of treated effluent to TSF4. This discharge will be assessed under W6832/2023/1, with the relevant instruments to be amended later if and when required (if approved) to incorporate any additional discharges to TSF4.

2.2.1 Bituminous geomembrane liner

Permeability and seepage

GHD (2023) 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. They calculated that, assuming five defects per hectare (with a defect area of 1 cm^2), the vertical seepage would be reduced by 97% (for detail see Appendix 2). Seepage, overall, for TS4 cell 1 would consequently be reduced by ~16%.

[1] For noting, the premises also operates under EP Act Part V licence L4247/1991/13.

The department sought internal technical advice (DWER reference A2195884) for how partial use of a BGM liner would modify the rate of seepage from TSF4. Advice indicated that, while the seepage may not be reduced as much as calculated by GHD (2023), 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. In practice, the as-installed hydraulic conductivity of a BGM liner could be higher than the theoretical value due to:

- the level of preparation of the subgrade materials on which the liner is being installed; and
- the level of care taken to install the liner.

Decant and underdrainage

No changes in the design of the internal drainage, underdrainage and the external seepage interception and collection network are proposed. Flow to the tailings underdrainage (above the liner) would increase by 77,472 m^3/year, for a total flow of 245,326 m^3/year for TSF4 at full height 295 m AHD. The underdrainage system has been sized to accommodate a flow of 311,900 m^3/year, which is greater than the anticipated estimated maximum drainage volume. Tailings underdrainage is intended for return to the sites "mine water circuit" (see section 2.2.2 below). Talison (2023) have stated that this tailings underdrainage (77,742 m^3/year) does not represent an additional input to the mine water circuit, as most of this would have otherwise been captured by the lining underdrainage (when using a clay liner).

GHD (2021) showed that with a fully clay-lined facility 33,800m^3/yr seepage would bypass the TSF drainage. This will be reduced with partial BGM lining as more seepage will be collected by the TSF drainage. The reduction in seepage bypassing drainage due to BGM was not calculated by GHD (2023). Talison (2023) have therefore considered an overly conservative scenario for capture of all seepage and return to the mine water circuit (i.e. 33,800m^3/yr). This is ~0.5% of the total mine water circuit capacity and ~5% of the approved (under construction) capacity which will be created by the lift to Cowan Brook Dam. The department notes that further lifts to Austin's and Southampton dam are also planned to create additional capacity for the mine water circuit.

The partial replacement of the clay liner with BGM will also increase the decant return rate up to 20m^3/hour, assuming 100% of the vertical seepage within the BGM lined area is retained and decanted. Additional decant water is intended to be returned to the Clear Water Dam, one of the dams for the sites mine water circuit.

Potential for hydraulic uplift

Internal technical advice was sought regarding the potential for hydraulic uplift of an underlying perched aquifer with use of a BGM liner. Advice indicated that any structure that is installed below the water table can be subjected to hydrostatic uplift if the uplift pressure that is exerted by groundwater over the area of the structure exceeds its weight. The uplift force exerted by groundwater would depend on the local hydrogeological conditions, area of the structure and depth of the structure below the water table. However, this risk could be managed by covering the BGM liner with sufficient fill or tailings to counteract the potential groundwater uplift force. Given TSF4 is intended for tailings deposition, this should assist in counteracting potential hydraulic uplift.

2.2.2 The mine water circuit

The mine water circuit is made up of several hydraulically connected unlined earthen dams containing process water; namely Clear Water Dam (primary dirty water dam), Austin Dam, Southampton Dam and Cowan Brook Dam (see Figure 6, Appendix 1). Process water generated at the premises is 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.

A detailed risk assessment for the mine water circuit and contaminant removal was undertaken for the 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.

