



Application for Licence Amendment

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

Licence Number	L8337/2009/2
Licence Holder	Genesis Minerals (Leonora) Pty Ltd
ACN	667 073 681
Application Number	APP-0030600
Premises	Gwalia Mine LEONORA WA 6438 Legal description - Mining Tenements: G37/25, G37/26, G37/27, M37/17, M37/25, M37/55, M37/137, M37/170, M37/200, M37/247, M37/251, M37/333, M37/391, M37/689, M37/903, M37/1026, M37/1027, M37/1150, L37/33, L37/34, L37/35, L37/36, L37/56, L37/58 and L37/66. LEONORA WA 6438 as depicted in Schedule 1. As defined by the Premises map attached to the revised Licence
Date of Report	25/03/2026
Decision	Revised licence granted

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1. Decision summary

Licence L8337/2009/2 is held by Genesis Minerals (Leonora) Pty Ltd (licence holder) for the Gwalia Mine (the Premises), located at mining tenements: G37/25, G37/26, G37/27, M37/17, M37/25, M37/55, M37/137, M37/170, M37/200, M37/247, M37/251, M37/333, M37/391, M37/903, M37/1026, M37/1027, L37/33, L37/34, L37/35, L37/36, L37/56, L37/58 and L37/66.

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 Licence L8337/2009/2 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 15 August 2025, the licence holder submitted an application to the department to amend Licence L8337/2009/2 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Include category 57 to the licence to authorise the storage of used tyres with a proposed maximum amount of 500 tyres;
- Increase proposed throughput of the processing plant from 1,500,000 to 1,600,000 tonnes per annum (tpa);
- Increase operating height of tailings storage facility (TSF4) supernatant pond from 372.8 m to 382.8 m;
- Include six seepage recovery bores to the licence;
- Construction and operation of a turkeys nest and mine dewater pipelines. Inclusion of additional mine dewater discharge locations;
- Authorisation to dispose tyres within tyre specific landfills within Waste Rock Landforms (WRLs); and
- Amend prescribed premises boundary to include mining tenements M37/689 and M37/1150 to the premises boundary to accommodate the WRL tyre disposal area, turkeys nest, and a used tyre storage location.

This amendment is limited only to changes to Category 5, 6 and 89 activities from the existing licence. No changes to the aspects of the existing Licence relating to Category 52 and 73 have been requested by the licence holder. Table 1 below outlines the proposed changes to the existing Licence.

Table 1: Proposed design and throughput capacity changes

Category	Current design and throughput capacity	Proposed design and throughput capacity	Description of proposed amendment
Category 5: Processing	<u>Existing:</u> 1,500,000 tonnes per annual	<u>Proposed</u> 1,600,000 tonnes per	No construction works is required to increase the throughput of the processing

Category	Current design and throughput capacity	Proposed design and throughput capacity	Description of proposed amendment
or beneficiation of metallic or non-metallic ore	period	annual period	<p>plant. The Licence holder has stated that the increase will be achieved through a series of process optimisation initiatives within the existing circuit, including improved maintenance scheduling, enhanced reagent dosing controls, and more efficient material handling practices.</p> <p>Construction of additional TSF embankments lifts are already authorised under the licence (the licence only limits the maximum operating height of the supernatant pond).</p> <p>The licence holder is requesting to increase operating height of supernatant pond from 372.8 to 382.8 m;</p>
Category 6: Mine dewatering	<u>Existing:</u> 5,500,000 tonnes per annual period	No change	<p>The licence holder is seeking approval to construct a new turkey nest damn constructed to store saline water from mine dewatering and to construct new pipelines to allow disposal of mine dewater into new disposal pit (Gwalia).</p> <p>Mine dewater stored within the turkey's nest will also be used for dust suppression.</p> <p>Currently Tower Hill and Harbour Lights and Lake Raeside (via sedimentation pond) are the only mine dewater discharge locations currently approved.</p>
Category 89: Putrescible landfill	<u>Existing:</u> 5,000 tonnes per annual period	No change	Inclusion of tyre disposal (inert waste type 2) within tyre specific landfills located within in two active waste rock dumps.

The amendment scope also included a request to construct and operate a mobile crushing and screening plant to process waste rock with a proposed throughput of 300,000 tonnes per annual period. This was later removed from the scope of the assessment and will be assessed under a separate licence amendment application.

3. Category 5

The licence holder has proposed multiple changes to the premises that are applicable to category 5 activities, these include:

- Increase the maximum throughput of the processing plant from 1,500,000 to 1,600,000 tpa;

- Increase the maximum supernatant pond operational height of TSF4 supernatant pond from 372.8 to 382.8 mRL; and
- Inclusion of seepage recovery infrastructure, additional monitoring bores and standing water level (SWL) triggers associated with TSF4 to the licence.

3.1 Increased throughput

The licence holder has identified an opportunity to increase ore throughput in the processing plant by an additional 100,000 tpa. This increase will be achieved through a series of process optimisation initiatives within the existing circuit, including improved maintenance scheduling, enhanced reagent dosing controls, and more efficient material handling practices (Astill 2025). Collectively, these measures are expected to deliver greater operational efficiency and reduce plant downtime.

The licence holder has also secured a more consistent and reliable supply of ore through recent acquisitions. This improved supply will allow the mill to operate at a more stable feed rate without exceeding design constraints. No additional infrastructure is required to facilitate the increased throughput.

3.2 Increase supernatant pond operating height for TSF4

The licence holder has requested approval to increase the operating height of TSF4 from 372.8 (Stage 2) to a final height of 382.8 mRL (Stage 6). It is noted that the construction of embankment raise stage 1-6 have already been approved under condition 9 of the licence but that operation after stage 2 has been restricted. It is understood that the intention behind this request is to enable continual operation of the TSF after each embankment raise (stage 2-6) has been constructed without the requirement for additional licence amendments to authorise higher operation heights.

3.2.1 TSF4 background

In 2020, the partially rehabilitated Grant's Patch Tailings Storage Facility (GP TSF) was converted into TSF4 by combining the two existing GP TSF cells into a single cell, in accordance with a licence amendment granted in December 2016. That amendment authorised the staged construction of the TSF embankment over six lifts to a final crest elevation of 383.5 mRL. To date, TSF4 has been constructed to a crest elevation of 373.5 mRL (Stage 2), although its current operating limit was restricted to stage 1 at 370.3 mRL.

Operation at the Stage 2 height was approved in December 2023, permitting the supernatant pond to operate up to 372.8 mRL. Construction of the Stage 2 embankment was completed in November 2023, and the associated compliance report was submitted on 15 March 2024. The department assessed the report on 30 January 2026 and determined that it generally met with the requirements of the licence conditions, no follow up actions were required.

During the 2023 licence amendment, a condition was added to the licence requiring the licence holder to engage a qualified hydrogeologist to develop a Groundwater Management Plan (GMP) to manage groundwater mounding impacts around TSF3 and TSF4. This requirement was imposed in response to groundwater expression observed at the surface. The department considered it necessary to evaluate the performance of the upgraded seepage control measures targeted at improving the toe drain and pumping infrastructure prior to authorising operation after additional embankment lifts at TSF4 (DWER 2023).

The GMP was required to address the following matters:

- An assessment of the existing groundwater monitoring bore network and its adequacy for monitoring groundwater mounding and seepage impacts within the zone of influence of TSF3 and TSF4;

- If found inadequate, the identification of proposed new groundwater monitoring locations and bore specifications (e.g., depths, screened intervals), with supporting justification;
- A suitable groundwater monitoring program including bore-specific standing water level triggers for both existing and new bores (if required); and
- Management actions to be implemented should groundwater level triggers be exceeded.

The licence holder engaged WSP Pty Ltd (WSP) to prepare the GMP, which was submitted to the department on 19 June 2024.

3.2.2 2024 Groundwater Management Plan

The GMP identified data gaps within the existing groundwater bore network and provided recommendations to improve the network, the following observations were noted:

- All existing bores are close to the TSF3 and TSF4 embankments. Bores at greater distance in a southerly direction are required to define the TSF zone of influence (ZOI);
- Surrounding vegetation is a potential shallow seepage receptor, there are no groundwater monitoring bores within the vegetation zones;
- A gap appears to be present in the monitoring bore network along the TSF4 southern embankment between TSF4/3 and TSF3/07 bores; and
- TSF3/8 bore is situated within a trench, any water flow out of the bore is recovered in the toe-drain therefore actual measured groundwater levels may be inaccurate. *“The TSF is bordered to the north by a Waste Rock Landform, and any mounding associated with the final lift of TSF3 is unlikely to result in the environmental impact. Due to the non-representative groundwater levels being collected and their limited environmental value TSF3/8 should be removed from the groundwater monitoring programme.”* (WSP 2024).

Additional monitoring bores

As a result of the identified gaps, WSP (2024) recommended to install five additional monitoring bores to expand the monitoring network to better define the TSF ZOI and to better understand baseline conditions for a potential future TSF expansion to the south.

In addition, WSP (2024) proposed four shallow monitoring bores (between 3 to 6 meters below ground level (mbgl)) to monitor groundwater within surrounding vegetation zones. The intention of the bores was to *“... identify if the vegetation is dependent upon a shallow water table the presence of which cannot be guaranteed”* (WSP 2024).

Recovery bores

To manage groundwater levels WSP (2024) recommended the installation of five¹ recovery bores along the southern perimeter of the TSF. Each bore is proposed to be approximately 18 m deep and spaced roughly 100 m apart and fitted with 4-inch submersible pumps. The GMP also recommended that step-rate testing and a 24-hour constant rate pump tests be undertaken as part of the installation works.

The recovery bores will be managed to balance the objectives of controlling groundwater levels and seepage while avoiding the unintended draw-in of water from Lake Raeside (WSP 2024).

¹ Six recovery bores were installed instead (Pennington Scott 2025).

Tentative Trigger Action Response Plan

The GMP (WSP 2024) proposed standing water level (SWL) early trigger and trigger responses to a rise in SWL.

Early trigger response includes:

- Notification of mine management;
- Review recent monitoring results against historical data;
- Compare observation data with model predictions;
- Investigate the likely cause of any exceedance;
- Determine if there has been a specific incident or operational practice that has led to an exceedance; and
- Report Incidents in accordance with Environmental Licence reporting obligations.

Full trigger response includes:

- Review decant pond area and location. Manage the decant pond such that it is away from the trigger exceedance area and generally away from southern and western embankments;
- Review the toe drain design and operation e.g. set the trench pump inlet to a lower level or deepen the trench and the pump inlet; and
- Recovery bore operation.

The only TSF4 monitoring bores with proposed triggers were TSF4/05 and TSF4/06. Development of triggers for other bores are either not provided as baseline values are naturally at or close to groundwater levels or the proposed triggers will be informed after the trial period (post construction).

Conclusion

The GMP (WSP 2024) made the following conclusions:

- Groundwater levels to the west of the TSF has, since the year 2000 been consistently within 0.5 mbgl, and often close to, or at ground level. A groundwater trigger level stipulating a minimum depth to water would not be appropriate to the west of the TSF as the natural groundwater levels associated with Lake Raeside are close to or at ground level;
- Deposition of tailings into TSF4 has resulted in a rapid rise of groundwater to or close to ground level identified within TSF3/7, TSF4/2 and TSF4/3;
- Groundwater levels south of TSF4 can potentially be managed by recovery bores, deepening the TSF4 toe drain and pump inlet, or reducing/redirecting deposition into/from TSF4; and
- Viability of recovery bores is dependent upon sufficient sand aquifers.

Departments review of the GMP

The department assessed the GMP on 13 August 2024 and determined that it met the requirements² of the licence conditions. As part of its assessment, the Department

² The only non-compliance was a late submission, the department considered it an administrative non-compliance and considers that no environmental harm occurred as a result.

recommended to the licence holder that geophysical investigations³ be undertaken along transects extending away from each side of the TSF structures to better define the extent of groundwater mounding, consistent with historical investigations.

The department also recommended that evaporation rates be reviewed in future submissions. It considered that actual seepage rates are likely higher than those presented in the GMP due to the hypersaline nature of the decant water, noting that pan factors may range between 0.2 and 0.4 of the local pan evaporation rate.

In addition, the department advised the licence holder in 2024 that once the proposed additional monitoring bores have been constructed, the licence should be updated to incorporate these bores, including bore-specific trigger levels and associated management responses.

3.2.3 Implementation and Addendum to Groundwater Management Plan

The licence holder engaged Pennington Scott (2025) to implement the recommendations within the GMP and address the comments provided by the department. The scope included:

- Interpret frequency domain electromagnetics (FDEM) geophysical surveys to validate the proposed bore locations;
- Supervise the construction of the new seepage and monitoring bores in accordance with the GMP (WSP 2024);
- Conduct hydraulic testing of the seepage recovery bores;
- Recommend bore equipping requirements; and
- Prepare an operational plan detailing trigger levels and associated management responses.

