



Application for Works Approval Amendment

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

Works Approval Number	W6734/2022/1
Works Approval Holder	MARBL Lithium Operations Pty Ltd
ACN	637 077 608
File Number	DER2022/000448
Premises	Wodgina Lithium Project L45/443, M45/383, M45/923, M45/1188, M45/1252, G45/321 and G45/291 MARBLE BAR WA 6760 As defined by the Premises map attached to the Revised Works Approval
Date of Report	09 September 2024 (FINAL)
Decision	Revised works approval granted

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1. Decision summary

Works Approval W6734/2022/1 is held by MARBL Lithium Operations Pty Ltd (Works Approval Holder) for the Wodgina Lithium Project (the Premises), located approximately 110 km south of Port Hedland within L45/443, M45/383, M45/923, M45/1188, M45/1252, G45/321 and G45/291.

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 W6734/2022/1 has been granted.

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 Amendment summary

On 13 March 2024, the Works Approval Holder submitted an application (MinRes 2024a) to the department to amend Works Approval W6734/2022/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act).

The amendment being sought is to expand to the current Atlas In-Pit (IP) Tailings Storage Facility (TSF) by 6.2 million cubic metres (Mm³) by expanding part of the TSF above ground.

Proposed changes to the current design include (refer also to section 2.2.1):

- Combining the Anson A, B and C pits with an embankment constructed to an elevation of RL 290 m expanding the tailings storage of the pits to above ground.
- Combining the Dragon A, B and C pit by construction of the Dragon Saddle embankment on the east to an elevation of RL 275 m.
- An increase in Constellation Pit B of the final tailings deposition level from RL 286 m to RL 290 m.

In addition, the following changes have been requested:

- Amend the minimum tailings discharge density (% solid) in previous Condition 15 (now Condition 14), Table 5 from 60% to a nominal 40% to 60% range during normal operating conditions (refer to section 2.2.2);
- Increase to the prescribed premises boundary to include tenement G45/291 (refer to section 2.2.3); and
- Update to the groundwater monitoring and seepage recovery bore network (refer to section 2.2.3).

This amendment is limited only to changes to the Category 5 activities from the Existing Works Approval. There is no change to the previously assessed Category 5 production or design capacity as a result of this amendment.

2.2.1 Atlas TSF

The existing Atlas IPTSF is a multi-pit facility consisting of six separate TSF areas (Anson Pit A and B; Dragon Pits A, B and C; and Constellation Pit B) as shown in Figure 1 below.

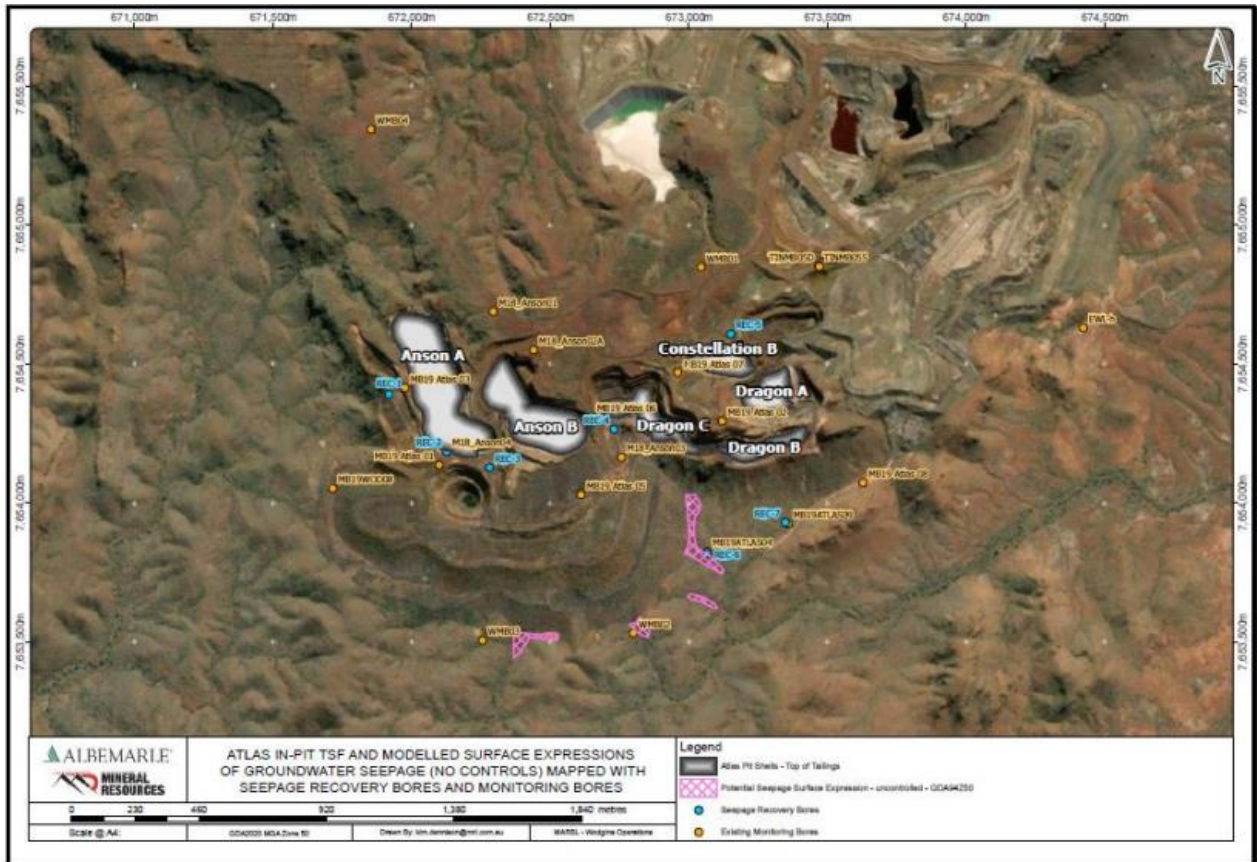


Figure 1: Existing Atlas IPTSF

The Works Approval Holder submitted an Environmental Compliance Report for the Anson Pits A and B on 11 July 2023 (MinRes 2023a). Under this works approval the Anson Pits A and B are currently operating under time-limited operations until the 24 March 2025.

As the Atlas IPTSF has limited storage capacity (estimated at 1.8 years at a tailings rate of 2.5 million tonnes per annum) it proposed for an embankment to convert the IPTSF to an above-ground TSF (referred to as Atlas TSF).

The Atlas TSF will consist of three separate deposition areas as shown in Figure 2:

1. Combined Anson TSF;
2. Combined Dragon TSF; and
3. Constellation B In-pit TSF.

Combined Anson TSF

The western area will combine the Anson A, B and C pits with an embankment, expanding the pits' storage above ground. The embankment will be constructed to an elevation of RL 290 m.

Combined Dragon TSF

The eastern area will combine the Dragon A, B, C pits by constructing the Dragon Saddle embankment on the east to an elevation of RL 275 m.

Constellation B IPTSF

It is proposed the maximum tailings deposition level is to be from RL 286 m to RL 290 m.