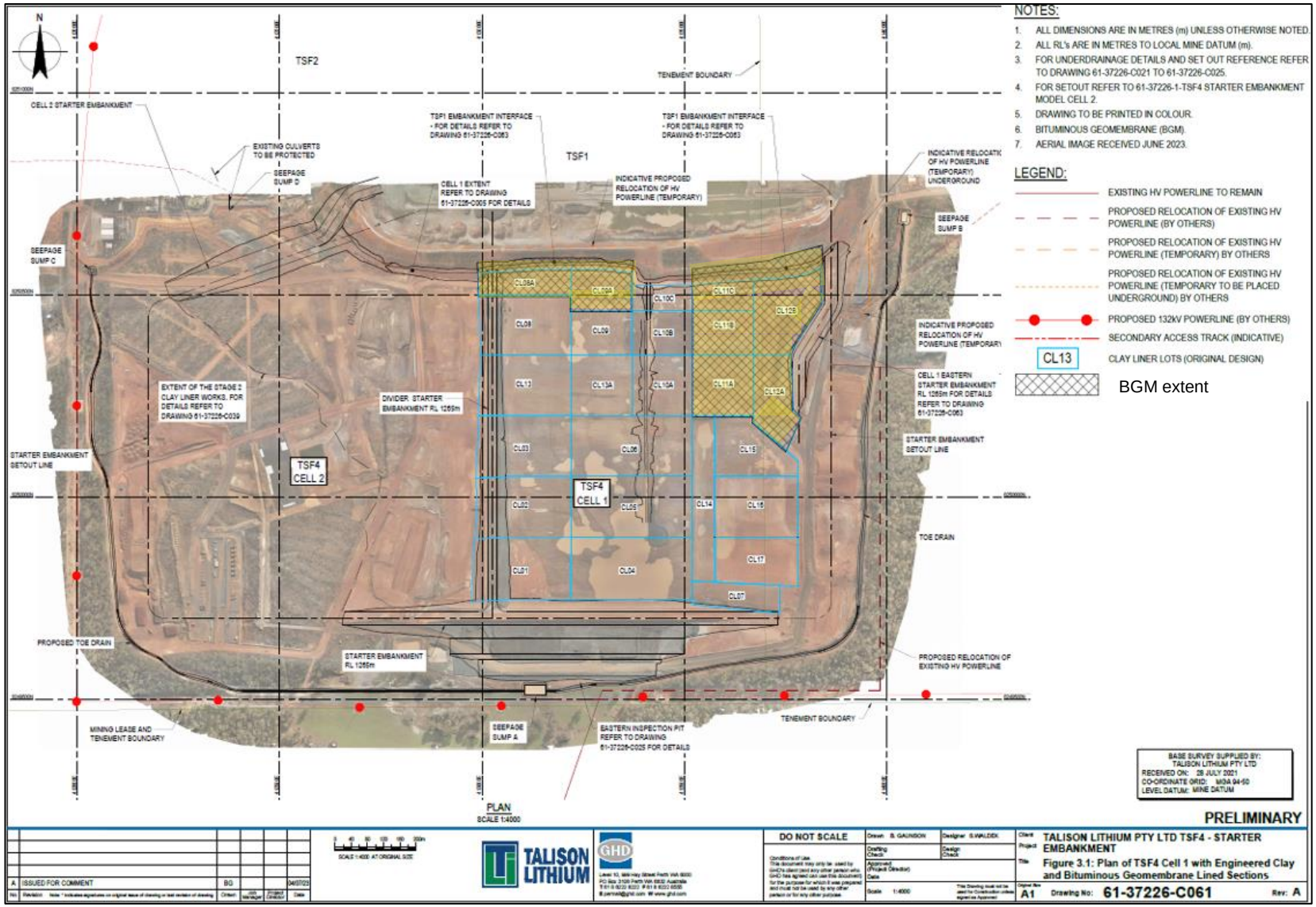


Figure 1 Bituminous Geomembrane Lined Sections of TSF4 cell 1

3. Other approvals

3.1.1 The *Mining Act 1978*

Department of Mines, Industry Regulation and Safety (DMIRS) confirmed, on 25 August 2023, the proposed works to install a BGM liner over about 20% of the base and embankment of TSF4 cell 1 have been incorporated into an amended Mining Proposal – REG ID 119573 (currently under assessment by DMIRS). DMIRS considers that the proposed changes within the application for the works approval amendment appears to be generally acceptable under the *Mining Act 1978* and *Work Health and Safety (Mines) Regulations 2022*. It was noted that if the works approval amendments will result in any changes to mining activities outside of the scope of the *Mining Act 1978* approvals, it is the tenement holder's responsibility to seek further approval or amendments under the *Mining Act 1978*.

4. 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.

4.1 Source-pathways and receptors

4.1.1 Emissions and controls

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

Table 1: Works Approval Holder controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Placement of BGM liner over 12.8 hectares of TSF4 cell 1 base	Air/windborne pathway causing impacts to health and amenity	Existing works approval controls: Condition 1 - Construction phase of TSF4 requires dust management by water carts during dry and windy conditions targeting high risk areas. Condition 13 - dust monitoring Existing licence conditions (L4247/1991/13): Condition 14 – required to develop a dust trigger/action/response plan Conditions 32, 34, 37, 44, 45 – dust monitoring and management

Emission	Sources	Potential pathways	Proposed controls
Noise	Mobile equipment movement over unconsolidated soil	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 and are not further assessed in this report.*
Operation			
Seepage water contaminated with metals/metalloids (modification to seepage rate)	Operation of TSF4 cell 1 with a liner comprising 16% BGM and 84% clay rather than 100% clay: • Potential loss of integrity of BGM liner resulting in additional seepage	Direct infiltration to groundwater causing contamination and mounding Migration of contaminated groundwater off-site causing adverse impacts to ecosystem health and human health	Given the integrity of the liner remains, GHD (2023) indicate the BGM will result in reduced seepage (see section 2.2.1). Controls to ensure the integrity of the BGM liner include: • Pebbles on the surface will not be angular and will not have a diameter great than 20 mm; • Installed by a competent and appropriately qualified installer from the top of the embankment floor; • Panels will be joined by overlapping the edges by 200 mm and torch welding the overlapped BGM together to form a watertight seam; • The BGM liner will be anchored in a 600 x 600 mm anchor trench located on the powerline corridor on the southern TSF 1 embankment and on the crest of the north-eastern TSF4 embankment; and • High friction angle BGM will be used on the embankments to further prevent the BGM from slipping down the embankment during deposition.
	• Increased seepage along joints between BGM and clay liner		• The BGM will be tied into the placed clay liner (Figure 5, Appendix 1) by removing the 200 mm sand cover and excavating a 3.0 m wide and 0.3 m deep tie-in trench into the clay liner. The BGM will be placed in the tie-in trench and the trench backfilled with the excavated clay and compacted. The leading edges of the BGM will be tied into the embankments in a 1.0 m wide and 0.6 m deep anchor trench.