To confirm the suitability of the proposed bore locations, Pennington Scott (2025) utilised historical FDEM surveys, which measure shallow ground conductance. These conductance values are predominantly influenced by the presence of high cation-exchange capacity clays and/or saline groundwater.

Construction of the seepage recovery bores (RB01 to RB06) and all ZOI and vegetation monitoring bores (MB01 to MB09) occurred between November 2024 and January 2025. To date, no seepage recovery bores have been equipped with pumps and are not yet in operation.

Seepage recovery bores RB03 and RB06 were installed on interpreted structural features within the bedrock. The high yields recorded from RB06 (Table 2) indicate that the bore likely intersected a permeable fault or shear zone. In contrast, RB03 was not drilled to a sufficient depth to verify the presence of the interpreted structural feature (Pennington Scott 2025).

The department considers that adequate geological information was available to support the interpretation of the FDEM survey data. The installed locations of the seepage recovery bores are appropriate and effectively target the significant basement lineaments identified near RB03, RB05 and RB06, which represent potential seepage pathways originating from the southern embankment wall of TSF4.

Pennington Scott (2025) has proposed a Management Response Plan (MRP) with proposed trigger levels for bores to reduce groundwater levels surrounding the TSF. Details of the MRP and trigger levels are presented within section 8.3.5 of the detailed risk assessment for TSF4 seepage.

³ Frequency domain electromagnetic investigations had previously occurred and are presented in section 3.2.3.

Hydraulic testing of seepage recovery bores

To ensure optimal performance of the seepage recovery bores, pumping should occur at rates high enough to induce sufficient drawdown, but low enough to minimise well losses each time pumping commences.

To calculate indicative optimal pumping rates, Pennington Scott (2025) undertook hydraulic testing of the seepage recovery bores. Testing consisted of five step rate tests, a 24 hour constant rate test (CRT), and a 2-hour recovery period (Pennington Scott, 2025).

Hydraulic testing of each seepage recovery bore was completed through the following steps:

- Installation of an electrical submersible sump pump;
- Use of Pennington Scott's automated SmartPump system, which includes water level and flowrate sensors, an actuated flow control valve, remote generator relays, and a telemetry system;
- Four 40 minute step tests performed at rates ranging from 0.1 to 15 L/s (Table 2);
- Determination of a sustainable pumping rate for the CRT based on step-test results; and
- Measurement of bore recovery over a 2 hour period following completion of the CRT.

Pennington Scott (2025) applied the Theis formula to estimate theoretical drawdown within the pumping bore. However, the use of the Theis equation to determine transmissivity and storage parameters requires adherence to the Dupuit assumptions⁴ (1863), which include:

1. The aquifer is confined;
2. The aquifer is of infinite lateral extent;
3. The aquifer is homogeneous, isotropic, and of uniform thickness within the area influenced by pumping;
4. The piezometric surface is horizontal prior to pumping;
5. Pumping occurs at a constant rate;
6. The pumping well fully penetrates the aquifer;
7. Flow to the well is in an unsteady state; and
8. The bore has an infinitesimally small radius (i.e., the model does not account for well storage).

Bore efficiencies were assessed using step-rate tests, where pumping occurs at sequentially higher rates. The constructed seepage recovery bores exhibited well efficiencies ranging from 34% to 100%, with end-of-test drawdowns between 8 and 36.5 meters below top of casing (mbtoc). The hydraulic testing results and recommended pumping rates are summarised in (Table 2).

⁴ Pumping tests that meet all of the Dupuit (1863) assumptions are very rare and therefore most pumping test analyses are to some degrees are compromised.

Table 2: Summary of step test / well efficiency (Sourced from Pennington Scott 2025)

Seepage Recovery Bore	SWL start of steps (mbtoc)	SWL end of steps (mbtoc)	Step test rates (kL/day)	Well efficiency (%)	Recommended rate @ 5 m SW (kL/day)
RB01	1.6	27.2	135, 233, 337, 423	62, 50, 40, 34	330
RB02	2.1	36.5	13, 45, 129, 171	100, 100, 100, 100	50
RB03	2.0	7.9	42, 64, 86, 110, 133, 148	100, 100, 100, 100, 100	105
RB04	1.7	14.3	24, 54, 81, 113, 142, 199	100, 100, 100, 100, 100	120
RB05	3.6	11.9	36, 90.5	100, 100	56
RB06	1.5	13.4	515, 739, 1024	99, 98, 97	780

4. Category 6

4.1 Gwalia Pit

The licence holder has proposed to include Gwalia Pit as a mine dewater discharge location. Gwalia Pit is located approximately 1.5 kms southeast of Tower Hill Pit and approximately 4.1 kms south of Harbour Lights Pit which are the currently approved mine dewater discharge pit locations on the licence (Figure 1).

The request to include Gwalia Pit as an additional mine dewater discharge location is intended to provide greater operational flexibility and enable water generated within the prescribed premises to be discharged into other approved pits.

To facilitate the new mine dewater discharge location the licence holder has proposed to construct additional mine dewatering pipelines to connect all three pits and proposes that water will be transported between each pit as required. The current and proposed pipelines are presented in Figure 1.

Mine dewater is currently abstracted from Gwalia underground mine with the entry portal located at the northern portion of the Gwalia Pit approximately 1.9 km from the surface.

4.1.1 Groundwater hydrology and parameters

Pre-mining groundwater salinity was reported to range from 1,500 to 12,500 mg/L total dissolved solids (TDS), and average 6,000 mg/L TDS. Salinities generally increase with depth and were up to 51,000 mg/L TDS in deep bores constructed for dewatering the deposit.

Groundwater recharge occurs mainly along creek lines as direct infiltration through alluvial sediments. The high evaporation rates reduce general seepage during summer months.

Groundwater flow within the area flows towards the major palaeodrainages and modern playa lakes where the water table is close to the surface (Astil 2025) which is in a southerly direction. It is noted that the TSF seepage mounding may influence the regional groundwater flow direction. The licence holder has mentioned that the pits all share the same aquifer system (Astil 2025) and the department notes that Gwalia pit is likely down groundwater gradient of the two other approved mine dewater discharge locations.

Since 2023 field pH and TDS concentrations recorded at Tower Hill Pit generally ranges from

~7.0 to 7.7 and ~110,000 to 120,000 mg/L respectively. During the same period Harbour Lights Pit has recorded pH and TDS concentrations of 7.2 to 8.0 and ~86,000 to 105,000 mg/L. It is observed that there is an increasing trend of TDS concentrations which could be caused from evaporation and/or the increase of salinity within the mine dewater as mining has increased in depth.

Metal concentrations that are generally reported within the pits consists of arsenic, calcium, cobalt, magnesium, nickel, potassium and sulfate. Other metals such as copper, iron, chromium (III+VI), lead, mercury, selenium and zinc are generally reported at very low concentrations are below the laboratory limit of reporting (LOR).

Although the groundwater in the area is not suitable for livestock drinking water and irrigation due to the high salinity nature it is noted the arsenic, calcium, magnesium and sulfate exceeds the draft livestock drinking water guidelines (ANZG 2023a) while cobalt exceeds the draft default guideline values for irrigation water (ANZG 2023b).

4.2 Tower Hill Turkey Nest Dam

The licence holder proposes to construct a new turkey's nest approximately 1.4 km southwest of Tower Hill Pit and 1.8 km west of Gwalia Pit.

The turkey nest dam will be used to store mine dewater and water sourced from the nearby borefield for dust suppression activities. Water will be pumped from the turkey's nest to a local standpipe, where it will be used to fill water carts (Astril, 2025).

The bund walls of the turkey's nest will be constructed using compacted, suitable clay material and lined with a HDPE liner to achieve a permeability of less than 1×10^{-9} m/s. To prevent fauna fatalities, wildlife egress matting will be installed within the dam.

5. Category 57 – Used tyre storage

The licence holder has requested to include category 57 to the licence to authorised the storage of up to 500 tyres at various locations (i.e. workshops and laydown areas) within the prescribed premises (Figure 2).

No storage or fire management controls have been proposed by the licence holder.

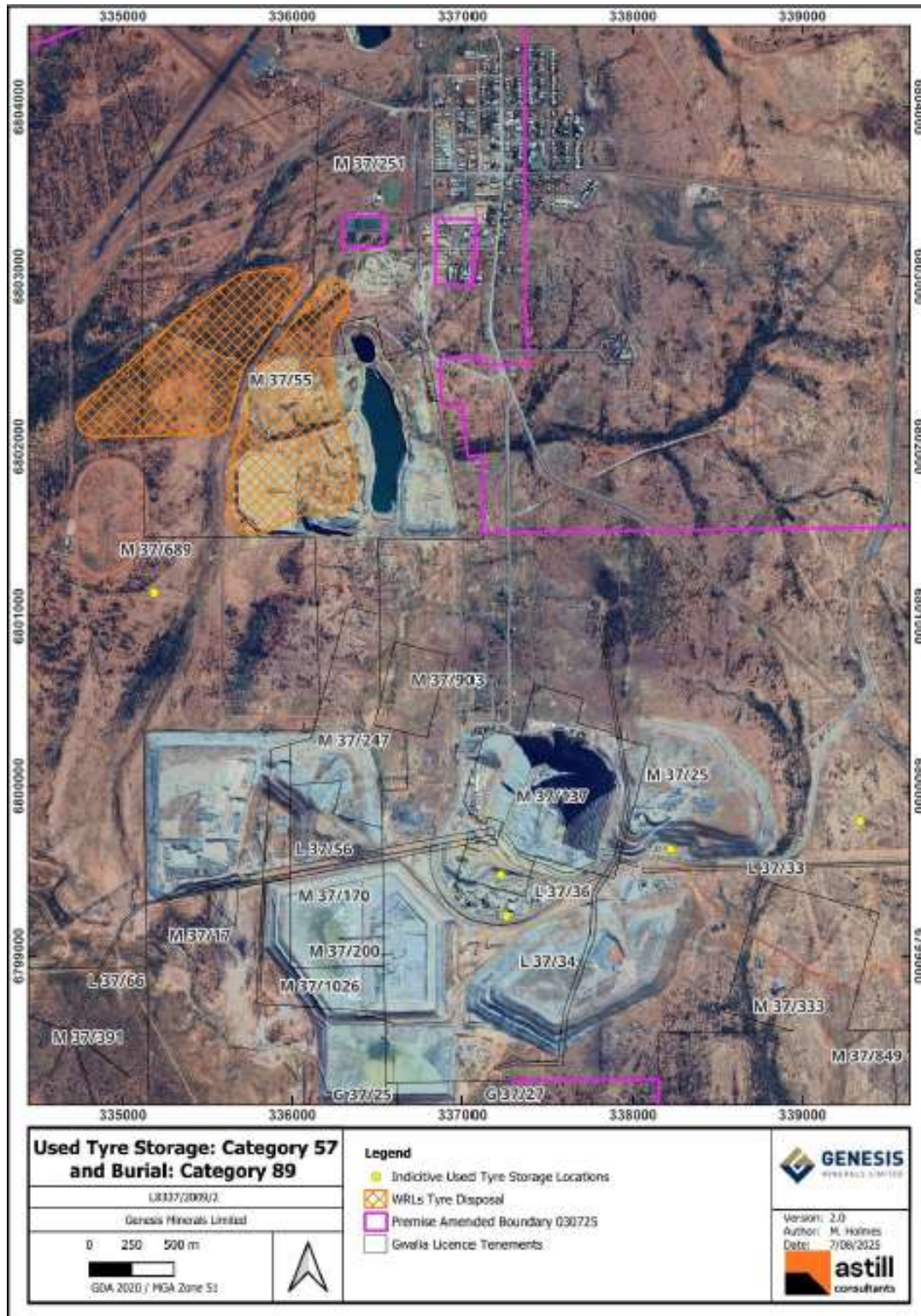


Figure 2: Used tyre storage locations and tyre landfill.

6. Category 89 – Used tyre disposal within Waste Rock Landforms

The licence holder has requested approval to dispose of used tyres within the existing and proposed waste rock landforms (WRLs). Mining Proposal (MP) 500743, approved by the Department of Mines, Petroleum and Exploration (DMPE) on 8 September 2025, outlines plans to expand the existing eastern WRL and construct a new western WRL (Figure 2). WRL East and WRL West will each have a maximum height of 36 m and will cover approximately 75.05 ha and 70.9 ha, respectively. Portions of TSF1 requiring relocation will be encapsulated within WRL East. The WRLs will primarily comprise of waste rock, low-grade ore (oxide mine waste material), and used tyres (as proposed within this licence amendment).

Used tyres will be disposed of in designated tyre burial cells within the WRLs and offsite tyres will not be accepted (Talis 2025). The cells will be clearly defined onsite and recorded within geographic information system (GIS) datasets. Used tyres will be buried in batches separated by at least 100 mm of waste rock, with a final cover of not less than 500 mm of waste rock.