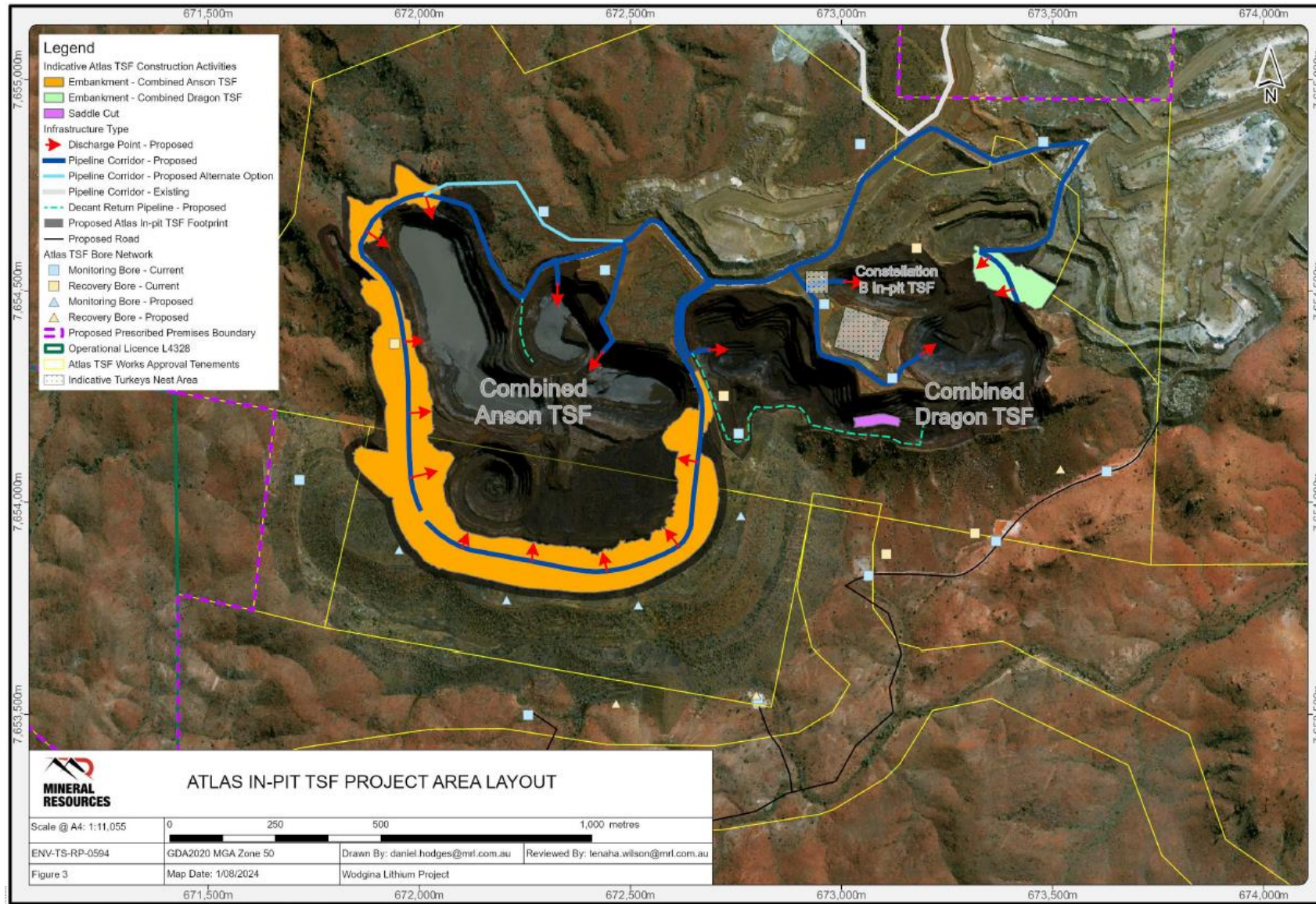


Figure 2: Atlas TSF

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Embankments

The embankments of the Atlas TSF are proposed to be constructed from blasted 'transitional' and oxide mine waste material sourced from nearby stockpiles to form the downstream general mine waste zone (Zone 1) and upstream select mine waste zone (Zone 2).

The Zone 1 material will be placed in homogenous horizontal layers and traffic compacted with construction traffic routed over the fill in a uniform distribution across the full width of the downstream zone. The Zone 1 material will be placed in traffic compacted layers not exceeding 1 m. Based on laboratory testing the dry density of the material is anticipated to range between 2.0 tonnes per cubic metre (t/m^3) and 2.2 t/m^3 . The expected hydraulic conductivity range is between 1×10^{-6} metres per second (m/s) and 1×10^{-5} m/s.

The Zone 2 material is proposed to be placed in compacted layers not exceeding 300 mm and compacted to a minimum of 95% Standard Modified Dry Density (SMDD). The dry density of the material has been assumed to be 2.0 t/m^3 and 2.2 t/m^3 and the expected hydraulic conductivity range is between 1×10^{-8} m/s and 1×10^{-6} m/s.

Tailings deposition and delivery system

Tailings slurry will be pumped at approximately 40% solids by mass to the Atlas TSF from the beneficiation plant via high density polyethylene (HDPE) pipework. The existing tailings delivery pipeline from the processing plant to the northeast side of the Atlas IPTSF, from where it will be connected and rerouted to the Atlas TSF embankment.

Tailings deposition will be sub-aerial and via multiple spigots along the embankment to systematically push the supernatant pond towards the decant reclaim area.

Decant water return system

Tailings deposition will be managed to allow tailings to beach towards the facility's north corner of the Combined Anson TSF, and southern section near the saddle cut of the Combined Dragon TSF.

Water will be recovered via a turret intake and diesel pump at the decant access and returned to the process plant via a HDPE return water pipeline. The existing pipeline will be relocated to the new decant structure and fully utilised.

Tailings characterisation

The beneficiation plant at the Premises has the capacity to produce the following three discrete tailings streams:

- Wet fine tailings (Fine).
- Dry coarse tailings (Coarse).
- Combined wet fine and coarse tailings (Total).

The Fine stream component of tailings will be deposited into the Atlas TSF. This tailings stream has previously been assessed under *W6734/2022/1 Report*, so no further assessment is required.

To note and also outside the scope of this assessment, coarse tailings are authorised under existing Licence L4328/1989/10 to be co-mingled with mine waste and deposited into the Eastern Waste Landform (EWL).

Seepage flow pathway

AQ2 Pty Ltd (AQ2) have been commissioned to undertake further (initial work was undertaken in 2022) groundwater modelling of potential seepage from the upscaled tailings deposition plan (i.e. use of Atlas Pits with raised pit crests / bunds to allow for an increased volume of tailings disposal) and assess the potential impact of seepage on the environment.

An updated numerical groundwater flow model was used to simulate seepage (as predicted seepage particle tracks) from the Atlas Pits.

Two tailings deposition scenarios (a Base Case and an Uncertainty Case) were considered. The Uncertainty Case is an upper estimate of the potential water stored in the in pit tailings and recharge to the underlying groundwater. This upper estimate of water stored is based on an upper estimate of the anticipated unconfined storage (specific yield) of the tailings material.

Modelling predicts that the operation of the proposed Combined Anson TSF without seepage mitigation (i.e. no seepage recovery bores in place) may result in:

- The water table in and around the Combined Anson TSF area rising (due to hydraulic pressure) and some surface seepage / ponding occurring on the southern side of the Atlas waste rock dump (WRD) (after 10 to 90 years).
- No surface seepage / ponding occurring to the east of the Combined Dragon TSF (during the 100 years simulated).
- Overall seepage pathways from the Atlas Pits TSF towards the south. These predicted flow paths are associated with very small flow volumes which are predicted to result in groundwater levels that exceed ground level on the southern side of the Atlas WRD after approximately 90 years. Seepage is not predicted to result in surface ponding in low-lying areas east of the Combined Dragon TSF or west of the Combined Anson TSF in any of the model runs.

AQ2 simulated seepage by assigning recharge to the pits with a rate based on hydraulic conductivity of the tailings material.

The AQ2 seepage model predicted that tailings deposition into the Atlas TSF will raise the water table, in and around the pits. Water levels on the southern side of the southern WRD are predicted to reach the surface 30 years into predictions, depending on surface elevation. Predicted water levels for the rest of the southern side of the Atlas WRD (WRD 1, WRD 3, WRD 4 and WRD 6 – refer to Figure 3) and on the eastern extended EWL (WRD 5) are not predicted to reach the surface. The predicted ponding is a result of hydraulic response to seepage recharging the water table beneath the TSFs and does not necessarily result in the daylighting of seepage.