Emission	Sources	Potential pathways	Proposed controls
			Once the BGM has been placed in the anchor trench it will be backfilled with the excavated soil and compacted.
Additional TSF decant water and tailings underdrainage[1] (containing metalloids) deposited back to the mine water circuit	Operation of TSF4 cell 1 with a liner comprising 16% BGM and 84% clay rather than 100% clay	Additional contaminated water deposited into the mine water circuit resulting in: • additional seepage	<u>Existing works approval controls</u>: No works approval controls proposed for mitigation of seepage risk for additional input to mine water circuit. <u>Existing licence controls:</u> Specified actions to reduce seepage risk from the mine water circuit were placed on the licence 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; and • submit a proposal for a revised annual ecological assessment for impacts to downstream sensitive surface water receptors.
		• potential for overtopping	Talison have historically had issues with capacity of the mine water circuit[2]. The whole mine water circuit contains ~7 GL water. To help increase the capacity of the circuit, Talison applied to lift the embankment height of Cowan Brook Dam to 1,229 metres relative level (m RL) and was granted works approval W6795/2023/1 on 28 June 2023. The Cowan Brook Dam raise will provide between 0.7 – 0.8 GL additional capacity. The additional input associated with BGM liner, 0.03GL, will represent ~5% of the additional capacity being created by the Cowan Brook Dam lift. Talison have also notified the department that they intend to submit

[2] On 18 September 2020, 8,400m^3 of process water overflowed from Austins Dam overland through native vegetation to Cowan Brook Dam.

On 6 August 2021 (DWERDT488002) Talison indicated that it had “minimal remaining capacity” in the Mine water circuit to store the rainfall runoff forecast for the remainder of the 2021 winter season” and predicted overflow events from Cowan Brook Dam and Southampton Dam were likely.

Talison notified DWER that Cowan Brook Dam overflowed and discharged outside of the premises boundary (to Cowan Brook) for 15 continuous days from 27 October 2021 to 10 November 2021.

Emission	Sources	Potential pathways	Proposed controls
			applications to lift the embankment heights for Southampton Dam and Austin Dam in September/October 2023.

Note 1: The existing proposed underdrainage system capacity (already authorised under W6618/2021/1), for return to mine water circuit, is considered sufficient to accommodate additional water collection associated with reduced permeability of the BGM liner.

4.1.2 Receptors

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

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

Table 2: 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[3] 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 2. **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 and groundwater users	Whilst the groundwater underlying the site is not recognised as a strategic resource area (not listed as a proclaimed area) there are a number of residential surface and groundwater users surrounding the site. Figure 4 shows the location of the surface and groundwater users in relation to the premises and surface water bodies. The results of a water survey carried out by the licence holder in 2021 indicates that downstream users access surface water from Norilup Brook, Hester Brook and Woljenup Creek for purposes including drinking water, domestic uses such as showering, laundry, water for gardens, recreational activities

[3] Taken from the closest weather station at Bridgetown (12.9km from Greenbushes), site ID 009617.

	(including swimming), aquaculture activities, irrigation for crops and stock water.
Environmental receptors	**Distance from prescribed activity**
Blackwood River and tributaries, including Woljenup creek	Woljenup creek is immediately south and down-gradient of TSF4 (Figure 3)
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. (Figure 6, Appendix 1)
Nearby native vegetation	Immediately adjacent to TSF4
<u>DBCA Legislated Tenure</u> Greenbushes State Forest	A proposal for expansion activities (including TSF4) was approved under Part IV of the Act for which Ministerial Statement MS 1111 was granted on 19 August 2019. Receptors addressed under ministerial statement MS 1111 are not assessed in this decision report and are not duplicated as conditions in the works approval.
Threatened/priority flora and fauna	