Within mining proposal 500743 (Talis 2025), tyres are not to be placed within 10 m of WRL edges. However, this licence amendment application proposed a minimum distance of 5 m. To not conflict with mining proposal 500743 (Talis 2025) the departments risk assessment will use the 10 m minimum distance of tyre disposal to the WRL edges instead of the proposed 5 m separation distance.

Both WRLs will exclude materials capable of generating acidic and/or metalliferous drainage. Waste rock samples have been classified as Non-Acid Forming (NAF) or NAF–Acid Consuming (NAF–AC), particularly in ultramafic lithologies, indicating a low risk of acid formation or metalliferous drainage (Talis, 2025). Material characterisation confirmed the waste is geochemically benign, posing negligible environmental risk. Water leachates from waste rock were slightly to strongly alkaline (pH 7.5–9.7), with low salinity in fresh waste rock (48–77 $\mu\text{S}/\text{cm}$ EC) and higher salinity in oxide and transitional waste rock (715–1,916 $\mu\text{S}/\text{cm}$ EC) (Talis 2025). The risk of arsenic leaching was assessed as low due to saline groundwater influence, evaporative losses, and conservative laboratory extraction methods (Talis 2025).

Talis (2025) concluded that waste rock and low-grade ore are environmentally benign, requiring no specific management beyond standard good practice. WRL design and closure planning address concerns regarding acid generation, metal mobility, and dispersive soils. The site's geochemical profile supports continued development under standard monitoring and environmental safeguards.

The department has granted approval for tyre disposal within WRLs. The associated risk assessment and regulatory conditions are detailed in Section 8.2 of this amendment report.

7. Premise boundary amendments

The following amendments to the prescribed premises boundaries have been requested:

- Inclusion of M37/689 to accommodate the WRL tyre disposal area, used tyre storage location and the Tower Hill turkeys nest; and
- Inclusion of M37/1150 to fill a gap within the prescribed premises

M37/689 is located west of the prescribed premises. The tenement has been proposed to be included in the premises boundary to encompass the Tower Hill Turkeys Nest Dam (section 4.2), tyre storage areas (section 5) and WRL tyre disposal area (section 6). The licence holder has demonstrated that they are the current holder of the tenement. The department has

included M37/689 to the premises boundary to incorporate the activities.

M37/1150 is entirely located within the Harbour Lights mining pit at the northern portion of the premises and is currently a mine dewater discharge location (category 6). The licence holder has demonstrated that they are the current holder of the tenement. The department has amended the premises boundary to include M37/1150.

8. 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 2020a).

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.

8.1 Source-pathways and receptors

8.1.1 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 3 below. Table 3 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

Table 3: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Category 6			
Dust	Construction of turkey nest dam to store saline water from Gwalia Underground, Tower Hill pit and Harbour Lights pit.	Air/windborne pathway	None proposed.
Dust	Construction of mine dewatering pipelines and earthworks for the pipeline.	Air/windborne pathway	
Noise			
Operation			
Category 5			
Tailings, decant and/or seepage recovery water	Increase operating height of TSF4 supernatant pond from 372.8 to 382.8 m.	Overtopping of TSF causing discharge of emission/s to land	<ul style="list-style-type: none"> None proposed outside of current licence requirements. <u>Existing licence conditions:</u> <ul style="list-style-type: none"> Freeboard requirements; Inspection of freeboard requirement; and

Emission	Sources	Potential pathways	Proposed controls
			<ul style="list-style-type: none"> • TSF water balance monitoring.
		Vertical infiltration and lateral migration through base and embankment wall and transported via stormwater runoff.	<ul style="list-style-type: none"> • Additional groundwater monitoring bores that have been installed; • development of SWL triggers for these bores; and • Inclusion of seepage recovery bores with individual automatic cut on and cut off pumps. <p><u>Existing licence conditions:</u></p> <ul style="list-style-type: none"> • Containment infrastructure requirements; • Maintain seepage recovery system for TSF and seepage is returned to the TSF or reused in processing; • Native vegetation audits; • TSF water balance monitoring; • Supernatant pond maximum operating height restriction; and • Groundwater monitoring requirements.
Category 6			
Hypersaline mine dewater	Transportation and discharge of mine dewater from Gwalia Underground to Gwalia pit.	Mine dewater discharged to land from rupture/leak of pipelines.	<p><u>None proposed</u></p> <p><u>Existing licence conditions:</u></p> <ul style="list-style-type: none"> • Mine dewater pipelines to either: be equipped with telemetry systems or pressure sensors to detect leaks, equipped with automatic cut-outs in the event of pipeline failure or provided with secondary containment sufficient to contain any spills between inspections; and • Daily inspection of mine dewater pipelines.
		Mine dewater discharged to pit resulting in overtopping.	<p><u>None proposed</u></p> <p><u>Current licence conditions:</u></p> <ul style="list-style-type: none"> • N/A
		Seepage of mine dewater through pit wall.	<p><u>None proposed</u></p> <p><u>Existing licence conditions:</u></p> <ul style="list-style-type: none"> • Six monthly monitoring of the discharge - flow rate, field parameters and analytical parameters mine dewater emissions to approved pits.
	Storage of mine dewater in Turkeys Nest Dam.	Overtopping of turkeys nest resulting in mine dewater discharge.	<ul style="list-style-type: none"> • Overflow point with 300 mm nominal rip rap. <p><u>Existing licence conditions:</u></p>

Emission	Sources	Potential pathways	Proposed controls
			<ul style="list-style-type: none"> Freeboard of 300 mm or a 1 in 100 year 72 hour duration storm event (whichever is greater) is to be maintained.
		Failure of HDPE liner leading to release of emission.	<ul style="list-style-type: none"> Liner to be UV stabilized/resistant; and Life expectancy of liner to be 15 years or greater.
Category 57			
Fire/smoke	Storage of up to 500 used tyres on site.	Accidental ignition of tyres followed by emissions transported via an air/windborne pathway.	<ul style="list-style-type: none"> Less than 500 used tyres to be storage on the premises at any one time.
Disease vectors		Rainfall trapped within tyres creating a breeding ground for disease vectors (mosquitoes).	<ul style="list-style-type: none"> Less than 500 used tyres to be storage on the premises at any one time.
Category 89			
Heavy metals and petroleum based compounds	Disposal of tyres in WRL.	Seepage of emissions through WRL and soil profile to groundwater.	<ul style="list-style-type: none"> Tyres will only be disposed of within an active WRL Landfill facility and within the prescribed premises boundary; and Tyres are to be buried in batches of 20 with a minimum of 1 m separation between tyres and a 10 m horizontal and 5 m vertical buffer zone between batches; and at 5 m or more from the landform outer surface. <p><u>Existing licence conditions:</u></p> <ul style="list-style-type: none"> Landfilling tyres to be managed in accordance with Part 6 of the <i>Environmental Protection Regulations 1987</i>.

8.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020a), the Delegated Officer has excluded employees, visitors and contractors of the licence 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 4 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental siting* (DWER 2020b)).

Table 4: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Town of Leonora	Closest residential receptor is:

	<ul style="list-style-type: none"> Located approximately 80 m east of the new proposed dewatering pipeline; and Located approximately 850 m east of the WRL Tyre Landfill.
Leonora Lodge	<ul style="list-style-type: none"> Located approximately 570 m east of the WRL Tyre Landfill.
Gwalia residences including Hoover House	<ul style="list-style-type: none"> Located approximately 960 m northwest of the closest used tyre storage location; and Located approximately 35 m north from the Gwalia Pit (mine dewatering discharge point).
Environmental receptors	Distance from prescribed activity
Native vegetation	<ul style="list-style-type: none"> Located approximately adjacent (<10 m) to the proposed WRL Tyre Landfill area); Located approximately adjacent (<10 m) to the mine dewatering pipeline; Located approximately adjacent (<10 m) to the proposed turkey nest dam; Located approximately 50 m from the proposed used tyre storage location; Located approximately 100 m to the east, south and west of TSF4; and Located approximately 450 m northeast of the Gwalia Pit.
Lake Raeside and associated playa systems and drainage lines.	<ul style="list-style-type: none"> Lake Raeside located approximately 2.6 kms south of TSF4 and a drainage line leading to the playa systems and Lake Raeside located approximately 70 m east of TSF4; and Closest drainage line leading toward a playa system is located approximately 30 m west of the proposed dewatering pipeline. Closest playa system is approximately 2.0 km downstream of the drainage line. <p>AQ2 (2025) mentions that creek lines within the area may eventually drain southeast toward Lake Raeside. However, the primary drainage pathway to Lake Raeside comprises a series of smaller salt lakes and claypans. It is likely that it would require a rare and significant rainfall event to activate the entire catchment and allow runoff from the Project area to reach Lake Raeside (Talis 2025).</p>
<i>Native fauna (birds)</i> <i>Discounted</i>	<p><i>Tailings Storage Facility 3 East and 3 West Tailings storage data sheet (Golder 2023) mentions TDS of return water is approximately 60,000 mg/L and Weak Acid Dissociable (WAD) Cyanide is between 6.2-40 mg/L.</i></p> <p><i>Due to the high concentrations of TDS within the decant native fauna are unlikely to utilise the water as drinking water.</i></p> <p><i>Migratory fauna has been registered near the Leonora wastewater treatment plant (WWTP) in 2015.</i></p>
Threatened Ecological Community (TEC) – Melita Calcrete (Priority 1)	<ul style="list-style-type: none"> Located approximately 650 m west of TSF4.
Groundwater	Groundwater within the area is primarily contained within two main

	<p>aquifer systems in the Leonora-Tower Hill area; the Upper Alluvial Aquifer and the Werillup Palaeochannel Aquifer (Pennington Scott, 2024).</p> <p>Upper Alluvial Aquifer - Perched and highly heterogeneous. Found in sandy portions aquifer and has low to moderate permeability, though it can become highly transmissive in areas of extensive and karstic calcrete.</p> <p>Werillup Palaeochannel Aquifer - Highly productive palaeochannel. The aquifer comprises a basal coarse-grained sand and gravel with frequently clayey medium-grained sand and interbedded clay in the upper portion (Pennington Scott, 2024). Permeability is highest through the lower aquifer zone, which can have a hydraulic conductivity of up to 15 m/day or greater.</p> <p>Groundwater recharge occurs mainly along creek lines as direct infiltration through alluvial sediments. The high evaporation rates reduce general seepage during summer months.</p> <p>Prior to mining groundwater levels in the vicinity of the Harbour Lights pit were 10 – 13 mbgl.</p> <p>Groundwater levels near TSF range between 0.5 to 2 mbgl.</p> <p>Groundwater levels approximately 1 km south of the WRLs (within TSF2/12 monitoring bore) are generally reported between 3.5 and 4 mbgl (Genesis 2025).</p> <p>Regional groundwater is expected to flow in a south-westerly to south direction towards Lake Raeside.</p>
<p>Cultural receptors</p>	<p>Distance from prescribed activity</p>
<p>Registered site – place id – 2708 – Lake Reyside (Raeside) – Creation / Dreaming Narrative.</p>	<p>Public boundary located approximately:</p> <ul style="list-style-type: none"> • 720 m south of TSF4.
<p>European heritage</p> <ul style="list-style-type: none"> • 33 heritage sites are located within Gwalia. 	<p>The closest European heritage receptor is Hoover house which is located approximately:</p> <ul style="list-style-type: none"> • 960 m northwest of the closest used tyre storage location; and • 35 m north from the Gwalia Pit (mine dewatering).