Results of particle tracking modelling by AQ2 indicates that any groundwater flow from the proposed Atlas Pits TSF, will be along the enhanced permeability zones associated with faults, mineralised Banded Iron Formation (BIF), WRD (i.e. Mullock) and extended EWL. Furthermore, the model predicts it would take between 90 to 100 years for the seepage particles from the Atlas Pits TSF to reach the drainage lines south of the Atlas WRD and daylight at surface.

Refer to section 3 for the risk assessment of the Atlas TSF.

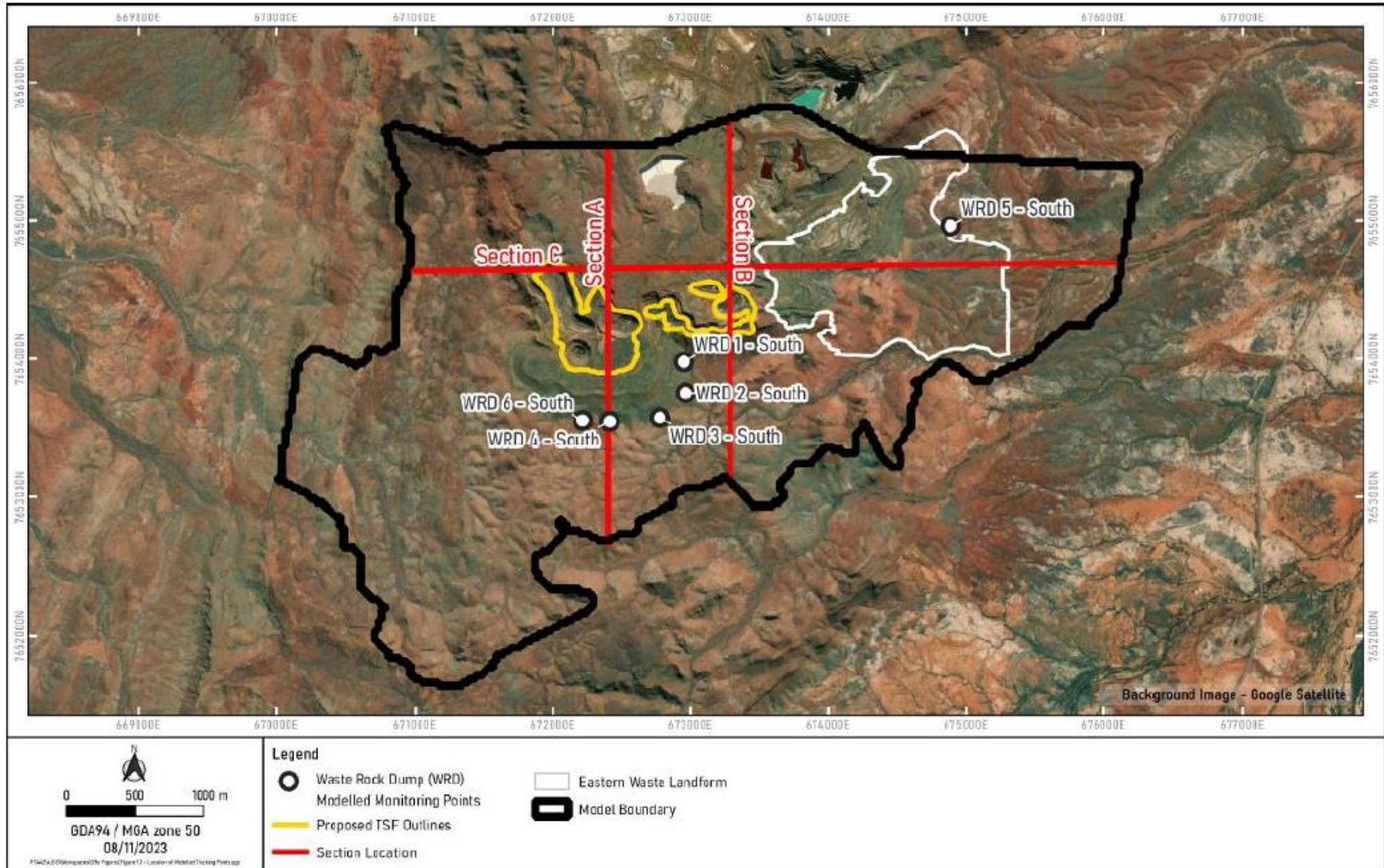


Figure 3: Modelled tracking points used for the Atlas WRD and extended EWL water level tracking

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2.2.2 Tailings discharge density

Previous Condition 15 (now Condition 14) required that the discharged tailing stream at the Atlas IPTSF contain a minimum of 60% solids content under normal operating conditions during Time-Limited Operations (TLO).

Upon review of the environmental commissioning report the department noted that the data showed tailings solids content under 40% on some days and requested the Works Approval Holder provide actions for implementation to increase the tailings solids content.

MinRes 2023b provided the following information as context:

- The process plant thickener was originally designed to pump tailings underflow at a target nominally between 55% and 65% solids content, for both the whole (coarse plus fine streams) and the fines-only tailings streams.
- Periods of lower tailings density were required by design (e.g., during a single train operation whereby addition of water is required to avoid solids settling within the pipeline and causing blockages).
- The process plant is currently unable to achieve the design solids content with the fine tailings stream due to an operational issue of line blockage created by a pump and pipeline sizing issue.
- The seepage study completed by AQ2 concluded that seepage from the Atlas IPTSFs would have minimal impact on groundwater quality and that any impact would be confined to the extent of the seepage migration.

The Works Approval Holder has requested to amend previous Condition 15 (now Condition 14), Table 5 from 60% to a nominal 40% to 60% range during normal operating conditions for the following reasons (*MinRes 2024a*):

- Variation in tailings slurry densities impacts short term water volumes stored in the facility which can be managed by adjusting decant return pumping. Measurement of the pond level and maintaining the required freeboard, is considered sufficient for managing TSF overtopping risk.
- Tailings discharge density (% solid) is not a parameter included in the modelling conducted by AQ2 (2023), thus variation in densities will not materially result in seepage outside of modelled results.

The Works Approval Holder has also advised that new tailings thickener underflow pumps with adjusted specifications to increase tailings discharge densities and new plant pipelines have been installed / constructed and are currently undergoing commissioning. Tailings solids contents of nominally 55% should now be achievable, for both whole tailings and fine tailings streams, under normal operating conditions.

The department has made the requested change.

2.2.3 Other amendments

Expansion of prescribed premises boundary

The Works Approval Holder has requested that tenement G45/291 be included in the prescribed premises boundary.

G45/291 is held by Wodgina Lithium Pty Ltd (WLPL) and Albemarle Wodgina Pty Ltd and expires on 21 January 2031.

The Premises was acquired by Mineral Resources Limited (MinRes) in 2016 under the subsidiary WLPL. In 2019, MinRes entered a joint venture with Albemarle Corporation and established MARBL Lithium Joint Venture (MARBL JV). MARBL JV operates as MARBL Lithium Operations Pty Ltd who are the Works Approval Holder for this Premises.

The department has added G45/291 to the prescribed premises boundary.

Groundwater monitoring and seepage recovery bore network

The updated groundwater modelling by AQ2 predicted that surface ponding and the surface expression of seepage particles from the upscaled Atlas Pits TSF in low lying areas (i.e. south of the Atlas WRD and east of the Combined Dragon TSF) can be mitigated by a network of low yielding seepage recovery bores.

To monitor and manage any potential seepage impacts from the Atlas TSF, several seepage recovery bores have been proposed. The nominal sites for seepage recovery bores were identified based on the following:

- Located on faults in the mineralised BIF (where practical).
- Located on the intersection of faults in the regional basement in the main area of predicted ponding.
- Sites that were accessible to drill rigs from both safety and environmental permitting perspectives.
- Bore locations will be refined following a hydrogeological drill program.

The Works Approval Holder proposes to:

- Decommission three monitoring bores MB19ATLAS01, MB19ATLAS03, MB18Anson04 and two recovery bores REC-2, REC-3 to allow for construction of the proposed Atlas TSF expansion; and
- Add four new monitoring bores TSFMB001, TSFMB002, TSFMB003, TSFMB004 and three recovery bores REC-8, REC-9, REC-10 as replacements.