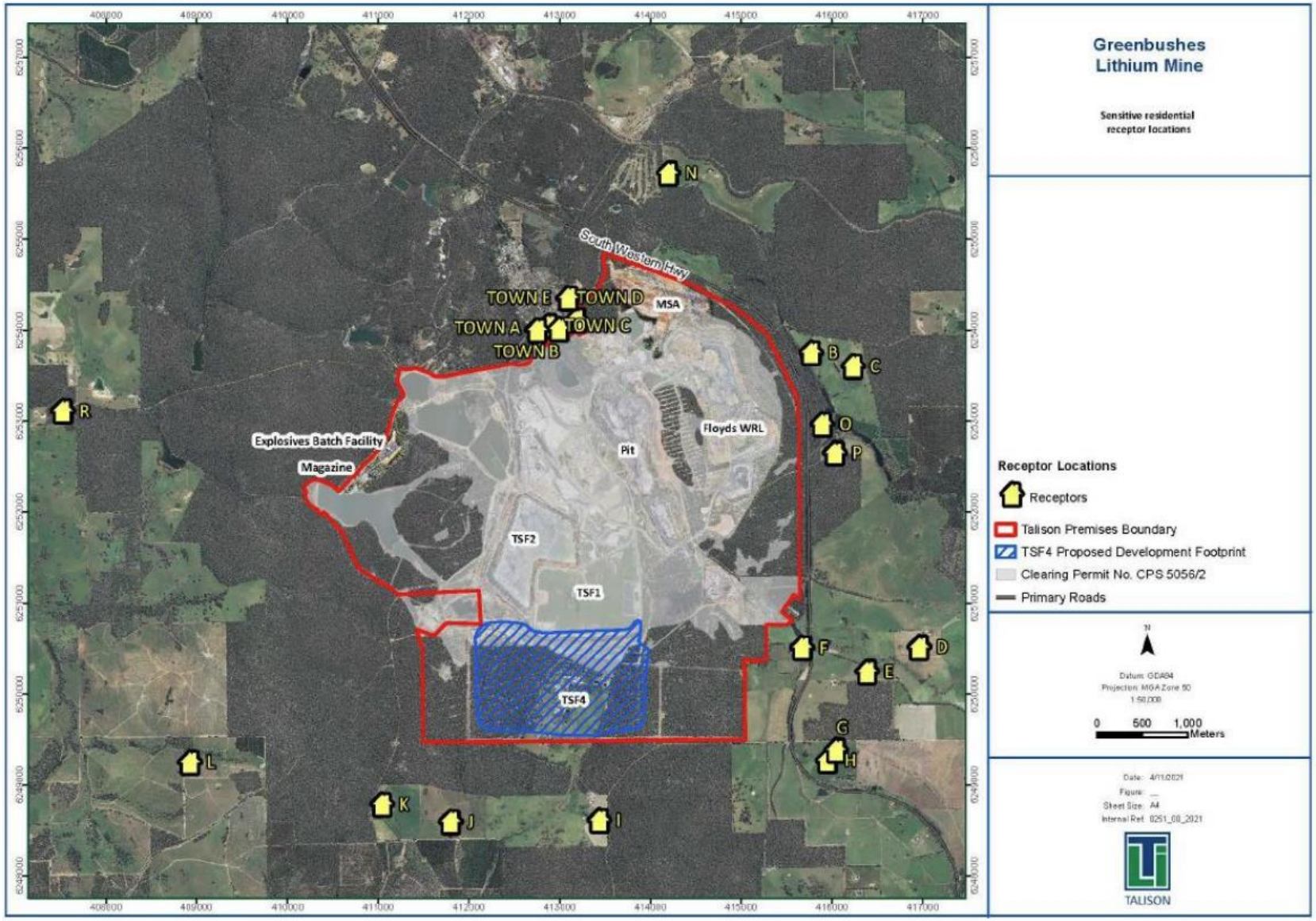


Figure 2: Distance to nearby residential receptors (Talison state no known additional residences as of 31/8/2023)