8.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020a) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 8.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the licence holder has proposed mitigation measures/controls (as detailed in Section 8.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the licence holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the licence holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

The revised licence L8337/2009/2 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. infrastructure construction, TSF operations, used tyre storage and disposal and mine dewater discharge.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 5. Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls/ DWER comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder's controls				
Construction								
Category 6								
Construction of turkey nest dam to store saline water from Gwalia Underground, Tower Hill pit and Harbour Lights pit.	Dust	Pathway: Air/windborne pathway Impact: Health and amenity	<ul style="list-style-type: none"> Native vegetation (<10 m) 	Refer to Section 8.1	C = Minor L = Rare Low Risk	Y	N/A	N/A
Construction of mine dewatering pipelines and earthworks for the pipeline.	Dust	Pathway: Air/windborne pathway Impact: Health and amenity	<ul style="list-style-type: none"> Native vegetation (<10 m) 	Refer to Section 8.1	C = Minor L = Rare Low Risk	Y	Condition 11: Dust suppression requirement;	The department has included a requirement to ensure that a watercart is on standby to reduce dust emissions from earthworks during the construction of the pipeline.
			<ul style="list-style-type: none"> Town of Leonora (80 m) 		C = Minor L = Unlikely Medium Risk	N		
	Noise		<ul style="list-style-type: none"> Town of Leonora (80 m) 		C = Slight L = Unlikely Low Risk	Y	N/A	N/A
Operation								
Category 5								
Increase operating height of TSF 4 supernatant pond from 372.8 m to 382.8 m.	Tailings, decant and/or seepage recovery water	Pathway: Overtopping of TSF causing discharge of emission/s to ground. Impact: Direct contact with receptors degrading environmental values.	<ul style="list-style-type: none"> Native vegetation (100 m) Water lines (70 m) Lake Raeside and Playa systems (2.6 kms) Heritage sites 	Refer to Section 8.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 3: Freeboard requirements. Condition 8: Freeboard inspection requirements. Condition 9: Restriction of supernatant pond operating height.	The department considers that the proposed controls and current licence conditions are appropriate to manage this risk event
			<ul style="list-style-type: none"> Water lines (70 m) Lake Raeside and Playa systems (2.6 kms) 		C = Moderate L = Possible Medium Risk	N	Condition 5: Seepage infrastructure requirements; Condition 7: Water balance monitoring requirements; Condition 9: Restriction of supernatant pond operating height; Condition 26: Groundwater monitoring requirements and passive siphon sampling requirement; and Condition 27: Management actions for SWL trigger.	
			<ul style="list-style-type: none"> Groundwater 		C = Moderate	N	Condition 5: Seepage	

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls/ DWER comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder's controls				
			<ul style="list-style-type: none"> Native vegetation (100 m) 		L = Possible Medium Risk		infrastructure requirements; Condition 6: Vegetation monitoring requirements; <u>Condition 7: Water balance monitoring requirements;</u> <u>Condition 9: Restriction of supernatant pond operating height;</u> Condition 26: Groundwater monitoring requirements; and Condition 27: Management actions for SWL trigger.	
			<ul style="list-style-type: none"> TEC –Melita Calcrete (650 m) 		C = Moderate L = Unlikely Medium Risk	Y	Condition 5: Seepage infrastructure requirements; Condition 7: Water balance monitoring requirements; Condition 9: Restriction of supernatant pond operating height; Condition 26: Groundwater monitoring requirements; and Condition 27: Management actions for SWL trigger.	The department considers it to be unlikely that seepage or mounding could impact the Melita Calcrete as: <ul style="list-style-type: none"> A major drainage line is situated between the Melita Calcrete and may intercept the seepage; Groundwater flow is understood to be south-southeast towards Lake Raeside; The low hydraulic conductivity of aquifer materials would limit the rate of lateral groundwater flow in the area; and Current and proposed seepage management infrastructure is likely to reduce overall seepage emissions. The department considers that the current and proposed controls, together with the licence conditions, are adequate to manage any risk to the Melita Calcrete.
Category 6								
Transportation of mine dewater between Harbour Lights Pit, Tower Hill Pit and Gwalia Pit; and Mine dewater transport to Tower Hill turkeys nest.		Pathway: Mine dewater discharged to land from rupture/leak of pipelines. Impact: Reduction in health of environmental receptors, damage to property or reduction of amenity.	<ul style="list-style-type: none"> Town of Leonora (80 m) Native vegetation (<10 m) Water line (30 m) 		C = Minor L = Unlikely Low Risk	Y	Condition 1: Pipeline telemetry or containment requirements; and Condition 8: Pipeline inspection requirements.	The department considers the existing licence conditions to be adequate for managing this risk event.
Discharge of mine dewater to Gwalia Pit.	Mine dewater (hypersaline)	Pathway: Mine dewater discharged to pit resulting in overtopping. Impact: Reduction in the health of environmental receptors.	<ul style="list-style-type: none"> Hoover House (35 m) Native vegetation 	Refer to Section 8.1	C = Minor L = Rare Low Risk	Y	Condition 5: Freeboard requirements; and Condition 19: Mine dewater discharge locations.	The department considers overtopping of the pit to be rare, given that the entry portal to the Gwalia underground workings is located approximately 1.9 kilometres below ground level. Overtopping could only occur if the entire underground void were to become fully saturated with groundwater or mine dewater.
		Pathway: Seepage of mine	<ul style="list-style-type: none"> Groundwater 		C = Minor	N	Condition 3: Containment infrastructure requirements;	Mine dewater is currently abstracted from the Gwalia underground mine and conveyed to the Tower Hill Pit and Harbour Lights Pit, both of

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls/ DWER comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder's controls				
		dewater through pit wall. Impact: Groundwater contamination or mounding resulting in impacts to environmental receptors at the surface.	<ul style="list-style-type: none"> Native vegetation (450 m) 		L = Unlikely Medium Risk		and Condition 4: Freeboard requirements.	<p>which exhibit similar groundwater characteristics.</p> <p>The department considers that the discharge and storage of mine dewater from the Gwalia underground workings to the Gwalia Pit, as well as the transfer of mine dewater between all three pits, is unlikely to significantly affect surrounding groundwater quality. This is because each pit intersects the same aquifer system, resulting in comparable groundwater parameters.</p> <p>The department has implemented an additional regulatory requirement to require a freeboard of 4 m. This requirement has also been incorporated into the other two mine dewater discharge pits (Tower Hill Pit and Harbour Lights Pit). The intention of the freeboard is to prevent impacts to surrounding native vegetation caused via groundwater mounding.</p>
Storage of mine dewater to turkey nest dam.	Mine dewater (Hypersaline)	Pathway: Overtopping of turkeys nest resulting in mine dewater discharge. Impact: Reduction in the health of environmental receptors.	<ul style="list-style-type: none"> Native vegetation (<10 m) 	Refer to Section 8.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 3: Freeboard requirement.	The department considers that the proposed controls and current licence conditions are appropriate to manage this risk event
		Pathway: Failure of HDPE liner leading to release of emission. Impact: Reduction in the health of environmental receptors.	<ul style="list-style-type: none"> Water line (180 m) Groundwater 		C = Moderate L = Rare Medium Risk	Y	Condition 2: Infrastructure containment requirement.	The department considers that the proposed controls and current licence conditions are appropriate to manage this risk event
Category 57								
Storage of up to 500 used tyres on site.	Fire/smoke	Pathway: Accidental ignition of tyres followed by emissions transported via an air/windborne pathway. Impact: Fire and/smoke damage impacting receptor health and amenity.	<ul style="list-style-type: none"> Town of Gwalia (960 m) Leonora Racetrack (120 m) Native vegetation (50 m) Native registered sites (150 m) 	Refer to Section 8.1	C = Moderate L = Unlikely Medium Risk	N	Condition 12: Used tyre storage requirements.	The department has included general storage requirements similar to other prescribed premises licenced under Part V of the EP Act. These requirements restrict the total number of used tyres stored on the premises, volume and height of each used tyre stack, tyre orientation storage requirements, firefighting capability and bunding requirements.
	Disease vectors	Pathway: Rainfall trapped within tyres creating a breeding ground for disease vectors (mosquitoes). Impact: Spread of mosquito population potentially impacting amenity or health of nearby receptors.	<ul style="list-style-type: none"> Town of Gwalia (960 m) Leonora Racetrack (120 m) 		C = Minor L = Unlikely Medium Risk	N		
Category 89								

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls/ DWER comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder's controls				
Disposal of tyres in WRL.	Heavy metals and petroleum based compounds	Pathway: Seepage of emissions through WRL and soil profile to groundwater. Impact: Soil and or groundwater contamination.	<ul style="list-style-type: none"> • Groundwater (>3.5 m) • Native vegetation (<10 m) 	Refer to Section 8.1	C = Minor L = Unlikely Medium Risk	Y	<p>Condition 12: Requirements of disposing used tyres within WRLs; and</p> <p>Condition 13: Cover requirements.</p>	<p>Condition 11 requires the licence holder to ensure that tyres are separated by a minimum distance of 1 metre between individual tyres and disposed of in batches of 20. Each batch must maintain a minimum separation distance of 10 metres horizontally and 5 metres vertically. The minimum distance between the maximum groundwater level and each batch of tyres placed within the WRL is greater than 3 metres. Available groundwater data indicates groundwater levels are more than 3.5 metres below ground level at the base of both the current and proposed WRLs, thereby reducing the likelihood of impacts to groundwater and native vegetation.</p> <p>The department considers that the combination of the proposed inert and NAF material to be placed within the WRL (section 6), together with the required separation distances between tyres and groundwater, results in an unlikely risk of impacts to groundwater or native vegetation. The department considers the proposed controls and existing licence conditions to be adequate and has not included any additional regulatory requirements.</p>

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

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

8.3 Detailed risk assessment for Seepage and groundwater mounding of TSF4

8.3.1 Overview of risk event

Licence L8337/2009/2 authorises the construction of six (6) embankment raises to TSF4 to a maximum height of 383.5 mAHD. Stage 1 and 2 has been completed. Deposition into stage 2 has also already been approved under the licence.

The licence currently restricts operation of TSF4 after stage 2 by restricting the maximum supernatant pond operating height. The licence holder is seeking a modification to the licence by the removal of this restriction so deposition of tailings into TSF4 can continue after the completion of each embankment raise without the need for continual licence amendments.

Operating the supernatant pond at higher elevations on TSF4 will likely result in an increase of seepage from the facility causing impacts to groundwater quality and/or cause mounding of the groundwater table, leading to impacts to sensitive receptors i.e. native vegetation at the surface, surface water drainage lines and salt lakes.

8.3.2 Source: Characterisation of emission

The GMP (WSP 2024) identified that surrounding SWLs could be impacted as a result of seepage and/or mass loading from TSF4 and that the seepage rate may change with time depending on tailings deposition rate, pond size and location and tailings permeability.

Tailings Characterisation

The following properties of the tailings from Golder (2023) will be considered for this risk assessment:

- Solid component of the tailings has very low activity concentrations of naturally occurring radionuclides;
- The tailings have a high sulphur content (0.77% to 1.6%) and high acid neutralising capacity (130 to 220 kg H₂SO₄/t) and therefore classified as NAF;
- Leachate from the TSF3 tailings samples were strongly alkaline (pH 8.7 to 9.2) and very saline (1,000 to 1,800 µS/cm);
- Acid leachate test result indicated elevated result for aluminium, iron, manganese and nickel as the key elements which would dissolve under acidic conditions. Trace metals were absent from the leachates indicating a low potential for release; and
- Return water from the decant pond was found to have a pH of 7 to 8, total dissolved solids of 60,000 mg/L and Weak Acid Dissociable (WAD) cyanide concentration of between 6.2 to 40 mg/L.

Evidence of seepage and observations

There has been a history of seepage observations that appear to have come from TSF4:

- Seepage was observed in 2020 along the southern portion of TSF4 after it was commissioned in October 2020 which initiated the construction of the toe drain (WSP 2024). TSF toe drain water has been sampled on seven occasions between 2022 and 2024 in each occasion the WAD cyanide was below LOR but total cyanide was recorded above LOR (0.153 to 0.533 mg/L) on six of the seven occasions, indicating that TSF seepage is being intersected;
- In July 2021, the area south of the TSF4 toe drain was waterlogged with some surface water present. Standing water was present in toe drain along the south flank of TSF4,

and it was concluded most likely that water is seeping from the toe drain into the surrounding soil to the south of the TSF4 (DWER 2023);

- The presence of a significant sand-boil (Figure 3) in the toe-drain near RB03. The department notes that this suggests that significant seepage is already taking place from this part of the TSF embankment. Pennington Scott (2025) notes that RB03 is situated within the sand boil area near the TSF4 toe drain and it is considered an area of known artesian seepage;
- During the 2024 TSF audit and management review by Tetra Tech Coffey seepage was identified on southern embankment of TSF4 and Southeastern corner of TSF3. A recommendation was made to include monitoring and measurement of the volume of seepage; and
- During a Department of Mines, Petroleum and Energy (DMPE) inspection of the premises in November 2024, clear running fluid was observed trickling from the southern section of embankment, indicating potential lateral tunnelling from the TSF. Resulting in potential seepage or a preferential pathway for seepage to exit the TSF at an increased rate.



Figure 3: Sand boil in the toe drain near RB03 in January 2021 (Golders 2021, Sourced from Pennington Scott 2025)

8.3.3 Pathway and Receptors

Approximate seepage rate beneath TSF4 has been estimated to be between 118 to 558 m³/d (1.4 to 6.8 L/s (WSP 2024)). The department notes that there is a potential that actual seepage amounts are greater than what is reported within the GMP (further details on this observation is provided in section 8.3.7).

Groundwater

Groundwater surrounding TSF4 is saline due to regional geochemical conditions and is not considered suitable for domestic or agricultural use. Groundwater levels in the vicinity of TSF4 range from approximately ~0.5 to 2 mbgl and have remained within this range since 2020 (Figure 4). Monitoring data indicates that groundwater in the area has been influenced by long-term mining activities. Prior to mining, TDS concentrations ranged from approximately 1,500 to 12,500 mg/L, whereas current TDS concentrations surrounding TSF4 range between 35,000 and 80,000 mg/L. Consistent with typical hydrogeological behaviour in the region, TDS concentrations generally increase with groundwater depth.