The department has updated Conditions 2, 3 and 16 during this amendment with the requested changes.

To note: the Works Approval Holder did initially propose to decommission seepage recovery bore REC-1 as the embankment will be constructed over this bore. The Works Approval Holder is now proposing to retain REC-1 as a seepage recovery bore by raising the casing during embankment construction. If the bore is damaged during construction activities, it will then be decommissioned.

Seepage Model Validation following TLO

Previous Condition 20 required - *The works approval holder must submit a report with the results of proposed seepage model validation for Atlas in-pit TSF to the CEO within seven months from commencement of tailings deposition. The AQ2 seepage model must be validated based on observational data. The report must include a review of suitability of current groundwater monitoring and seepage recovery strategy and any response actions to ensure seepage is appropriately monitored and managed.*

The Works Approval Holder submitted *MinRes 2024b* to the department on 15 March 2024, which was assessed and determined to generally meet the requirements of Condition 20 of works approval W6734/2022/1.

To note: the department's Principal Hydrogeologist made the following recommendation:

- That ground-based geophysical investigations at the Premises are undertaken to identify groundwater bearing fractures. Such investigations would help identify the dominant groundwater bearing fractures near waste repositories, and would provide targets for the construction of additional monitoring bores where required.

Previous Condition 20 has been removed from W6734/2022/1 during this assessment.

It is important to note that the Works Approval Holder is still required (under Condition 19

(previously Condition 22)) to submit a report with a revision of long-term seepage migration prediction (using the most recent validated/re-calibrated AQ2 seepage model) to the department within 24 months from commencement of tailings deposition.

2.3 Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)

The current approved Mining Proposal for the Premises is Reg ID 120114.

The Works Approval Holder has stated that a site wide Mining Proposal and Mine Closure Plan associated with the activities described in this works approval amendment application has been submitted to DEMIRS and is pending review – Reg ID 122942.

The department referred the application to DEMIRS to advise on the geotechnical aspects of converting the IPTSF to an above-ground TSF.

Recommendations from DEMIRS (associated with this assessment) related to the following:

- Construction program and details of any tailings storage embankment must be supervised / documented by an engineering or geotechnical specialist.
- All monitoring at the facility being maintained as per design and reviewed by an engineering or geotechnical specialist.

The department (DWER) advises that approval of the Mining Proposal is required prior to works assessed under this amendment application commencing.

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 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	Construction activities associated with Atlas TSF including pipeline placement, bore construction and	Air / windborne pathway	<ul style="list-style-type: none"> • Dust monitoring of surrounding environment down wind. • Dust suppression techniques.
Noise	vehicle movement	Windborne / vibration	<ul style="list-style-type: none"> • No controls proposed.

Emission	Sources	Potential pathways	Proposed controls
Sediment laden stormwater		pathway	
		Overland runoff	<ul style="list-style-type: none"> • Surface drains constructed at the downstream side of the embankment.
Commissioning and TLO			
TSF supernatant containing concentrations of elements with environmental significance	Deposition of tailings into Atlas TSF	Seepage infiltration /	<ul style="list-style-type: none"> • The average in-situ dry density of the tailings is expected to be 1.3 – 1.5 t/m³. • The tailings slurry from the process plant is approximately 40% solids by mass (target of 60%). • The decant pond maintained more than 150 m from the embankment face. • Surface water removed from the Atlas TSF by decant pumps located on respective ramps (i.e. north side of Anson Pit and western area of Dragon Pit). • Return water pumped directly to the process plant for reuse. • Five existing seepage recovery bores (REC-1, REC-4, REC-5, REC-6 and REC-7); and three additional seepage recovery bores (REC-8, REC-9, and REC-10) to be constructed/ installed (refer to Figure 4).
		Groundwater mounding	
		Overtopping	<ul style="list-style-type: none"> • Design limit of tailings deposition level. • Daily inspections. • Deposition occurs through multiple spigots (spaced at 60 m intervals) along the embankment. • Multiple spigots operated at once, and cycled around the embankment perimeter to form an even beach profile towards the pond area. • Combined Dragon TSF able to accommodate a 1% Annual Exceedance Probability (AEP) 72-hour rainfall event, requiring storage above the normal operating level with an addition 0.5

Emission	Sources	Potential pathways	Proposed controls
			m of freeboard. <ul style="list-style-type: none"> • Combined Anson TSF to maintain a minimum freeboard of 0.5 m.
Dust		Air / windborne pathway	<ul style="list-style-type: none"> • Cyclic deposition maintaining a wet beach. • Progressive capping to TSF beach as a maximum level is approached.
Spillage of tailings and decant return water through leaks, pipeline ruptures or failure	Tailings delivery and return water pipelines	Direct discharges to land	<ul style="list-style-type: none"> • HDPE pipework. • Pressure gauges and pump shutdown switches fitted. • Bunding and catchpits to pipeline route.