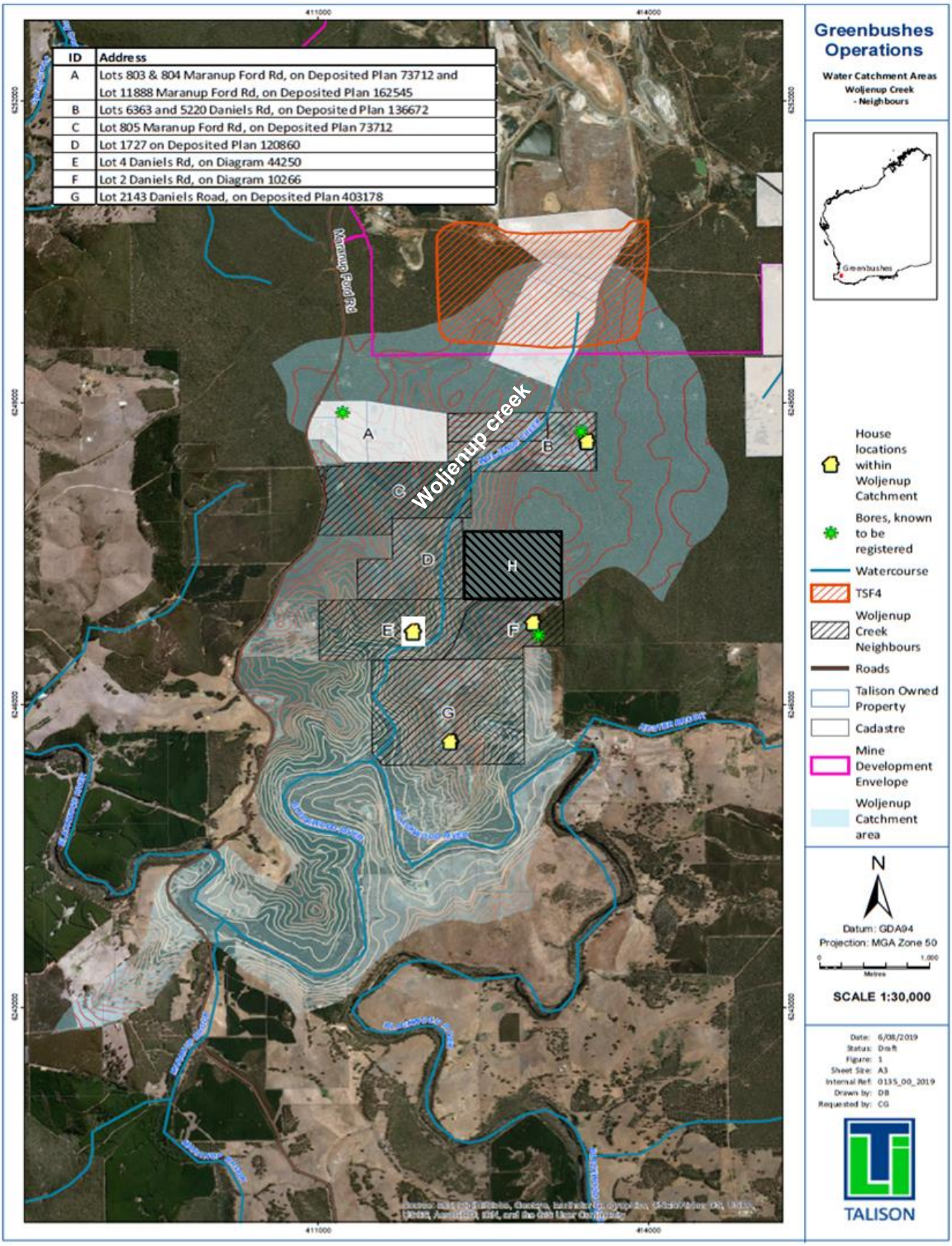


Figure 3 Sensitive receptors downstream of TSF4

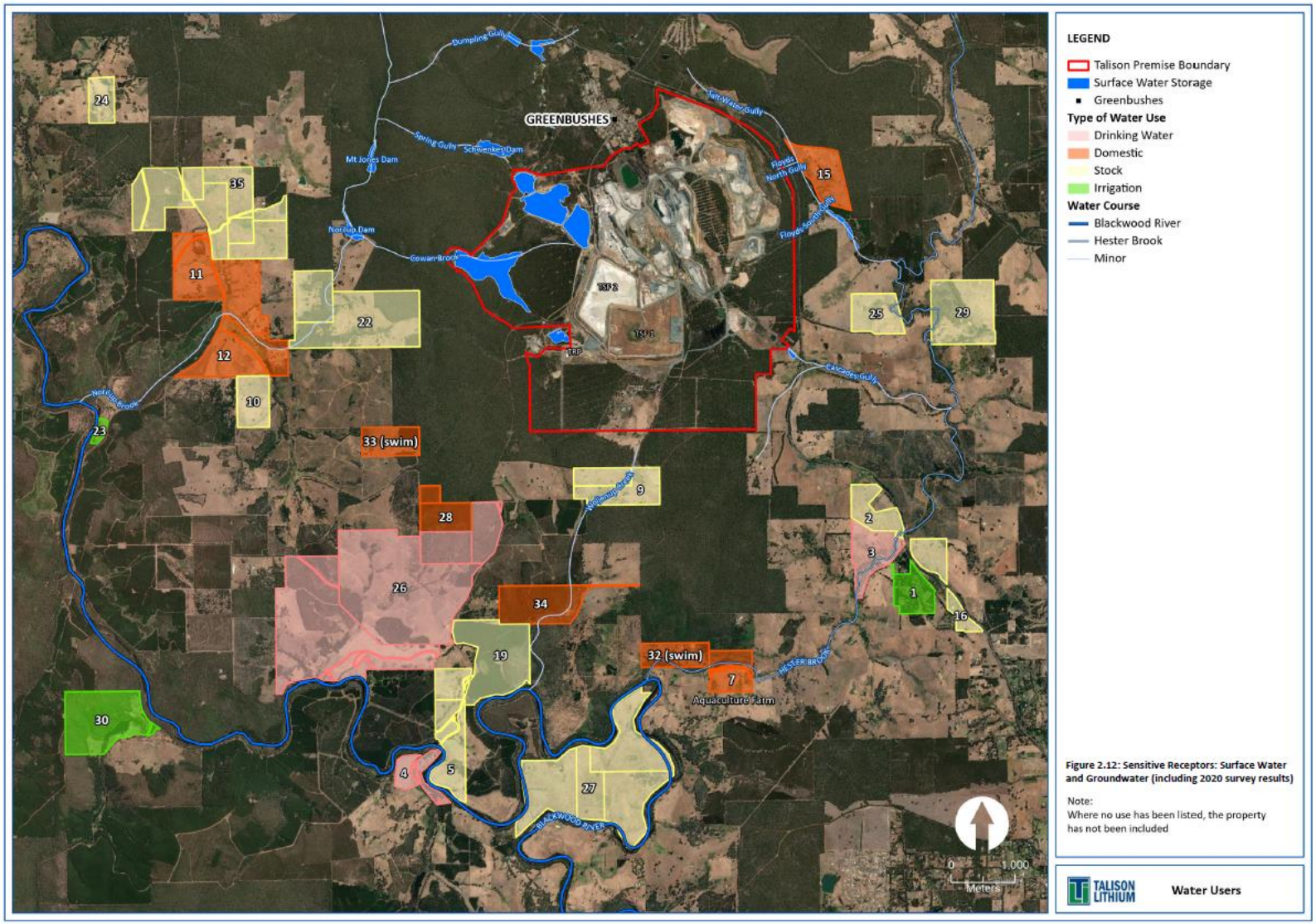


Figure 4 Nearby surface water and groundwater users (based on Talison 2021 survey - (Talison state no known additional groundwater users or uses as of 31/8/2023)

4.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 4.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Works Approval Holder has proposed mitigation measures/controls (as detailed in Section 4.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Works Approval Holder'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 Works Approval Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

The Revised Works Approval W6618/2021/1 that accompanies this Amendment Report authorises construction and time-limited operations. The conditions in the Revised Works Approval have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

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

Table 3: Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions[2] of works approval	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Works Approval Holder's controls**				
Construction								
Placement of BGM liner over 12.8 hectares of TSF4 cell 1 base	Dust	Air/windborne pathway causing impacts to health and amenity	Residences (closest 1 km south)	Refer to Section 4.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 1 – dust management with water cart	Placement of BGM liner instead of clay is not likely to result in a change of the risk profile associated with dust emissions. Existing condition requiring dust management with water cart is considered sufficient.
Operation **(including time-limited-operations operations)**								
Operation of TSF4 cell 1 with a liner comprising 16% BGM and 84% clay rather than 100% clay: • Potential loss of integrity of BGM liner resulting in additional seepage	TSF4 seepage water contaminated with metals/metalloids (modification to seepage rate)	Seepage through base and embankments to groundwater causing contamination and mounding Migration of contaminated groundwater off-site causing adverse impacts to ecosystem health and human health	Downstream surface water and groundwater users Blackwood River and tributaries, including Woljenup Creek Nearby native vegetation	Refer to Section 4.1.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1 – modified to include minimum BGM construction requirements	The applicant proposed controls have been placed on the works approval as regulatory controls.
Operation of TSF4 cell 1 with a liner comprising 16% BGM and 84% clay rather than 100% clay: • Increased seepage along joints between					C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1 – modified to include minimum BGM construction requirements – tie in detail	The applicant proposed controls have been placed on the works approval as regulatory controls.