Groundwater in the Leonora Tower Hill area is primarily contained within two aquifer systems (Pennington Scott 2024):

- Upper Alluvial Aquifer – A perched and highly heterogeneous unit found within sandy sediments. This aquifer typically exhibits low to moderate permeability, although it can become highly transmissive in areas where extensive calcrete, including karstic development, is present.
- Werillup Palaeochannel Aquifer – A highly productive palaeochannel system comprising a basal sequence of coarse-grained sands and gravels, overlain by clayey medium-grained sands with interbedded clay layers. Permeability is greatest within the lower portion of the aquifer, where hydraulic conductivity values can reach 15 m/day or higher.

Native vegetation

Five distinct vegetation groups are recorded surrounding TSF3 and TSF4 which include: Open low chenopod shrubland, Mulga over chenopod shrubland, Mulga over *Eremophila Forrestii* and *Eremophila compacta*, Tecticornia shrubland and Mulga over *Melaleuca interioris* and *Eremophila miniata sand dunes*.

NVS (2025) notes that there is limited publicised information available for the salinity tolerance of species recorded surrounding the TSFs (TSF3 and TSF4). Species listed by Department of Agriculture and Food (DAFWA) in 2002, that are similar to those present in these quadrats (share the same genera), are those that appear to survive in extreme saline conditions (EC > 16,000 µS/cm (~11,200 mg/L TDS⁵)).

Surrounding vegetation associated with the shallow sand aquifer may be affected via the change in water quality from either a rise in salinity or changes to water quality. Impacts could also occur via groundwater levels rising causing water logging of the roots (WSP 2024).

Lake Raeside

WSP (2024) notes that Lake Raeside may be a potential receptor of seepage, as parts of the lake system is likely to interact with the regional groundwater network where both discharge and recharge may occur. However, the department does not consider it feasible that contaminated groundwater (via seepage) would migrate from the TSFs to Lake Raeside. This is due to the low hydraulic conductivity of the aquifer materials in the area, which would significantly limit the

⁵ Based on conversion factor of 0.7 for saline waters.

rate of lateral groundwater flow. Under continued seepage from the TSFs, it is more likely that groundwater would mound beneath and around the facilities and be discharged at or near the land surface, rather than travelling long distances through the aquifer.

Contaminated groundwater could instead discharge into the ephemeral watercourse located approximately 70 metres west of TSF4. This discharge would manifest as increased accumulations of salts within the alluvial sediments due to the region's high evaporation rates. During infrequent heavy rainfall events, these salts, and any entrained metals, could be mobilised and transported further in surface runoff, resulting in episodic releases to the environment.

8.3.4 Impacts

Groundwater

Groundwater in the area may potentially become contaminated from excessive seepage from the TSFs. The high TDS concentrations limit beneficial uses of the groundwater within the area, however, limiting impacts to groundwater remains a necessary. Groundwater mounding can also increase the mobility of contaminants, which may pose risks to invertebrates and migratory birds that utilise saline lakes near TSF4 (Senner et al., 2018).

Groundwater SWLs within monitoring bores are measured monthly during plant operations, with broader groundwater monitoring undertaken quarterly. Historical SWL data from the original monitoring bores surrounding TSF4 (TSF4/01RD to TSF4/06) indicate that groundwater levels have generally increased since installation. A period of groundwater decline occurred across all bores from 2022 to March 2024, after which groundwater levels began to rise again.

As groundwater mounding has occurred in response to seepage and/or hydraulic pressure, a locally perched unconfined aquifer has developed within the shallow sandy regolith at the upper part of the weathered profile. Historical groundwater SWL results (Genesis, 2025) show that surface expression of groundwater has occurred at TSF4/02 and TSF4/03, located along the western and southern embankments.

Common analytes associated with seepage from gold-processing tailings include WAD cyanide, cobalt, nickel, zinc, arsenic, antimony, and mercury. Maximum concentrations reported in existing TSF4 monitoring bores (TSF4/01–TSF4/06) are as follows:

- WAD cyanide: ~0.072 mg/L;
- Cobalt: ~3.6 mg/L;
- Nickel: ~0.11 mg/L;
- Zinc: ~0.071 mg/L (only exceeded the limit of reporting during a single event since 2020);
- Arsenic: ~0.04 mg/L;
- Antimony: below limit of reporting; and
- Mercury: ~0.004 mg/L.

The department considers these concentrations to be overall low and not likely to result in consequential impacts to potential receptors, with the exception of cobalt. Historical cobalt concentrations (Figure 6) suggest that TSF4 has either not contributed, or has only minimally contributed to cobalt levels to the groundwater.

Groundwater TDS has not changed significantly since TSF4 commenced operations, with the exception of TSF4/01RD where TDS has increased from ~30,000 mg/L to ~65,000 mg/L.

Overall, groundwater monitoring data indicates that current seepage from TSF4 may be having minimal impact on surrounding groundwater quality. The observed rise in groundwater SWL is primarily attributable to the increased load and pressure from tailings deposition, which forces water upwards, rather than to a degradation of groundwater quality.

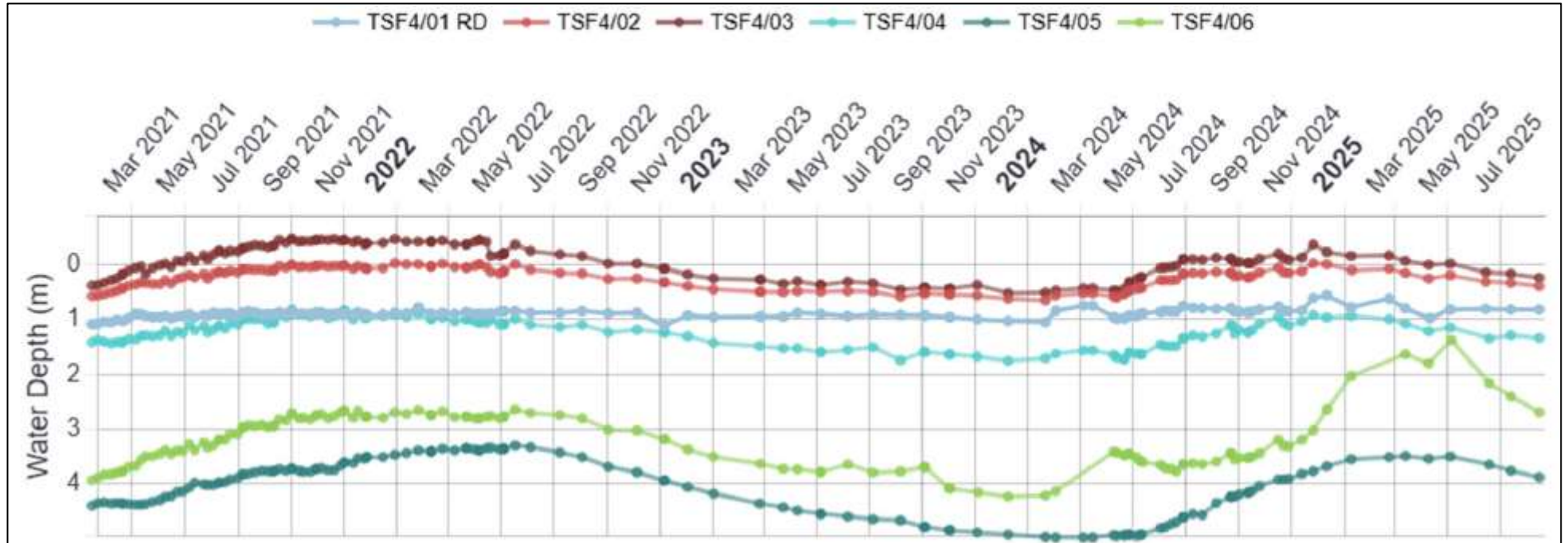


Figure 4: Historical SWL measurements (Genesis 2025)

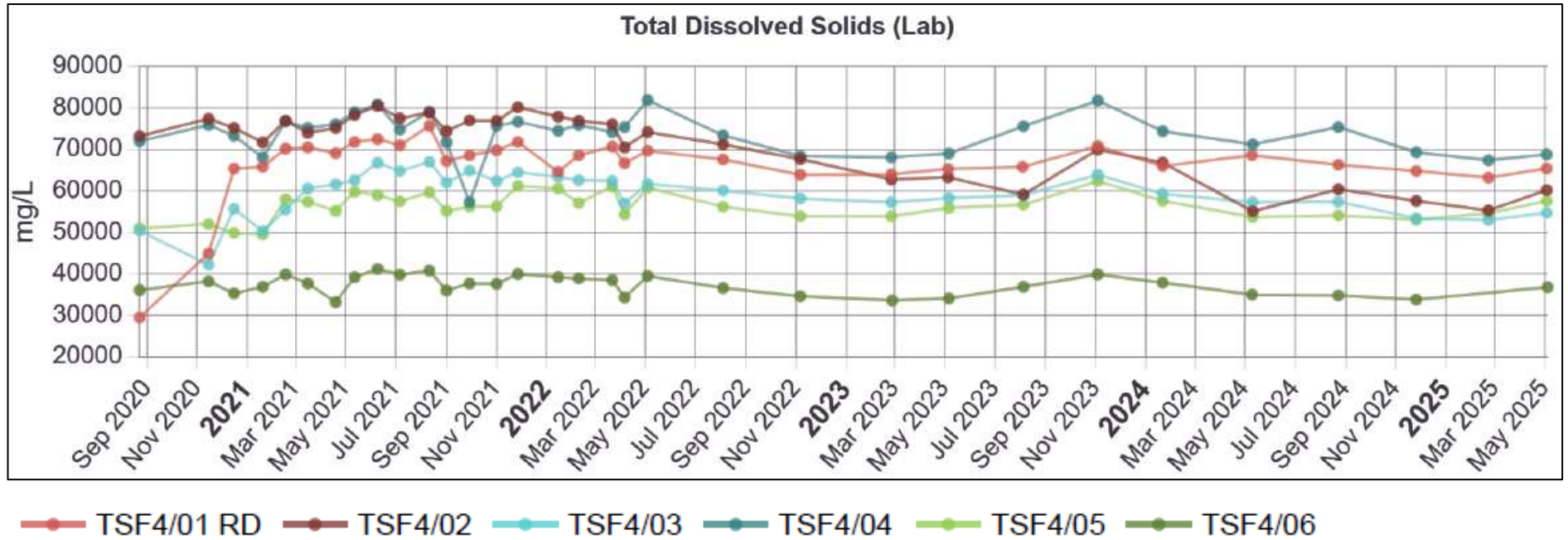


Figure 5: TDS concentrations within TSF4 monitoring bores (Sourced from Genesis 2025).

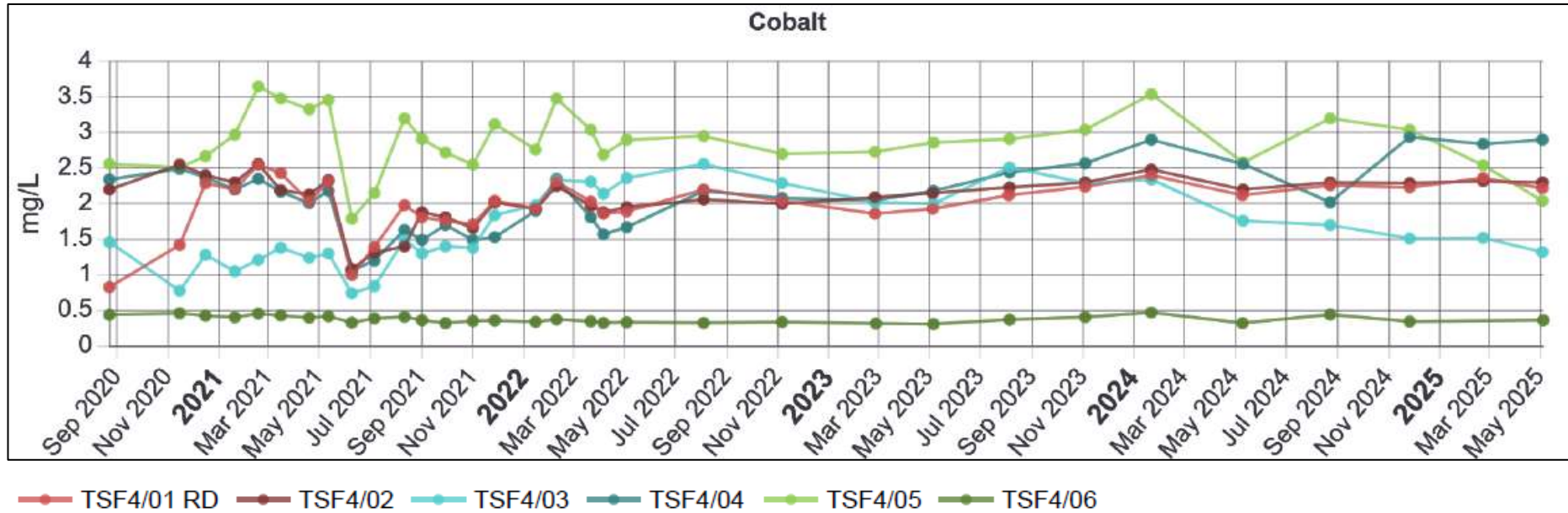


Figure 6: Cobalt concentrations within TSF4 monitoring bores (Sourced from Genesis 2025).