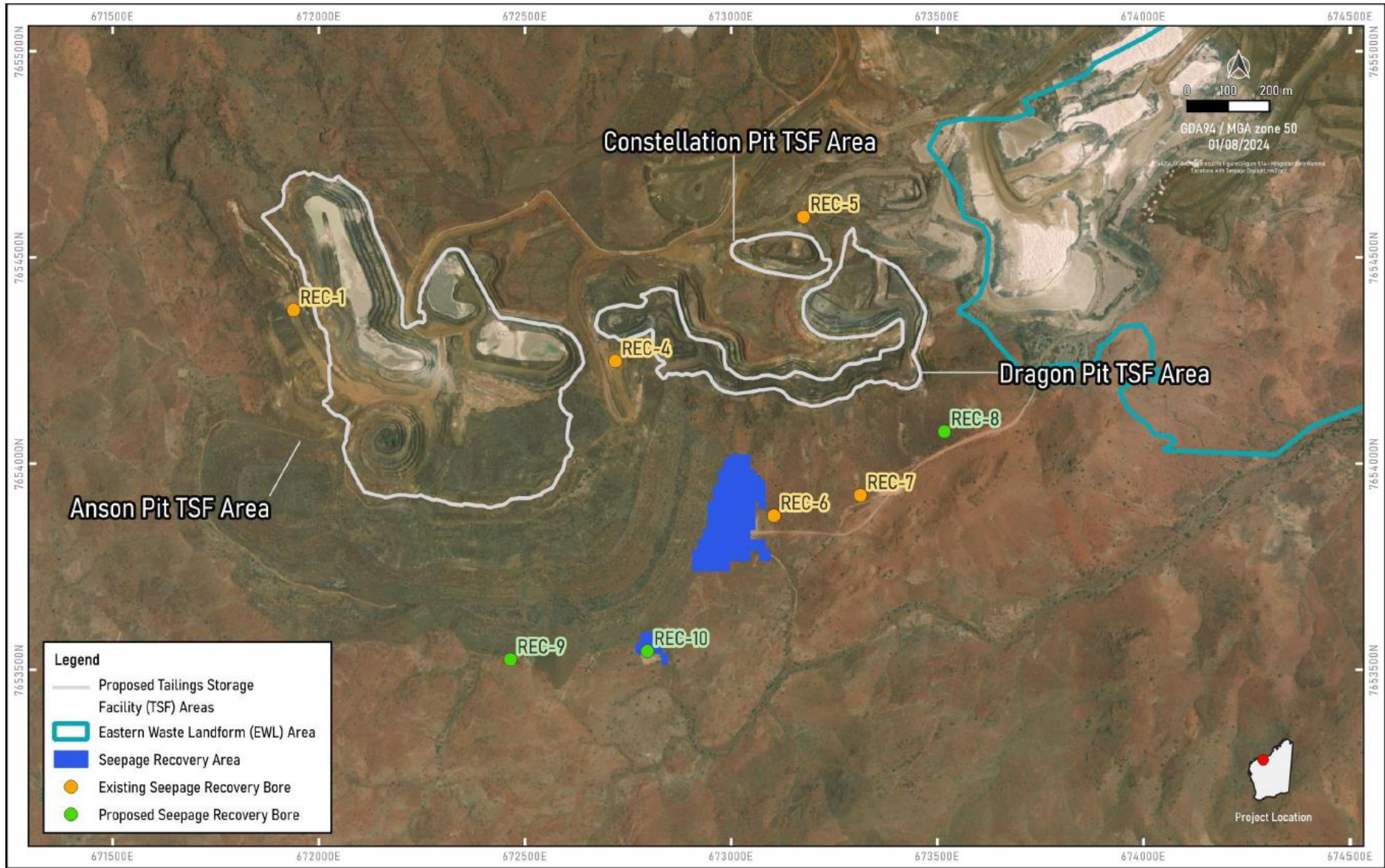


Figure 4: Location of existing and proposed seepage recovery bores

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3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), the Delegated Officer has excluded employees, visitors and contractors of the Works Approval Holder's 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 and Figures 5 and 6 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
Altura Mine Camp (not operated by the Licence Holder)	Approximately 9 km north-east of the proposed Atlas TSF.
Environmental receptors	Distance from prescribed activity
Groundwater	<p>The premises is located within the <i>Rights in Water and Irrigation Act 1914</i> (RIWI Act) Proclaimed Pilbara Groundwater and Surface Water Areas.</p> <p>No stock bores are in close proximity. The closest bore (not operated by the Works Approval Holder) that is for camp use is under groundwater licence GWL184329 (Pilgangoora Operations Pty Ltd). This bore is located more than 10 km from the Atlas TSF.</p> <p>Groundwater levels at the Atlas TSF range from 10 m below ground level (mbgl) in areas surrounding the greenstone belt to 55 – 95 mbgl within the greenstone belt located on the high ridges. This is below the base of the Atlas pits where base elevations range from 40 to 80 mbgl.</p> <p>Groundwater quality: Generally alkaline (pH 7.4 to 8.4), fresh to brackish salinity (510 to 3,200 mg/L total dissolved solids) and very hard (406 to 1,600 mg CaCO₃/L).</p> <p>Low environmentally significant metals and metalloids including arsenic, cadmium, cobalt, lead, mercury, selenium and thallium were detected.</p> <p>Variable in lithium content, ranging from 0.08 mg/L (groundwater in non-lithium bearing ultramafic rocks) to 9.5 mg/L (groundwater associated with pegmatite dykes).</p>
Major watercourses/ waterbodies	<p>No permanent surface water systems intersect the Atlas TSF, although semi-permanent pools, such as the Wodgina Rock Hole, occur following heavy rainfall events.</p> <p>The mine operations are predominantly situated within the western sub-catchment of the Turner River that drains generally in a north-east direction towards the Turner River approximately 9 km downstream of the Premises.</p>

	Ephemeral drainage located within Premises.
Conservation Significant Flora – refer to Figure 5	<p>Three significant species are located adjacent to the Atlas TSF area including:</p> <ul style="list-style-type: none"> • <i>Euphorbia clementii</i> (Priority 3) • <i>Terminalia supranitifolia</i> (Priority 3) • <i>Triodia chichesterensis</i> (Priority 3)
Threatened/ Priority Fauna	Numerous Threatened and Priority Fauna are located within the premises boundary.
Aboriginal Sites and Heritage Places – refer to Figure 6	<p>ID Number: 22037 – WodE#1 Mabarn Caves (lodged) Reg Site 6871 – Mt Tinstone (registered)</p> <p>The Works Approval Holder has stated that no Aboriginal heritage sites will be impacted or disturbed as a result of the construction of infrastructure proposed as part of this approval.</p>