Risk Event					Risk rating[1] C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions[2] of works approval	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Works Approval Holder's controls**				
BGM and clay liner								
Operation of TSF4 cell 1 with a liner comprising 16% BGM and 84% clay rather than 100% clay: • Additional decant water and tailings underdrainage deposited back to mine water circuit	Additional mine water circuit seepage contaminated with metals/metalloids	Additional seepage from the mine water circuit dams to groundwater causing contamination and mounding Migration of contaminated groundwater off-site causing adverse impacts to ecosystem health and human health	Downstream surface water and groundwater users Cowan Brook, Norilup Dam and Norilup Brook (water quality and ecology) Nearby native vegetation	Refer to Section 4.1.1	C = Moderate L = Unlikely **Medium Risk**	Existing licence conditions (L4247/1991/13) considered sufficient	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; and • submit a proposal for a revised annual ecological assessment for impacts to downstream sensitive surface water receptors. These conditions are currently considered sufficient to address risk associated with additional input to the mine water circuit. It is recommended that, at the time of the licence amendment application that will be required to allow ongoing operations of TSF4 Cell 1, the department check Talison's compliance with the specified action conditions and consider if they are sufficient to mitigate risk associated with additional input to the mine water circuit.	
	Additional water within mine water circuit contaminated with metals/metalloids	Potential for overtopping from mine water circuit dams		Refer to Section 4.1.1	C = Moderate L = Possible **Medium Risk**	Addressed by separate applications for the Talison site	Talison have historically had issues with capacity of the mine water circuit . The whole mine water circuit contains ~7 GL water. To help increase the capacity of the circuit, Talison applied to lift the embankment height of Cowan Brook Dam to 1,229 metres relative level (m RL) and was granted works approval W6795/2023/1 on 28 June 2023. The Cowan Brook Dam raise will provide between 0.7 – 0.8 GL additional capacity. The maximum additional input associated with BGM liner, ~0.03GL, will represent ~5% of the	

Risk Event					Risk rating[1] C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions[2] of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							additional capacity being created by the Cowan Brook Dam lift. Talison have also notified the department that they intend to submit applications to lift the embankment heights for Southampton Dam and Austin Dam in September/October 2023. It is recommended that, at the time of the licence amendment application to incorporate the expanded water storage infrastructure, the Department consider any updated water management requirements for the facility.	

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

Note 2: Proposed Works Approval Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

5. Consultation

Table 4 provides a summary of the consultation undertaken by the department.

Table 4: Consultation

Consultation method	Comments received	Department response
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal 13/7/2023	Please refer to section 3.1.1	The department has included within this decision report DMIRS comment that it is the tenement holder's responsibility to ensure mining operations are conducted in accordance with *Mining Act 1978* approvals.
Works approval holder was provided with draft amendment on 29/8/2023.	Responses to DWER queries and request to waive remaining consultation period.	N/A

6. Conclusion

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

The department is also assessing works approval W6832/2023/1 for a new wastewater treatment plant at the Talison accommodation village (at the time of writing). The proposal includes a discharge of treated effluent to TSF4. This discharge will be assessed under W6832/2023/1, with the relevant instruments to be amended later as required.

6.1 Summary of amendments

Table 5 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the revised works approval as part of the amendment process.

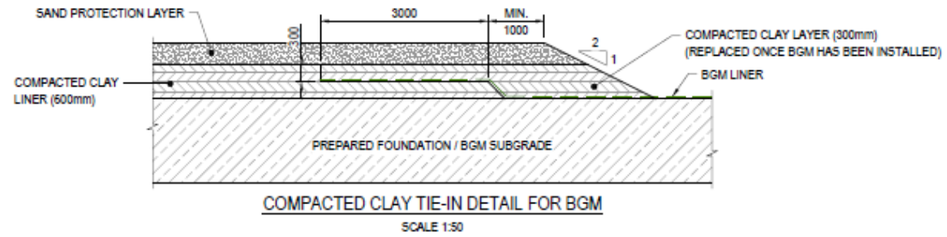
Table 5: Summary of works approval amendments

Condition no.	Proposed amendments
1	Construction condition modified to include requirements for BGM liner
Schedule 1	New figures 11 and 12, showing location of BGM liner within TSF4 cell 1 and BGM tie in detail

References

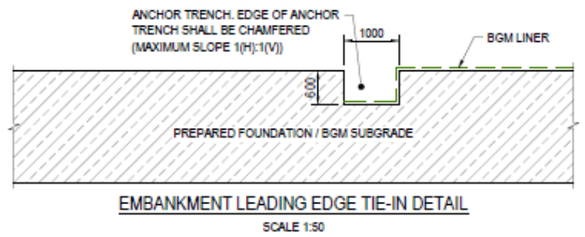
1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. GHD 2023, TSF4 cell 1 Bituminous Geomembrane Liner Design Report (DWER location reference A2187317, page 395)
5. Talison Lithium Australia 2023, TSF4 Works Approval Application Supporting Document – Cell 1 Bituminous Geomembrane Liner (DWER location reference A2187317)