Native vegetation

A rise in groundwater SWLs in the vicinity of surrounding native vegetation could lead to impacts if mounding results in the root zone becoming inundated. Waterlogged soils rapidly become oxygen-deficient, disrupting root respiration and cellular processes and leading to plant stress or mortality (Pan et al., 2021). Although the vegetation communities present in the area are generally adapted to salinity and periodic waterlogging, impacts may still occur if changes to groundwater are sufficiently prolonged or substantial.

Soil pH and Electrical Conductivity (EC) was collected as part of the NVS (2025) vegetation monitoring program, pH values ranged between 7 and 9, and EC values ranged from 6 to 30,000 $\mu\text{S}/\text{cm}$. In both 2024 and 2025 monitoring events, soil EC concentrations generally decreased with increasing distance from the TSF, with the highest reported EC concentrations were recorded between ~100 and ~300 metres from the TSF. This pattern may indicate seepage influence on shallow soils and is consistent with the low hydraulic conductivity of the local groundwater system, which would slow lateral movement and promote localised salt accumulation keeping potential impacts limited to the immediate TSF area.

The 2025 vegetation monitoring report found that quadrats with the lowest species richness were associated with the highest EC values. However, these quadrats corresponded to *Tecticornia* shrubland, a vegetation community typically occurring on salt lakes and saline flats. *Tecticornia* shrubland consistently recorded the highest EC levels, whereas Mulga over *Melaleuca interioris*, *Eremophila miniata* sand dunes, and Mulga over chenopod shrubland recorded the lowest. This pattern suggests that elevated EC values reflect the inherent salinity of specific vegetation communities rather than an effect of TSF seepage (NVS, 2025).

NVS (2025) also notes that there was no clear correlation between vegetation health parameters and soil EC or pH in 2025, though ongoing monitoring is recommended to detect any future vegetation stress, changes in soil acidity/alkalinity, or salt scalding potentially attributable to TSF seepage.

The department understands that historical native vegetation health data is limited, however, the combination of quarterly photographic records and annual vegetation monitoring is likely to be sufficient to detect potential vegetation degradation arising from the increased operating height of TSF4. In the 2025 monitoring event, the analogue (background) quadrats showed similar vegetation abundance patterns to the monitoring quadrats located closer to the TSF (Figure 8 and Figure 9), suggesting that current TSF operations are not impacting vegetation within the TSFs zone of influence.

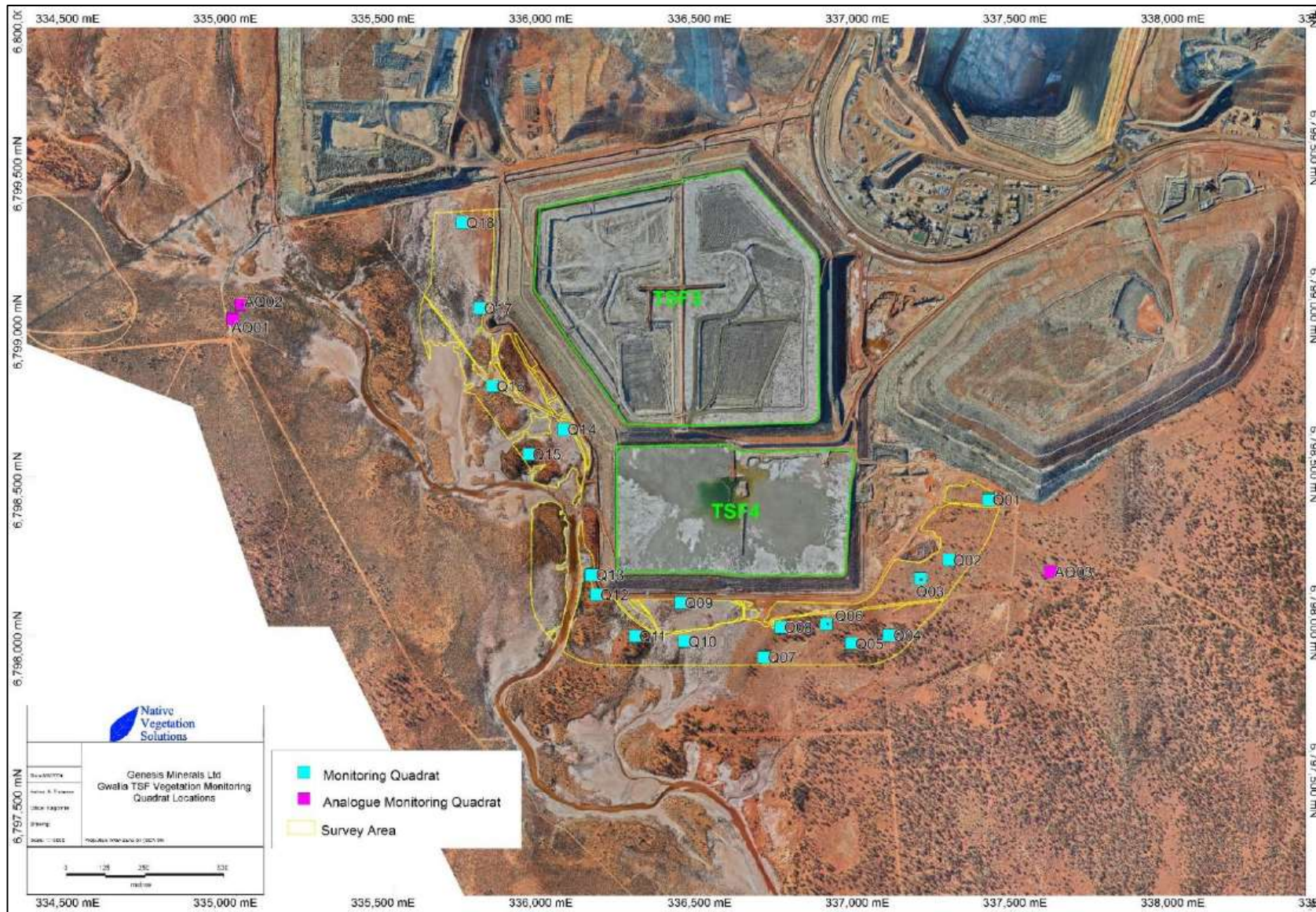


Figure 7: Vegetation monitoring quadrats (Sourced from NVS 2025)

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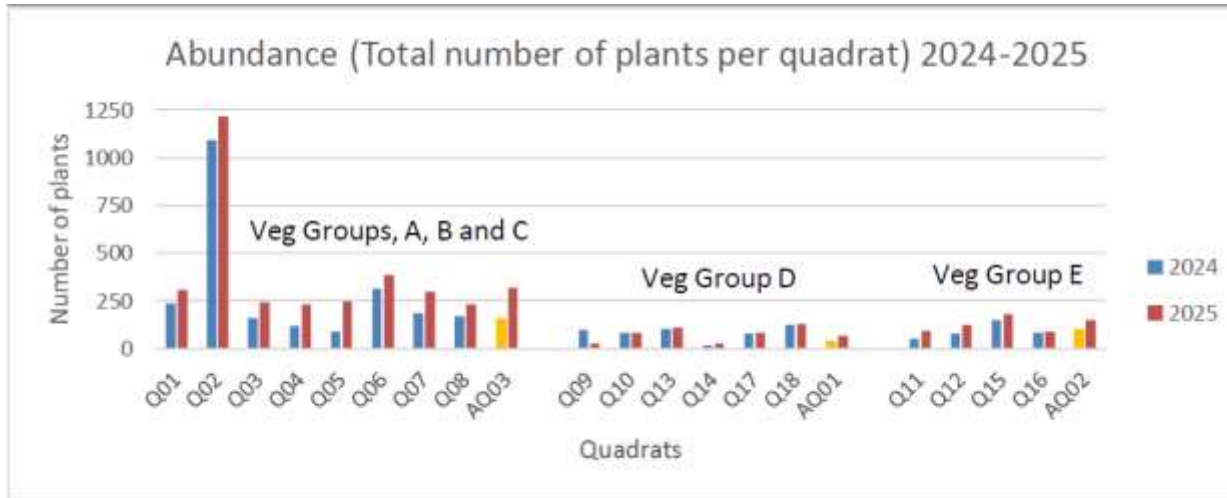


Figure 8: Total plant abundance within monitored quadrats (Sourced from NVS 2025)

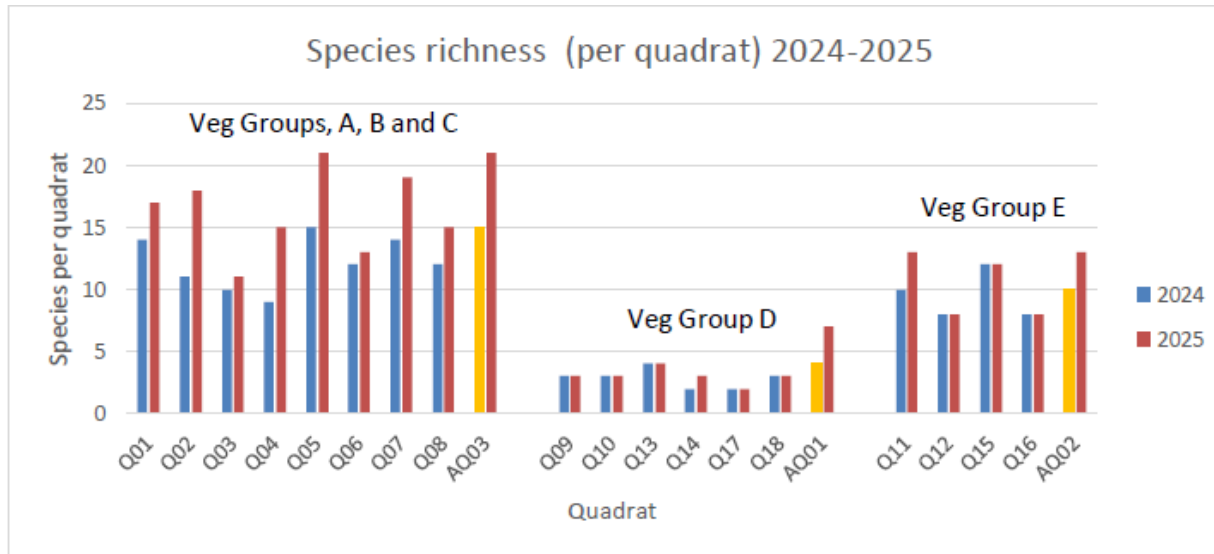


Figure 9: Species richness within monitored quadrats (Sourced from NVS 2025)

Lake Raeside

The central channel of Lake Raeside is located approximately 70 metres west of TSF4. The Lake Raeside catchment comprises occluded palaeodrainage channels containing numerous interconnected playa lakes and pans of varying sizes, which collectively drain to the southeast toward the Eucla Basin. Due to low and episodic rainfall and high evaporation rates, standing surface water on Lake Raeside is rare; however, intermittent flows and flooding can occur following significant seasonal rainfall events (DWER, 2023).

As outlined in section 8.3.3, the department considers it unlikely for seepage from TSF4 would impact Lake Raeside. However, a potential pathway may occur if groundwater mounding/shallow seepage enters the drainage line (70 m west of TSF4), allowing stormwater flows during major rainfall events to transport contaminants towards Lake Raeside. Should this occur, the movement of contaminants could result in adverse effects on fauna inhabiting Lake Raeside, including potential degradation of health or mortality.

8.3.5 Proposed and current controls

TSF operation

Future tailings deposition at TSF4 will form a conventional beach profile (that includes internal seepage mitigation measures) that will promote effective return water operations (reducing size and volume of water stored at TSF4 during operations).

Previous deposition was taking place in excavation voids, excavated to the natural ground and, as a result, the hydraulic connection between tailings and the groundwater would have been more direct than it will be in the future as depicted in Figure 4 (WSP 2024). It is also mentioned that the TSF4 toe drain improvements completed in 2022 could start to take effect and begin to control groundwater levels.

Native vegetation monitoring

An existing licence condition requires the licence holder to conduct annual native vegetation monitoring and quarterly photographs of key vegetation features within the ZOI of the TSF, these requirements were added to the licence during an amendment in December 2023.

The first native vegetation monitoring event was conducted in March 2024 by Native Vegetation Solutions (NVS) and the second event occurred in March 2025 by the same company (NVS 2025).

Current seepage recovery infrastructure

A toe drain was constructed in 2022 and is located along the southern and western embankment toes of TSF4, the trench ranges between 2 to 3 mbgl (WSL 2024).