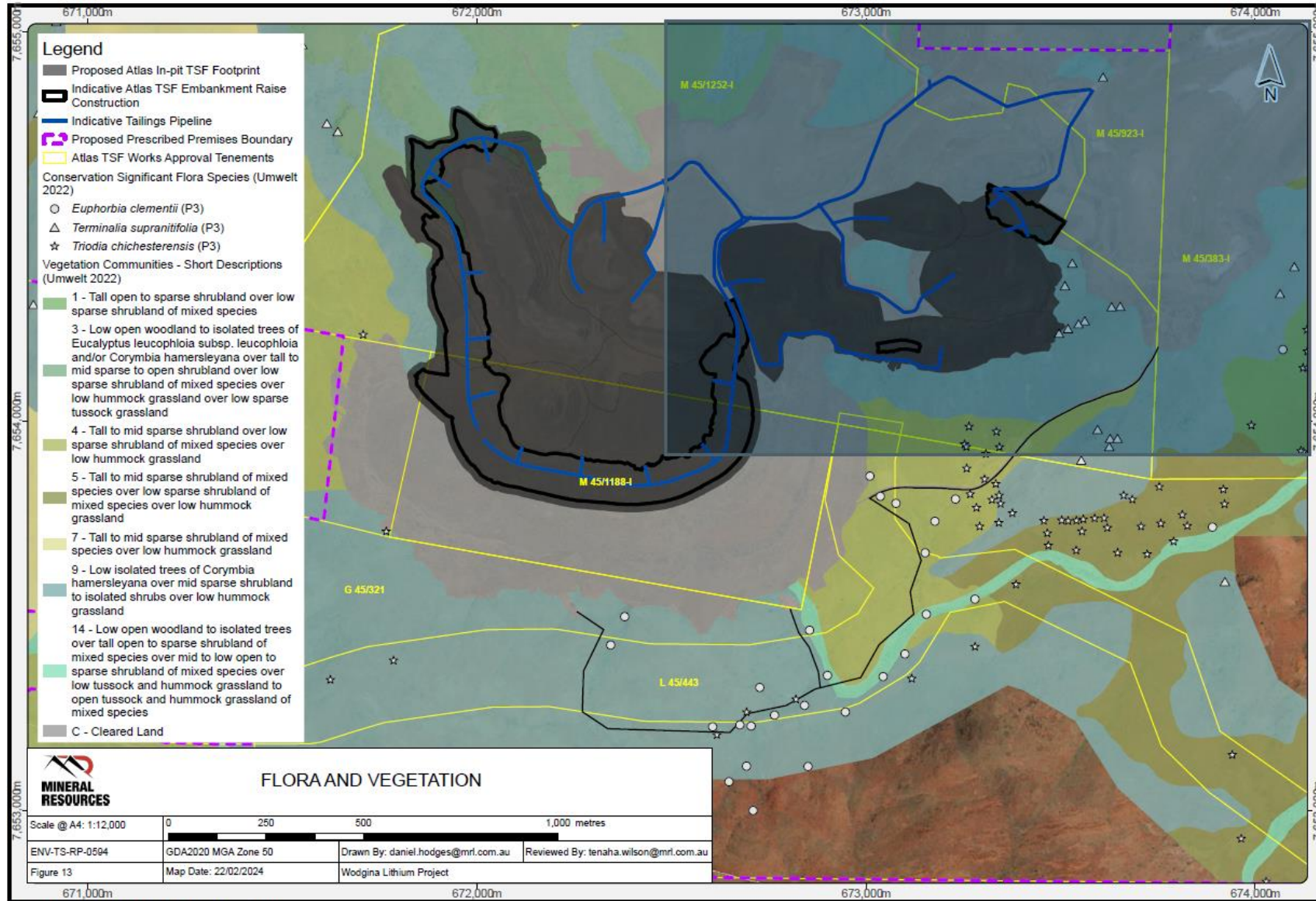


Figure 5: Flora and Vegetation

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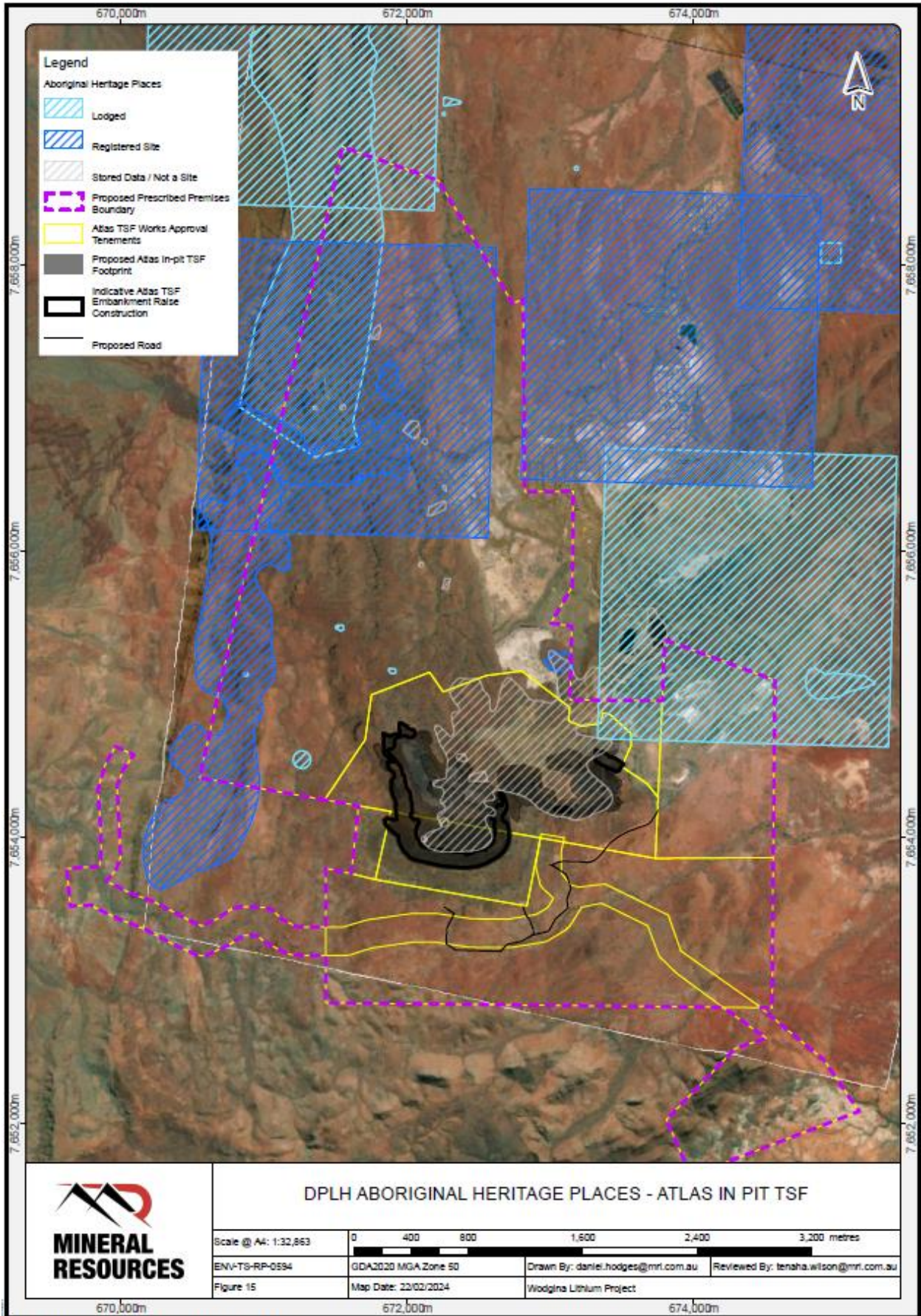


Figure 6: Aboriginal Heritage Places

3.2 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 3.1. 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 3.1), 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 W6734/2022/1 that accompanies this Amendment Report authorises construction and TLO of the Atlas TSF. The conditions in the Revised Works Approval have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to licence L4328/1989/10 is required following the TLO phase authorised under the works approval to authorise emissions associated with the ongoing operation of the Premises. 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, commissioning and operation of the Atlas TSF

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								
Construction activities associated with Atlas TSF including pipeline placement, bore construction and vehicle movement	Dust	Air / windborne pathway causing impacts to vegetation health	Surrounding vegetation Aboriginal Heritage Sites	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	No conditions imposed. The general provisions of the EP Act apply.	N/A
	Noise	Windborne / vibration disruption to nocturnal foraging behaviour	Conservation significant fauna Aboriginal Heritage Sites	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	N/A	No conditions imposed. The <i>Environmental Protection (Noise) Regulations 1997</i> applies.	N/A
	Sediment laden stormwater	Overland runoff impacting surrounding vegetation and resulting in sedimentation of surface water drainage	Surrounding vegetation Aboriginal Heritage Sites Surface water	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	No conditions imposed. The general provisions of the EP Act apply.	N/A
Commissioning and TLO								
Deposition of tailings into Atlas TSF	TSF supernatant containing concentrations of elements with environmental significance	Seepage / infiltration of supernatant water through pit walls and base resulting in reduced groundwater quality	Groundwater (>5 mbgl) with flow to the northeast toward the existing Cassiterite Pit mine void, to the west-southwest towards the Yule River and to the east- southeast	Refer to Section 3.1	C = Moderate L = Possible Medium Risk	Y	Condition 2 - Construction / installation requirements for the four additional groundwater monitoring bores. Condition 3 – Construction / installation requirements for the three additional seepage recovery bores. Condition 14 – Infrastructure	N/A

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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				
			towards Turner River West).				and equipment requirements during TLO for the Atlas TSF, seepage recovery bores, decant infrastructure and discharge point. Condition 15 – Authorised discharge points for tailings and decant water and seepage recovered water. Condition 16 – Groundwater monitoring during TLO. Condition 19 – Seepage mitigation report.	
		Groundwater mounding resulting in seepage expression on surface, impacting vegetation and reducing surface water quality.	Land / soils Surrounding vegetation, including Priority Flora (P3) Surface water located south/south east of proposed in-pit TSF, including its potential hyporheic community Aboriginal Heritage Site	Refer to Section 3.1	C = Moderate L = Possible Medium Risk	Y	Condition 2 - Construction / installation requirements for the four additional groundwater monitoring bores. Condition 3 – Construction / installation requirements for the three additional seepage recovery bores. Condition 14 – Infrastructure and equipment requirements during TLO for the Atlas TSF, seepage recovery bores, decant infrastructure and discharge point. Condition 15 – Authorised discharge points for tailings and decant water and seepage recovered water. Condition 16 – Groundwater monitoring during TLO. Condition 19 – Seepage	N/A

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				
							mitigation report.	
		Overtopping of tailings resulting in direct discharges to land and infiltration to soil resulting in reduced soil and surface water quality and impacting health of surrounding vegetation	Surrounding Vegetation, including Priority Flora (P3) Land/soils Surface water located south/south east of proposed in-pit TSF Aboriginal Heritage Site	Refer to Section 3.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 14 – Infrastructure and equipment requirements during TLO for the Atlas TSF, seepage recovery bores, decant infrastructure and discharge point. Condition 18 – Water balance for the Atlas TSF.	N/A
	Dust	Air / windborne pathway causing impacts to vegetation health due to dust deposition leading to reduced ability for photosynthesis and smothering	Surrounding Vegetation Aboriginal Heritage Site	Refer to Section 3.1	C = Slight L = Possible Low Risk	Y	Condition 14 – Infrastructure and equipment requirements during TLO for the Atlas TSF.	N/A
Tailings delivery and return water pipelines	Spillage of tailings and decant return water through leaks, pipeline ruptures or failure	Direct discharges to land and infiltration to soil resulting in reduced soil and surface water quality and impacting health of surrounding vegetation	Land/soils Surrounding vegetation Surface water Aboriginal Heritage Site	Refer to Section 3.1	C = Moderate L = Possible Medium Risk	Y	Condition 9 – Commissioning requirements for the tailings discharge and decant water return pipelines. Condition 14 – Infrastructure and equipment requirements during TLO for the tailings discharge and return pipelines.	N/A

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.