Appendix 1: Additional figures



COMPACTED CLAY TIE-IN DETAIL FOR BGM

SCALE 1:50

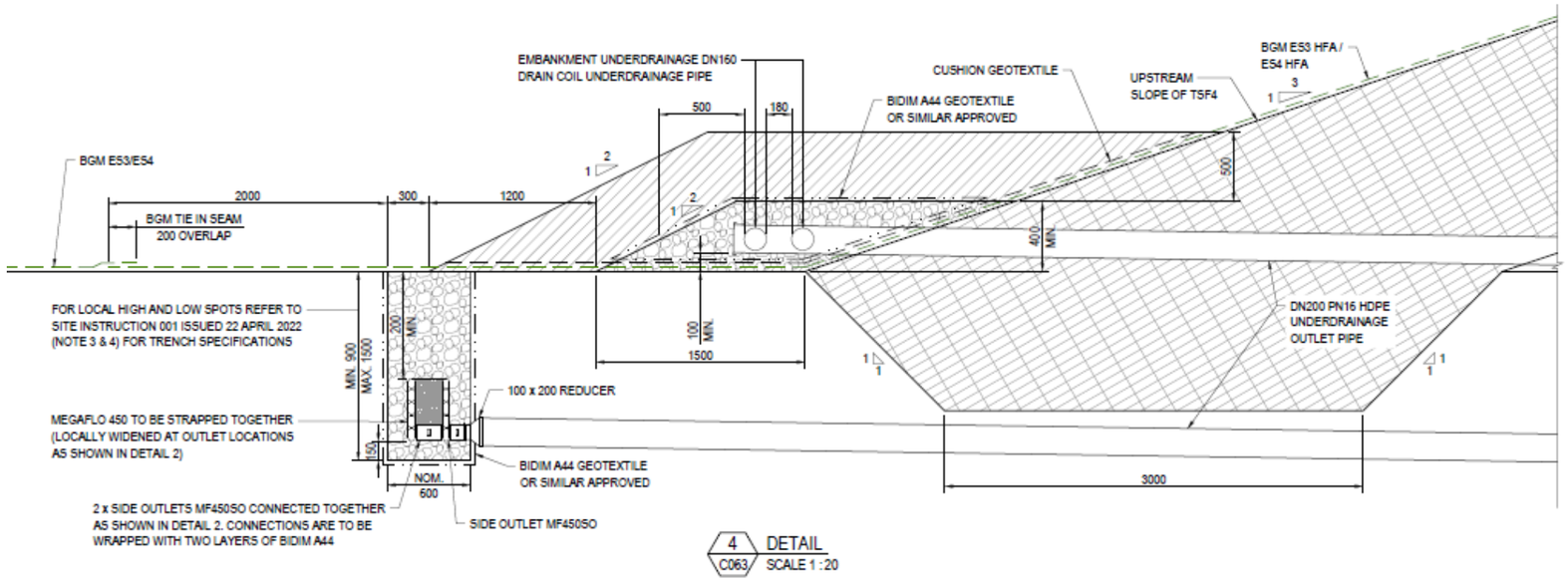


EMBANKMENT LEADING EDGE TIE-IN DETAIL

SCALE 1:50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.
2. ALL RL's ARE IN METRES TO LOCAL MINE DATUM (m).
3. WINDROWS TO INCLUDE BREAKS EVERY 40m FOR DRAINAGE.
4. STARTER EMBANKMENT HAS WIDER CREST THAN THE FINAL DAM, HENCE SET OUT LINE (INCLUDED IN STARTER DAM MODELS) IS OFFSET FROM THE FINAL DAM CENTRELINE. STARTER EMBANKMENT SETOUT LINE TO BE USED FOR STARTER DAM CONSTRUCTION.
5. EDGE OF ANCHOR TRENCH SHALL BE CHAMFERED (MAXIMUM SLOPE 1(H):1(V).
6. BITUMINOUS GEOMEMBRANE (BGM).



LEGEND:

- GENERAL ROCK FILL
- MINE WASTE ROCK
- SELECT MINE WASTE ROCK
- CLEAN TAILINGS SAND
- COMPACTED CLAY LINER
- PREPARED FOUNDATION / BGM SUBGRADE
- BGM
- SAND PROTECTION
- WEARING COURSE
- ZONE 1A
- ZONE 1B
- ZONE 2B (GRAVEL)
- ROCK LINING