Additional monitoring bores

Additional monitoring bores recommended within the GMP (WSP 2024) were installed within the proposed locations to monitor groundwater levels surrounding native vegetation and to provide an accurate understanding and delineate the TSF4 ZOI. The new monitoring bores installed (MB01 to MB09) are presented in Figure 10.

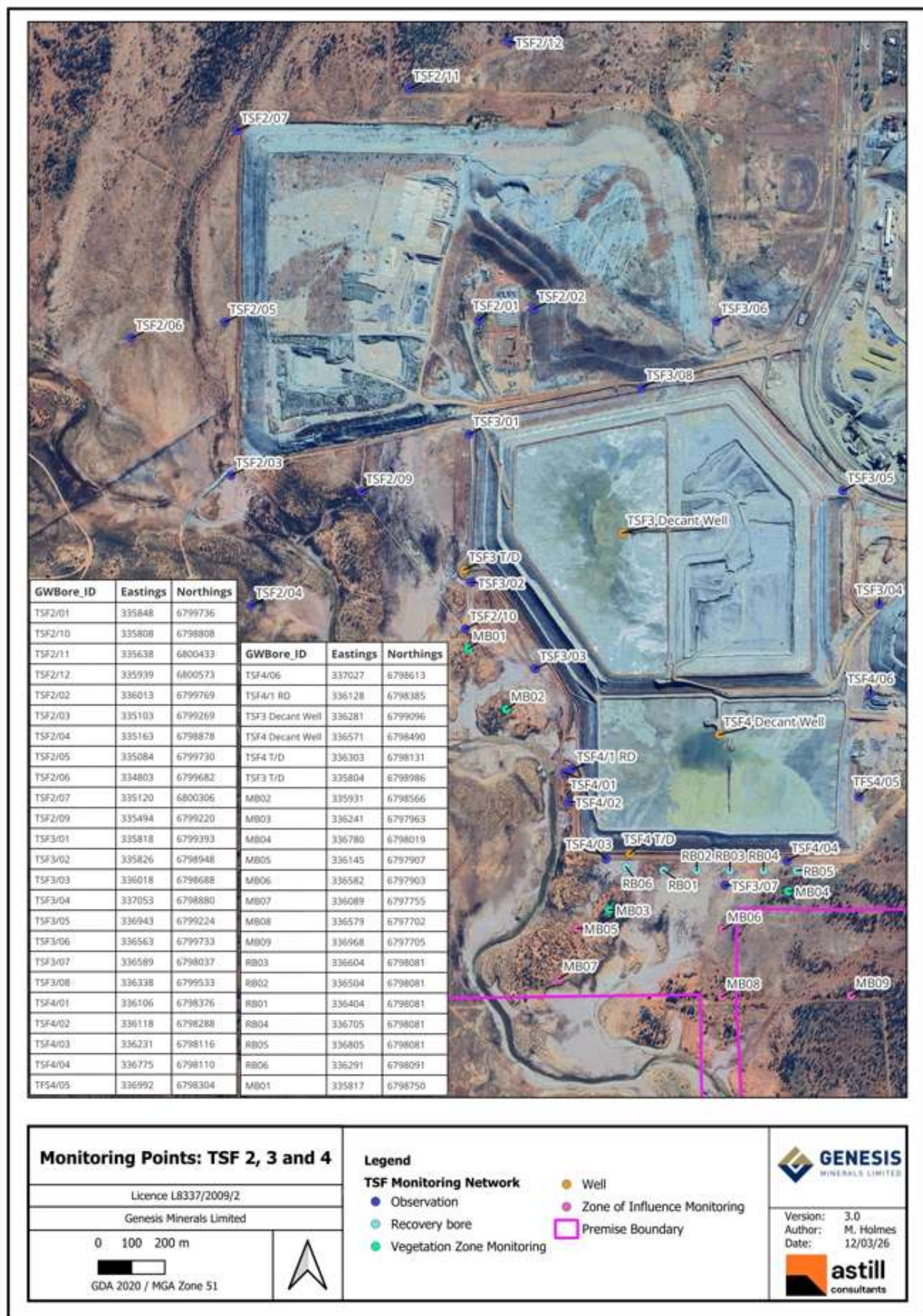


Figure 10: New and existing monitoring and recovery bore locations (Sourced Astill 2025)

Additional Seepage recovery bores and management response plan

Additional seepage recover bores were installed (RB01 to RB06) by the Licence Holder between November 2024 and January 2025.

The department considers that the installed locations of the seepage recovery bores are appropriate and effectively target the significant basement lineaments identified near RB03, RB05, and RB06, which represent potential seepage pathways originating from the southern embankment wall of TSF4

As previously discussed in section 3.2.3, Pennington Scott (2025) developed an addendum to the GMP. As part of this addendum, a MRP was prepared with the primary objective of reducing and maintaining groundwater levels in all seepage recovery bores to a management target of at least 0.5 mbgl, which was originally recommended as the trigger level in the GMP.

To achieve this, each recovery bore is proposed to be equipped with an automated pump system that activates when groundwater levels rise to within 0.6 mbgl. Pumping will continue until groundwater levels are drawn down to 7 mbgl, at which point the pump will shut off (Pennington Scott, 2025). Each seepage recovery bore will be fitted with bore-specific pump specifications, installation depths, and valve yield settings designed to achieve an initial well loss of 5 m (± 1 m) and a pump duty cycle of approximately 75% (Table 6).

Recovered seepage from the seepage recovery bores will be transferred via pipeline to the Gwalia plant process water pond for reuse in mineral processing activities.

Table 6: Pump triggers and pump specifications (Sourced from Pennington Scott 2025).

Bore	Target pump yield (L/s)	Installed pump recommendation	Pump turns on (mbtoc)	Pump turns off (mbtoc)
RB01	3.8	5.5 KW Lowarra 16GS55 (98 mm O.D.)	2.18	8.58
RB02	0.6	1.5 KW Lowarra 8GS15 or Grundfos SP8A-10 (98 mm - 101 mm O.D.)	2.2	8.6
RB03	1.2	1.5 KW Lowarra 8GS15 or Grundfos SP8A-10 (98 mm - 101 mm O.D.)	2.17	8.57
RB04	1.4	1.5 KW Lowarra 8GS15 or Grundfos SP8A-10 (98 mm - 101 mm O.D.)	1.48	7.88
RB05	0.6	1.5 KW Lowarra 8GS15 or Grundfos SP8A-10 (98 mm - 101 mm O.D.)	1.61	8.01
RB06	9	11 KW Lowarra Z6-31/9 (146 mm O.D.)	2.0	8.4

Proposed trigger for monitoring bores

During the 21-day draft consultation period for the licence amendment granted in December 2023 (DWER 2023), the licence holder requested that generic groundwater level limits not be included in the amendment. Instead, the licence holder proposed engaging an external hydrogeology consultant to prepare a GMP to assess the suitability of the existing monitoring bore network and to develop bore-specific SWL triggers and management actions. The

department supported this approach and did not include SWL limits for monitoring bores in the 2023 amendment.

Pennington Scott (2025) subsequently recommended that a SWL trigger of 0.5 mbgl be applied to all bores, except for MB03, MB04, MB08, and MB09, where a trigger of 1.0 mbgl is considered more appropriate due to their deeper natural water-level fluctuations.

The licence holder proposes the following procedures if an SWL trigger is reached in any monitoring bore:

- Confirm that seepage recovery bores are operating as intended;
- Notify Genesis mine management;
- Investigate the likely cause of the exceedance;
- Determine whether any specific incident or operational practice contributed to the exceedance; and
- Report the incident in accordance with Licence L8337/2009/2.

8.3.6 Risk ratings

Groundwater and native vegetation

The department has assigned a **Moderate** consequence rating to this risk event, as mid-level impacts to onsite receptors (native vegetation / groundwater) may occur. A higher operating height of the supernatant pond within TSF4 will increase hydraulic pressure on the groundwater aquifer, increasing the potential for groundwater mounding /seepage to occur which could impact native vegetation at the surface.

Evidence of seepage and mounding has been recorded during the operational life of TSF4 (Section 9.3.2). Groundwater mounding has occurred historically (Figure 4), particularly within deeper groundwater areas on the eastern side of the facility (bores TSF4/05 and TSF4/06). For this reason, the department has assigned a **Possible** likelihood rating for this risk event.

In accordance with the *Guideline: Risk Assessments* (DWER, 2020a), a **Moderate** consequence combined with a **Possible** likelihood results in a **Medium** risk rating. This rating is considered tolerable; however, additional regulatory controls may be applied where practical and appropriate. Accordingly, the department has imposed additional conditions to manage this risk event (see Section 8.3.7).

Lake Raeside

The department has assigned a **Moderate** consequence rating to this risk event, as low-level offsite impacts at a local scale may occur.

Seepage and mounding has been recorded throughout the operational life of TSF4, and the shallow groundwater SWL (Figure 4) creates a potential pathway for seepage-affected groundwater to enter the drainage line and be transported towards Lake Raeside during stormwater runoff events. Although groundwater quality data from the TSF4 monitoring bores do not currently indicate significant concentrations of seepage identified within the aquifer (section 8.3.4), there remains a potential for increased seepage concentrations in the future if operational height of the supernatant pond increases and seepage recovery bores do not operate effectively. The department has assessed the likelihood of this risk event as **Possible**.

In accordance with the *Guideline: Risk Assessments* (DWER 2020a), a **Moderate** consequence rating combined with an **Possible** likelihood rating results in a **Medium** risk rating. This risk level is considered acceptable but typically requires regulatory controls. Accordingly, the department has imposed additional conditions to manage this risk event (section 8.3.7).

8.3.7 Additional regulatory controls

As a result of this detailed risk assessment the department has included additional regulatory controls to the licence and has provided justification to each as presented below.

Passive Siphon Sampling

Due to the close proximity of TSF4 to the watercourse leading to Lake Raeside, and the shallow groundwater present around the TSF, the department has included an additional regulatory control requiring the licence holder to conduct annual targeted sampling events to capture first-flush water using passive siphon samplers. Sampling must be undertaken in accordance with the methodology described in Mackay & Taylor (2011).

Specifically, the licence holder must install two passive siphon samplers within the ephemeral creek located approximately 70 metres west of TSF4 one upstream and one downstream of the TSF. These samplers will collect the initial runoff following a significant rainfall event, providing critical data on surface water quality and enabling assessment of any potential downstream impacts. The licence holder is required to report the monitoring results to the department as part of the Annual Environmental Report (AER).

The intention of this additional monitoring requirement is to ensure that any increased concentrations of contaminants, potentially mobilised as a result of the increased operating height of the supernatant pond on TSF4, are detected promptly and are not being transported along the watercourse to offsite receptors.

Seepage recovery bores

The installed seepage recovery bores appear to be screened within partially weathered bedrock (saprock) near the base of the weathered profile. As a result, the measured transmissivity values are highly variable, reflecting local differences in hydraulic conductivity within the regolith materials and variations in saprock thickness across the profile. Transmissivity may also depend on the proximity of individual bores to groundwater-bearing bedrock fractures.

Sustainable pumping rates for each recovery bore is therefore expected to vary considerably under these hydrogeological conditions. Determining suitable rates using step-tests can be problematic because drawdown behaviour may be affected by local depletion of groundwater stored in bedrock fractures and by boundary effects that develop as the cone of depression expands over time. For these reasons, step-tests may not reliably determine sustainable pumping rates in low yielding, fractured bedrock aquifers (Piscopo et al., 2023), and results must be interpreted with caution.

The department considers that pumping rates for the recovery bores may need to be progressively reduced over time to ensure abstraction occurs at sustainable rates.

The department also considers that, although the seepage recovery bores will reduce additional seepage from the TSF, their effectiveness may be limited under the hydrogeological conditions present at the premises due to:

- Low hydraulic conductivity of saprock and fractured bedrock, which restricts the lateral extent of the cone of depression produced by pumping. This means that a large number of bores may be required to effectively dewater areas experiencing significant groundwater mounding.
- Low vertical leakage rates through the overlying clayey saprolite, resulting in slow drainage and requiring prolonged pumping to meaningfully lower near-surface potentiometric heads.
- Limited interconnection between fractures, which may restrict groundwater flow to poorly interconnected “compartments,” reducing the ability of recovery bores to lower potentiometric heads across the full extent of the groundwater mound.

- Additional seepage load anticipated from the proposed embankment lifts at TSF4, which may further exacerbate groundwater mounding.
- Low recovery bore yields (2 to 3 m³/h), which may be sufficient to capture shallow seepage immediately adjacent to TSF4 but are unlikely to exert broader influence on groundwater levels south of TSF4.

Given these factors, the department considers there is a risk that the proposed recovery program will have limited effectiveness and that additional recovery bores may be needed in the future to manage groundwater levels near the TSFs. The department also notes that reducing the water content of tailings discharged to TSF4 may assist in reducing seepage rates.