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4. Consultation

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

Table 4: Consultation

Consultation method	Comments received	Department response
DEMIRS advised of proposal on 10 May 2024	Response received 03 July 2024	Refer to section 2.3
Kariyarra Aboriginal Corporation advised of proposal on 10 May 2024	No comments received	N/A
Works Approval Holder was provided with draft amendment on 18 July 2024	The Works Approval Holder provided comments (MinRes 2024c) on 09 August 2024 Refer to Appendix 1	Refer to Appendix 1
Works Approval Holder was provided with a 2 nd draft amendment on 22 August 2024	The Works Approval Holder responded (MinRes 2024d) on 06 September 2024 stating <i>“As per our discussion, we are happy to accept the conditions in the second draft.”</i>	N/A

5. 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.

5.1 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.

Note: Refer to Appendix 1 for additional updates to the works approval following the initial proposed draft works approval being provided to the Works Approval Holder on 18 July 2024.

Table 5: Summary of works approval amendments

Condition no.	Proposed amendments
Premises details	Inclusion of G45/291 and the locality. Refer also to section 2.2.3 under Expansion of prescribed premises boundary.
Condition numbering	Updated in line with works approval conditions.
1	Inclusion of construction / installation requirements for the Atlas TSF including the combined pits, embankments and tailings pipelines and decant return water pipelines.

Condition no.	Proposed amendments
	<p>Administrative updates and references to Figures updated.</p> <p>Removal of reference to monitoring bores and seepage recovery bores as these are conditioned under conditions 2 and 3.</p>
2	<p>Removal of column for timeframe.</p> <p>Inclusion of column for monitoring bore location(s) including reference to the Figure and bore numbers.</p> <p>Removal of reference to 'existing bores' and baseline data requirements.</p>
3	<p>Removal of column for timeframe.</p> <p>Inclusion of Figure and seepage recovery bore numbers.</p> <p>Removal of reference to 'existing bores'.</p>
Previous condition 4	<p><u>Installation of meteorological monitoring unit</u></p> <p>This condition has been removed. The Environmental Compliance Report which included this infrastructure was received by the department on 11 July 2023 (MinRes 2023a) satisfying this condition.</p>
Previous condition 6	<p><u>2D seepage modelling</u></p> <p>This condition has been removed. The Environmental Compliance Report which included this requirement was received by the department on 11 July 2023 (MinRes 2023a) satisfying this condition.</p>
Condition 5 (previous condition 7)	<p>Administrative changes to remove reference to deleted conditions.</p>
Condition 6 (previously condition 8)	<p>Administrative updates.</p> <p>Removal of reference to 'existing bores'.</p> <p>Removal of previous (f) and (g) as these requirements have been met (MinRes 2023a).</p>
Condition 14 (previously condition 15)	<p>Inclusion and removal of operational requirements for the Atlas TSF in line with <i>MinRes 2024a</i>.</p> <p>Administrative and referencing updates.</p> <p>Refer also to section 2.2.2 - Tailings discharge density.</p>
Condition 15 (previously condition 16)	<p>Correct Figures now referenced.</p>
Condition 16 (previously condition 17)	<p>Inclusion and removal of groundwater monitoring bores in line with <i>MinRes 2024a</i>.</p> <p>Refer also to section 2.2.3 under Groundwater monitoring and seepage recovery bore network.</p>
Condition 18 (previously condition 19)	<p>Administrative updates to remove reference to deleted conditions.</p>

Condition no.	Proposed amendments
Previous condition 20	Removed. Refer to section 2.2.3 under Seepage Model Validation following TLO.
Condition 21 (previously condition 23)	Administrative updates.
Definitions	Updated as per works approval conditions.
Schedule 1: Maps	Previous Figures 1, 2, 3 and 4 removed. Inclusion of new Figures 1, 2, 3, 4, 5, 6, 7 and 8.

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. Mineral Resources Limited (MinRes) 2023a, RE: *Works Approval (W6734/2022/1) – Compliance Report, Wodgina Lithium Project Atlas In-Pit Tailings Storage Facility*, dated 06 July 2023 (DWER reference: DWERDT806121).
5. MinRes 2023b, RE: *Works Approval (W6734/2022/1) – Atlas Tailings Storage Facility Commissioning Report, Wodgina Lithium Project*, dated 21 December 2023 (DWER reference: A2244675).
6. MinRes 2024a, *Part V Works Approval Amendment Application Attachment 3B – Supporting Documentation*, MARBL Lithium Operations, 13 March 2024 (DWER reference: A2266369).
7. MinRes 2024b, RE: *Wodgina Works Approval (W6734/2022/1) – Seepage Model Validation Report for Atlas Tailings Storage Facility*, dated 15 March 2024 (DWER reference: DWERDT922364).
8. MinRes 2024c, *Response to DWER – Proposed Amendment to Works Approval W6734/2022/1*, dated 09 August 2024 (DWER reference: DWERDT989024).
9. MinRes 2024d, RE: *MinRes response 20240906 Proposed Amendment to Works Approval W6734/2022/1 – Second Draft*, dated 06 September 2024 (DWER reference: A2308666).
10. W6734/2022/1 Report available at <https://www.der.wa.gov.au/our-work/licences-and-works-approvals/current-licences>.

Appendix 1: Summary of Works Approval Holder's comments on risk assessment and draft conditions

Condition	Summary of Works Approval Holder's comment	Department's response
Condition 1, Table 1, row 1 for the Atlas TSF	<p>The Works Approval Holder has requested that the Combined Dragon TSF (consisting of Dragon A, B and C pits) be considered as separate infrastructure to the Constellation Pit B TSF.</p>	<p>The department has updated the works approval and Amendment Report to read:</p> <p>Atlas TSF consisting of three separate TSF areas:</p> <ul style="list-style-type: none"> • Combined Anson TSF • Combined Dragon TSF • Constellation B In-pit TSF. <p>Design and construction requirements for each TSF has also been updated as applicable.</p> <p>Based on this request, the department has also updated conditions 5, 9 and 14 making it clearer that each TSF is considered as separate infrastructure so compliance and commissioning reporting will need to be undertaken / submitted for each TSF.</p>
Condition 1, Table 1, row 1 for the Embankments	<p>The Works Approval Holder states that <i>REE (2023) Section 6.3: Embankment Design includes "The excavation depth of they key trench will be less should competent material be reach[ed]"</i>.</p> <p><i>Competent material will be determined when refusal during excavation is met.</i></p> <p>The Works Approval Holder proposed the following revision:</p> <ul style="list-style-type: none"> • Embankment to incorporate a cut-off trench excavated to a nominal depth of up to 0.5 m within the natural ground <u>or</u> <u>competent material</u> to reduce seepage losses. 	<p>The department has made the requested change.</p>

Condition	Summary of Works Approval Holder's comment	Department's response
<p>Condition 1, Table 1, row 1 for the Tailings discharge point</p>	<p>The Works Approval Holder states that <i>REE (2024) design includes tailings discharge points from both over pit walls and from embankment crests.</i></p> <p><i>The conceptual design of the slotted pipe is presented in REE (2024) Appendix H: Design Drawings.</i></p> <p>The Works Approval Holder proposed the following revision:</p> <ul style="list-style-type: none"> At the discharge points <u>located at pit walls</u> the tailings delivery pipe extends a minimum distance of 5 to 10 m over the pit rim crest. <u>Discharge points located on embankments will be HDPE pipe extending down the embankment face.</u> 	<p>The department has made the requested change.</p>
<p>Condition 1, Table 1, row 2</p>	<p>The Works Approval has stated that some discharge points are not located on the TSF embankments.</p> <p>The Works Approval Holder proposed the following revision:</p> <ul style="list-style-type: none"> Existing tailings delivery pipeline from the processing plant to the northeast side of the Atlas in-pit TSF, from where it will be connected and rerouted to the Atlas TSF embankment; <p>The Works Approval Holder also provided an updated Schedule 1: Figure 6, which aligns with a revision to the Mining Proposal. The changes include an alternative pipeline route to the north of the Combined Anson TSF and the indicative Turkeys Nest location. The alternate tailings pipeline corridor route will simplify construction activities.</p>	<p>The department has made the requested change to the wording and has updated Schedule 1: Figure 6.</p>
<p>Condition 1, Table 1 Additional infrastructure</p>	<p>The Works Approval Holder has stated that they propose <i>to reuse recovered TSF seepage water and Reverse Osmosis (RO) reject water (approved waste type on L4328, approved for use as dust suppression in disturbed areas) for construction activities for the Combined Anson TSF and Combined Dragon TSF. Raw groundwater from production bores may also be used. The proposed Turkeys Nest has been included in a revision to the Mining Proposal (Reg ID 122942).</i></p>	<p>The department has included the Turkeys Nest to condition 1, Table 1 as row 3 with construction requirements.</p> <p>Also refer to the department's response for Condition 14, Table 5, row 2; and Condition 15, Table 6.</p>