Figure 5: TSF4 cell 1 starter embankment BGM tie-in detail

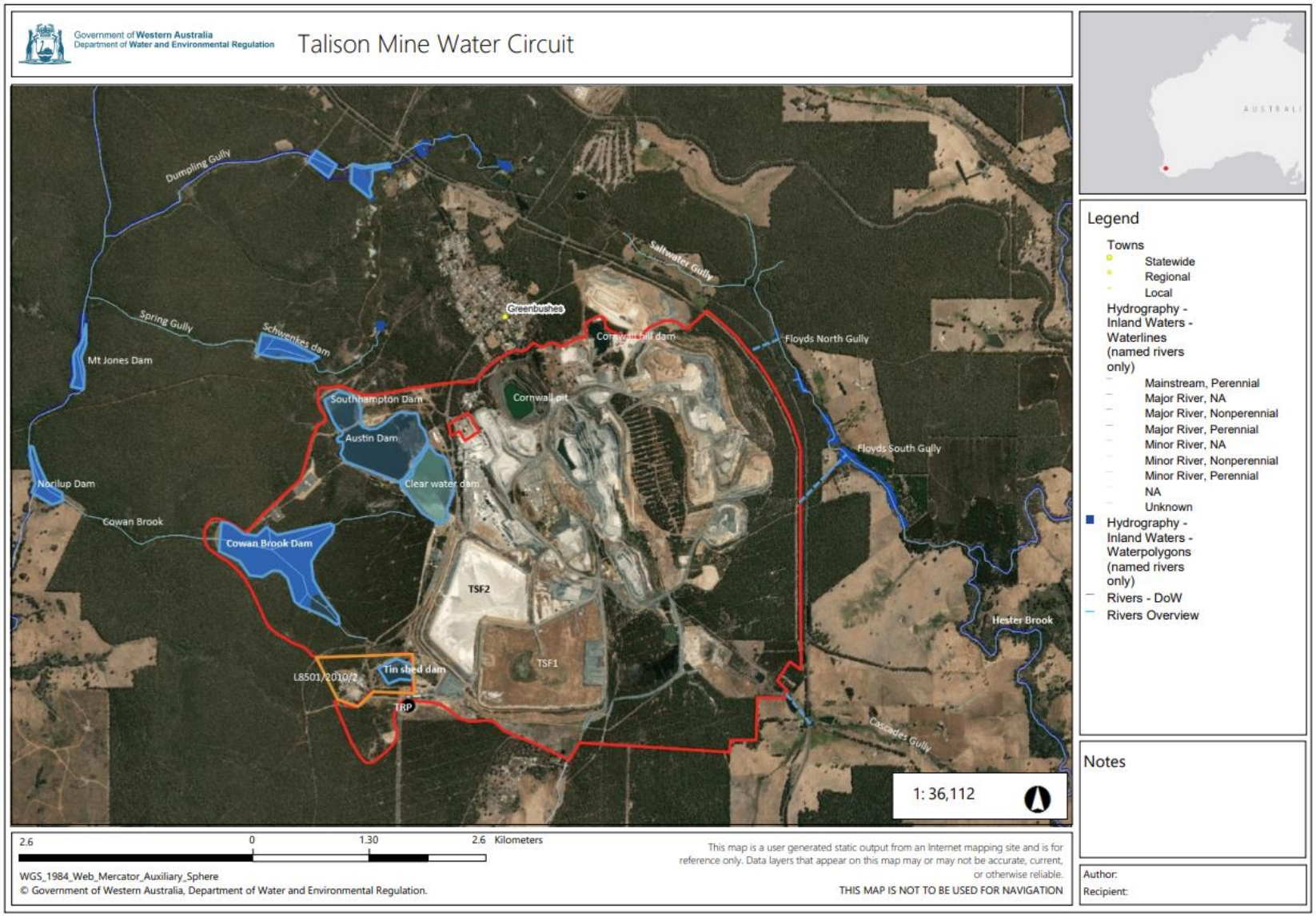


Figure 6 On premises water storage and off-site surface water

Appendix 2: Seepage calculation

Table 6 GHD (2013) Seepage rate through BGM due to installation defects

Item	Description	Value
Giroud and Bonaparte equation	$Q=C_{qo}\,[1+0.1(h/t_s)^{0.95}]\,a^{0.1}\,h^{0.9}\,k_s^{0.74}$	
C_{qo}	Contact quality factor for good contact	0.21
h	Liquid head	39.7 m
t_s	Thickness of saprolitic clay	10 m
a	Circular defect area	1 cm2
k_s	Permeability of saprolitic clay	4.75×10^{-03} m/d
Q	Rate of liquid migration per defect	2.86×10^{-01} $m^3/m^2/d$
n	Number of defects per Hecate	5
Q	Rate of liquid migration per hectare	1.43 $m^3/d/h$
A	Hectare	10,000 m^2
Q	Rate of liquid migration	1.43×10^{-04} m/d

Based on the calculated seepage and using the Darcy flux equation the normalised permeability of the BGM for 5 x 1 cm^2 defects per hectare is 1.69×10^{-13} m/s.

Replace the clay liner with BGM reduces the seepage by 97% and replacing 12.8 hectares of the 64.3 hectares clay liner with BGM will reduce the total vertical seepage from Cell 1 by 19%.

Appendix 3: Application validation summary

SECTION 1: APPLICATION SUMMARY			
Application type			
Amendment to works approval	☒	Current works approval number:	W6618/2021/1
Date application received		5/07/2023	
Applicant and Premises details			
Applicant name/s (full legal name/s)		Talison Lithium Australia Pty Ltd	
Premises name		Talison Greenbushes Lithium Mine	
Premises location		Maranup Ford Road, Greenbushes WA 6254	
Local Government Authority		Shire of Bridgetown – Greenbushes	
Application documents			
HPCM file reference number:		DER2021/000628~2	
Key application documents (additional to application form):		• Hydrogeological Investigation 2018 and Site-wide Hydrogeological Report 2019 (A2187308) • Talison TSF4 Geotechnical Investigation 2019 (A2187310) • Effluent and treated wastewater quality results 2021 (A2187312) • Mining Proposal Surface Water Assessment 2019 (A2187313) • Conservation Significant Terrestrial Fauna Management Plan 2019 (A2187308) • TSF4 Works Approval Application Supporting Document – Cell 1 Bituminous Geomembrane Liner (A2187318), including: o Tailings Storage Facility 4 – Detailed Design Report (GHD 2021) o Supporting Information for the Staged Commissioning Talison TSF4 Cell 1 (GHD 2023a) o TSF4 Cell 1 Bituminous Geomembrane Liner Design Report (GHD 2023b) o Environmental Review of Replacing Clay Liner with BGM in TSF4 Cell 1 (GHD 2023c) o Scope of Work – TSF4 Hydrogeological Investigation (GHD 2021b) o Acid and Metalliferous Drainage Studies	
Scope of application/assessment			
Summary of proposed activities or changes to existing operations.		• Proposed amendment to replace the clay liner in TSF4 with bituminous geomembrane (BGM) in the northern and north-eastern portions of Cell 1 where installation of the clay has been delayed by inclement weather. • Specifically, BGM will be installed across approximately 12.8 ha of the ~64.3 hectares of the floor of Cell 1 (~20% of floor area).	

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

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5: Processing or beneficiation of metallic or non-metallic ore	(c) 7 000 000 tonnes of tailings deposited per year	N/A

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: Managed under Part V ☐ Assessed under Part IV ☐
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☒ No ☐	Ministerial statement No: MS 1111 EPA Report No: 1635
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No: N/A
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☐ General lease ☐ Expiry: Mining lease / tenement ☒ Expiry: 27/12/2026 for M01/7 & M01/6 Other evidence ☐ Expiry:
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	Approval: Expiry date: If N/A explain why? 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 No clearing is proposed.
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 No clearing is proposed.

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: Licence / permit not required.
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 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) • Noise Regulations, Regulation17 exemption • Part V of the EP Act, Native Vegetation Clearing permit • Department of the Environment and Energy (DoEE)- EPBC 2013/6904 – Clearing • *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