A new requirement has been added to condition 33 to ensure that seepage recovery bore pumping rates are periodically reviewed and adjusted to ensure abstraction remains sustainable. Evidence of the review, along with justification for current or revised abstraction rates, must be provided in the Annual Environmental Report (AER) to the department.

Maximum operation height

The department has determined to not grant approval to operate TSF4 supernatant pond to the maximum requested height of 382.8 mRL due to concerns around the efficiency of the seepage recovery bore program and ongoing seepage management at the TSF.

The department has instead authorised the operation of TSF4 to a maximum height of 377.8 mRL (stage 4). The reduction of the total operational height of TSF4 will act as a hold point to enable the department to review (via a new amendment application) the efficiency of the seepage recovery bores and review the management of seepage from the TSF. This approach is consistent with other decisions made for similar premises with TSFs situated in shallow groundwater environments.

Evaporation measurements

Within the 2024–2025 Annual environmental report (AER) (Genesis, 2025), it appears that a monthly evaporation rate equivalent to approximately 0.7 times the monthly pan evaporation measured at the Leonora weather station has been applied to the surface of the TSF. The department notes that a pan factor of 0.7 is generally applicable to freshwater bodies and is not appropriate for hypersaline supernatant ponds typical of TSFs. Research conducted by Newson and Fahey (2003) indicates that the average pan factor for hypersaline ponds on Goldfields TSFs is approximately 0.45, while evaporation from TSF beach areas may be represented by a pan factor of approximately 0.25.

To ensure that evaporation is calculated more accurately within the TSF water balance, as required by the licence, the department has imposed a condition requiring evaporation to be determined using the methodologies presented in Newson and Fahey (2003).

Monitoring bores

The department has adopted the SWL triggers proposed by Pennington Scott (2025) for monitoring bores MB01 to MB09, as well as the SWL triggers proposed by the licence holder for monitoring bores TSF4/1 to TSF4/6 and have incorporated these into the licence.

If an SWL trigger is exceeded, the licence holder must undertake the required management actions, including confirming seepage recovery bore operation, determining the likely cause of the exceedance, and undertake management actions to reduce SWLs below trigger levels. The licence holder must also report these investigations to the department, including actions to prevent further trigger exceedances.

To ensure that groundwater is not contaminated via concentrations of WAD cyanide, the department has also added a limit for WAD cyanide (of 0.5 mg/L) to the newly installed

groundwater monitoring bores (both vegetation and ZOI bores). This limit is already applied to the existing monitoring bores surrounding TSF4 (TSF 4/1 to TSF 4/6).

The department recommends the licence holder to investigate ways to reduce the volume of water discharged to the TSF. If groundwater levels significantly increase from the increase in operation height of the TSF the department may require the licence holder to construct additional seepage recovery bores and/or compile a Water Reduction Action Plan to target the reduction of water within the tailings. This will be considered in further in future amendments.

9. Consultation

Table 7 provides a summary of the consultation undertaken by the department.

Table 7: Consultation

Consultation method	Comments received	Department response
<p>Application advertised on the department's website on 13 October 2025.</p>	<p>One comment was received during the advertising period.</p> <p>The following comments applicable to this licence amendment are summarised below:</p> <p><u>Groundwater mounding and artesian head development</u></p> <ol style="list-style-type: none"> 1. Monitoring of groundwater demonstrates a persistent upwards trench in SWLs adjacent to TSF4. The Addendum (Pennington Scott 2025) attributes the mounding to hydraulic loading from the tailings mass which is insufficiently substantiated; 2. FDEM surveys reveal high-conductivity lineaments intersection recovery bores RB03 and RB06 suggesting preferential flow pathways; 3. Both step-test efficiencies and the wide range of transmissivity values indicate heterogenous aquifer which undermines the Theis-based analysis; 4. Application should provide: A calibrated numerical groundwater flow model, Sensitivity analysis to explore worse-case scenarios for the increase in tailings deposition height and independent peer review of the model; <p><u>Water quality and salinity risks</u></p> <ol style="list-style-type: none"> 5. Chloride concentrations and trace metals display elevated levels relative to natural background values for the Murchison region; 6. Concentrations exceed Australia Drinking Water Guidelines raising concerns for any future use of groundwater as a potable source; 	<p>1-4 – Seepage and mounding from the TSF and impact to SWLs, as well as the seepage recover bores have been considered as part of the risk assessment. See sections 3.2 and 8.3 for further information</p> <p>5-7 – Seepage from the TSF and impact to surrounding water quality and surface water features have been considered as part of the risk assessment. See sections 8.2 & 8.3 for further information.</p> <p>8-11 – Dust has been identified as a receptor (section 8.1.1) and has been included within the risk assessment. See section 8.2.</p> <p>12-13 – Seepage recovery bore requirements have been discussed in section 8.3.5. In addition, condition 33 requires an annual review of pumping rates of the seepage recovery bores.</p> <p>14-16 – The department undertook a risk assessment (sections 8.2 and 8.3) and considers the proposed controls (8.1.1 and 8.3.5) and additional regulatory controls (sections 8.2 and 8.3.7) are appropriate at managing potential risks to the receptors from the proposed activities.</p>

Consultation method	Comments received	Department response
	<p>7. Application does not address the broader ecotoxicological implications of metal-rich brines discharging to surface waters or evaporative pans, following actions are recommended:</p> <ul style="list-style-type: none"> a. comprehensive risk assessment that evaluates the potential for metal-bearing seepage to reach the nearby playa lakes and public drinking-water reserve (30 km north); b. Implement monitoring regime for downstream surface-water bodies; c. Define trigger levels for each contaminant with management actions. <p><u>Dust generation and air-quality controls</u></p> <p>8. Hypersaline fines from tailings may become more readily mobile under low-humidity conditions;</p> <p>9. Use of saline water for dust suppression may lead to salt-laden aerosols potentially depositing salts on vegetation and altering soil chemistry;</p> <p>10. No quantitative dust-emission factor or modelling outcome presented for the increase throughput scenario;</p> <p>11. Licence holder should:</p> <ul style="list-style-type: none"> a. Conduct a wind-erosion and fugitive dust study that quantifies emission rates for the proposed throughput, accounting for particle-size distribution and hygroscopic behaviour of the brine; b. Review alternative dust-suppression agents to minimise salt deposition; c. Establish dust monitoring stations at the nearest community receptors; <p><u>Seepage Recovery Bore Design and Operational Reliability</u></p> <p>12. Target pump yield for several bores is low which may be insufficient to relieve the observed mounding;</p> <p>13. The licence should require:</p> <ul style="list-style-type: none"> a. Redundant pumping capacity (i.e. a standby submersible pump); 	

Consultation method	Comments received	Department response
	<p>b. Maintenance schedule that includes periodic back-flushing, screen inspection, and replacement of deteriorated casings;</p> <p>c. Escalation protocol whereby sustained failure of any seepage-recovery bore triggers an immediate review and, if necessary, the activation of additional temporary dewatering wells.</p> <p><u>Cumulative impact assessment and adaptive management</u></p> <p>14. The application does not present a holistic cumulative impact framework (e.g., increased tailings height → higher hydraulic head → greater seepage → higher salinity in surface waters → altered dust-binding properties);</p> <p>15. A set of Key Performance Indicators should be developed to capture the status of groundwater levels, water-quality parameters, ambient noise and airborne dust with thresholds for corrective action, annual reporting should summarise these trends and explain deviations and remedial measures; and</p> <p>16. Independent scientific advisory panel should review monitoring data and advise on any necessary licence condition modifications.</p>	
<p>Application advertised in the West Australian on 20 October 2025.</p>	<p>None received</p>	<p>N/A</p>
<p>Local Government Authority (shire of Leonora) advised of proposal on 13 October 2025.</p>	<p>The Shire of Leonora replied on 5 November 2025 and was comfortable with the proposed amendment and supported the application.</p>	<p>Noted.</p>
<p>Department of Mining, Petroleum and Exploration (DMPE) advised of proposal on 4 December 2025.</p>	<p>DMPE responded on 19 December 2025 and made the following comments:</p> <ul style="list-style-type: none"> • All proposed activities are authorised under various mining proposal and notice of intents; • The external 2024 TSF audit and management review seepage was identified on southern embankment of 	<p>The department has considered DMPEs comments during its risk assessment.</p>

Consultation method	Comments received	Department response
	<p>TSF4 with recommendations including monitoring and measuring volume of seepage.</p> <ul style="list-style-type: none"> No seepage was observed during the last inspection by DEMIRS in January 2024. <p>DMPE inspected the premises and observed the following:</p> <ul style="list-style-type: none"> Toe drains and the newly seepage recovery pumps were installed and operational; Clear running fluid was observed trickling from a section of embankment. Other areas of potential seepage identified in external TSF audit report were not observed. No clear evidence of mounding, seepage (other than already discussed), no clear vegetation ill health. Salt expression observed in some toe drains, however it was uniform, as such possibly natural expression from the salt lake system or mounding. 	
Licence holder was provided with draft amendment on 25 February 2026.	<p>The licence holder responded on 12 March 2026 with information and updates to figures that the department requested during the 21 day draft period.</p> <p>No comments were made on the draft licence amendment or draft amendment report.</p>	N/A

10. Conclusion

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

10.1 Summary of amendments

Table 8 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the revised licence as part of the amendment process.

Table 8: Summary of licence amendments

Condition no.	Proposed amendments
Throughout licence	Changed "shall" to "must".
	Updated condition numbers, tables and figures. No change to condition requirements.
Front Page	Included internal number.
	Included mining tenements M37/689 and M37/1150 to the premises boundaries.
	Changed assessed production / design capacity from 1,500,000 to 1,600,000 tonnes per annual period for Category 5.

Condition no.	Proposed amendments
	Included Category 57: Used tyres storage (general) to licence.
Licence History	Included this licence amendment to the table.
2, Table 1	Added Gwalia Pit to receive dewatering water.
	Added Turkeys Nest Dam to receive dewatering water and be HDPE lined.
4 (new condition)	Added requirement for mine dewater pits to maintain an embankment freeboard of 4 m
5	Added recovery bores RB01 to RB06 to require that they are maintained.
7	Amended note 1 removing evaporation measurements to be obtained from Leonora Airport.
	Added note 2 to require evaporation to be calculated by methodologies presented within Newson and Fahey (2003).
9, Table 3	Increased maximum operating height of TSF4 from 372.8 to 377.8 RL (m).
11d (removed)	Removed condition 11d label as it was a typographical error. No change to licence requirements.
11, Table 5	Included construction of mine dewater pipelines and turkeys nest dam to the table.
	Added installation of seepage recovery bore pumps to seepage recovery bores.
12, Table 6	Added requirement for a watercart to be available to apply dusty suppression as required for landfill facilities.
	Authorised handling and disposal of tyres to the WRLs with requirements.
	Authorised handling and storage of tyres at storage areas with requirements.
	Added note to the table that used offsite tyres must not be accepted.
17	Added reference to Figure 5 for emission points to air.
18	Changed reference to figure within condition from Figure 5 to Figure 10.
19, Table 10	Added Gwalia Pit to mine dewater discharge locations.
25, Table 12	Added Gwalia Pit as a monitoring location.
26, Table 13	Added references to figures for monitoring locations throughout table.
	Added trigger levels for monitoring bores located around TSF4.
	Added annual Passive Siphon Sampling requirement to the table and a note below the table referencing the methodology to be used.
27, Table 14 (new condition)	Added trigger response requirements including management actions and reporting requirements.
27 and 28 (removed conditions)	Removed requirement to develop a Groundwater Management Plan to manage mounding impacts.
	Added requirement for seepage recovery bores (RB01 to RB06) pumping rates to undergo

Condition no.	Proposed amendments
33, Table 15	a review of pumping rates to ensure they are efficient and sustainable.
	Removed requirement to report "volumetric flow" for Table 14 (condition 26) as no monitoring requirement for volumetric flow within that condition. Considered a typographical error.
35	Removed mention of TSF3 and replaced with "infrastructure" to capture the turkeys nest and mine dewater pipelines.
	Added requirement for the submission of a compliance document to be submitted within 30 days of the completion of the infrastructure/stage.
36	Removed mention of TSF3 works within condition, no change to condition requirements/
Definitions	Added WRL, AEP, HDPE, and WAD CN to the definitions table.
Schedule 1	Removed text above all figures within Schedule 1. Reference to figures are now presented within the licence.
Figure 1	Updated showing updated prescribed premises boundary.
Figure 6	Updated showing all monitoring and recovery bores.
Figure 8	Amended Figure name to include "(2 of 2)"
Figure 10 (new figure)	New figure showing current and to be constructed mine dewater pipeline routes.
Figure 11 (new figure)	New figure showing the construction requirements of the Turkeys Nest.
Figure 12 (new figure)	New figure showing the WRL tyre disposal location and used tyre storage locations.
Figure 13 (new figure)	Sampling locations for annual passive siphon sampling.

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