Condition	Summary of Works Approval Holder's comment	Department's response
	<p><i>The final location of the Turkeys Nest will be adjacent the Combined Dragon TSF, with an indicative location presented on Attachment 1.</i></p> <p><i>Recovered seepage that will be used for construction activities will be sourced from the recovery bores presented in Attachment 2.</i></p> <p><i>The Turkeys Nest design is included as Attachment 3.</i></p>	
<p>Condition 1, Table 1</p>	<p>The Works Approval Holder has stated that <i>The use of the drawings included in Schedule 1 Figure 2 to Figure 5 is discussed by in REE (2024) Appendix C: Construction Technical Specification, Section 4. The drawings and specifications may be amended during the works in response to site conditions encountered during construction and safe work requirements. Any amendments will be included as a Hold Point, requiring approval from the Responsible Engineer or Representative in order for works to progress. Any modifications made during construction would align with the overall design intent. As-built drawings will be prepared at completion of the works and will present any changes to initial design. These changes will also be captured and explained in the as-constructed report.</i></p> <p><i>As the Drawings are included in Schedule 1 Figure 2 to Figure 5, there is the potential that changes to design, in line with that detailed in the REE (2024) Construction Technical Specification and described above, could be interpreted as a non-compliance with Condition 1.</i></p>	<p>The department has included new condition 7 as shown below:</p> <p><i>Subject to conditions 5 and 6, where an item of infrastructure or component of infrastructure has been certified as not being constructed, or does not comply with corresponding requirements, or contains material defects, the works approval holder must:</i></p> <ul style="list-style-type: none"> <i>(a) correct the non-complaint or defective works, prior to re-certifying in accordance with condition 6(a); or</i> <i>(b) provide to the CEO a description of, and explanation for, any departures from the requirements specified in condition 1 that do not require rectification and do not constitute a material defect along with the Environmental Compliance Report.</i>
<p>Condition 13</p>	<p>The department queried the timeframe (date for completion of time limited operation) including consideration of construction and commissioning periods for the Atlas TSF.</p> <p>The Works Approval Holder has stated that providing an exact date for completion of Time Limited Operations (TLO) in this situation is not practical. The Combined Dragon TSF and Combined Anson TSF will be commissioned at different times due to variation in construction timelines.</p> <p>To simplify reporting requirements and allow for a holistic assessment of monitoring data, the Works Approval Holder proposed a 180-calendar day limit for TLO from the date all infrastructure associated with the Atlas</p>	<p>As the TSFs are identified as separate infrastructure, which is now reflected in conditions 5, 9, 11 and 14 the department has updated condition 13 as shown below:</p> <p>The works approval holder may conduct time limited operations for an item of infrastructure specified in condition 14:</p> <ul style="list-style-type: none"> <i>(a) for a period not exceeding 24 March 2025 180¹ calendar days from the day the works approval holder meets the requirements of condition 12 for that item of infrastructure; or</i> <i>(b) until such time as a licence for that item of infrastructure is granted in accordance with Part V of</i>

Condition	Summary of Works Approval Holder's comment	Department's response
	<p>TSF listed in Table 1 is constructed.</p>	<p><i>the Environmental Protection Act 1986, if one is granted before the end of the period specified in condition 13(a).</i></p> <p><i>Note 1: The works approval holder may only conduct time limited operations for the Anson Pits A and B until 24 March 2025.</i></p> <p>This will ensure that the Anson Pits A and B are operated under time limited operations until 24 March 2025 (as per existing condition); and that each separate TSF (associated with the Atlas TSF) is only operated under time limited operations for a 180 calendar day period from the date that the Commissioning Report is provided for each TSF.</p>
<p>Condition 14, Table 5, row 1</p>	<p>The Works Approval Holder has stated that the stormwater storage requirements in Schedule 2 are now outdated. Freeboard will be managed as per the new requirements included in Table 5 Line 1.</p> <p>The Works Approval Holder requests that Schedule 2 is removed.</p>	<p>The department has removed the following requirement and deleted Schedule 2:</p> <ul style="list-style-type: none"> • Decant RL must not exceed recommended final level at decant RL(m) s per Schedule 2.

Condition	Summary of Works Approval Holder's comment	Department's response
<p>Condition 14, Table 5, row 2</p>	<p>The Works Approval Holder proposes to use recovered seepage from the current approved recovery bores as a source of water for embankment works during the Construction phase of the Combined Anson TSF and Combined Dragon. The recovered seepage would be transferred to a HDPE-lined Turkeys Nest.</p> <p>Given the recovered seepage will be used within the Atlas TSF footprint and will be stored in a HDPE-lined Turkeys Nest, the risk of this activity is considered negligible.</p> <p>The Works Approval Holder requests the following revised condition wording:</p> <ul style="list-style-type: none"> Recovered seepage must be pumped back to the plant <u>or to the Turkeys Nest for use in TSF construction activities.</u> 	<p>The department has not made the requested change.</p> <p>The use of seepage water for dust suppression was not part of the original works approval amendment application.</p> <p>Existing licence L4328/1989/10 Condition 18 stipulates that TSF3E decant water or process water must not be used for dust suppression.</p> <p>The department notes that recovered seepage water will be from the Atlas TSF, but as the department has not risk assessed the use of seepage water to the environment via dust suppression under this works approval amendment the activity is therefore not supported.</p> <p>Under the existing licence L4328/1989/10 only diluted RO brine is authorised for dust suppression purposes within the Premises as outlined below:</p> <p>Condition 3 allows for RO brine:</p> <ul style="list-style-type: none"> To be used for dust suppression within disturbed areas and vegetation avoided. RO brine must not be directly discharged to the environment. To be discharged into Cassiterite Pit (this is also authorised under Condition 15 of L4328/1989/10). <p>Condition 17 states <i>that only diluted RO brine, as specified in condition 3, is used for dust suppression on pre-disturbed locations throughout the prescribed premises including haul roads, access roads, ROM pads and waste dumps associated with the mine and crushing plant and construction areas.</i></p>
<p>Condition 15, Table 6</p>	<p>The Works Approval Holder has requested the inclusion of discharge of seepage recovered water and RO reject (approved waste type on L4328) from the RO Plant to the Turkeys Nest for use in TSF construction activities.</p>	<p>As above, the use of decant water and / or seepage recovered water is not supported by the department.</p> <p>The department has updated Table 6 to authorise the use of diluted RO brine for dust suppression purposes within the</p>

Condition	Summary of Works Approval Holder's comment	Department's response
		<p>Atlas TSF footprint.</p> <p>A footnote stipulating that RO brine must not be diluted with Decant water and / or Seepage recovered water has also been included.</p> <p>Existing Condition 15, Table 6 of W6734/2022/1 stipulates that decant water and seepage recovered water must be returned via new and existing pipelines to the existing processing plant infrastructure.</p>
Schedule 1, Figures	The Works Approval Holder has provided new Figures 6, 7, 8 and 9	The department has updated the Figures in Schedule 1 as requested.