Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for Licence Amendment

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

Licence Number	L8578/2011/1
Licence Holder	Regis Resources Limited
ACN	009 174 761
File Number	2011/003002-1
Premises	Duketon Gold Project Legal description – Mining tenements M38/114, M38/237, M38/250, M38/283, M38/292, M38/302, M38/303, M38/341, M38/343, M38/352, M38/354, M38/407, M38/498, M38/499, M38/500, M38/589, M38/630, M38/802, M38/943, M38/1091, M38/1249, M38/1250, M38/1251, M38/1257, M38/1258, M38/1259, M38/1260, M38/1261, M38/1262, M38/1263, M38/1277, L38/201, L38/202, L38/203, L38/204 and L38/216. As depicted by Schedule 1 attached to the revised licence.
Date of Report	23 April 2024
Proposed Decision	Revised licence granted

Mariana Almeida de Moraes

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Mariana Almeida de Moraes
SENIOR ENVIRONMENTAL OFFICER, RESOURCE INDUSTRIES REGULATORY SERVICES

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

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1. Decision summary

Licence L8578/2011/1 is held by Regis Resources Limited (Licence Holder) for the Duketon Gold Project (the Premises), located on several mining tenements [1] in the Shire of Laverton.

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 operation of the Premises. As a result of this assessment, Revised Licence L8578/2011/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary

On 14 November 2023, the Licence Holder submitted an application to the department to amend Licence L8578/2011/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The applicant is seeking to expand the existing Stirling in-pit TSF (TSF 2) in the north of the operation to include the adjoining four open pits to create an enlarged in-pit TSF, as shown in Figure 1, below. The expansion of TSF is intended to occur in four stages.

[1] M38/114, M38/237, M38/250, M38/283, M38/292, M38/302, M38/303, M38/341, M38/343, M38/352, M38/354, M38/407, M38/498, M38/499, M38/500, M38/589, M38/630, M38/802, M38/943, M38/1091, M38/1249, M38/1250, M38/1251, M38/1257, M38/1258, M38/1259, M38/1260, M38/1261, M38/1262, M38/1263, M38/1277, L38/201, L38/202, L38/203, L38/204 and L38/216

Figure 1: Proposed expanded in-pit TSF incorporating the existing Stirling in-pit TSF

This amendment is limited only to changes to Category 5 activities from the existing licence. No changes to the aspects of the existing licence relating to Category 6, 52, 54, 64, 73 or 85 have been requested by the licence holder.

2.3 Overview of Stirling-Eindghoven TSF4

Gold is mined at Duketon North from several open pit mines which are centrally processed at

Moolart Well (MLW). Tailings storage has previously occurred in an above-ground TSF (MLW TSF1) which is undergoing rehabilitation. Processing operations currently utilise an in-pit TSF within the Stirling pit (MLW TSF2) for tailings deposition (Figure 1).

The Licence Holder has pivoted its tailings storage plan from facilities requiring capital earthworks (development of the approved MLW TSF3 and deferral of the MLW TSF2 raise) to instead proposing to place tailings into exhausted mine pits adjacent to MLW TSF2. These pits include the Beaufort, Eindhoven, Lancaster and Lancaster South pits and collectively will be known as MLW TSF4 (or the 'Greater Eindhoven' pit) (Figure 2). Should sufficient ore reserves become available (due to exploration discovery or changes to economic conditions), MLW TSF4 will eventually engulf the existing MLW TSF2 in Stirling pit as part of MLW TSF4 (see Figure 3).

The Licence Holder proposes the design of MLW TSF4 up to 537 mRL in four stages:

- Stage 1 - Lancaster/Eindhoven pit to 500 mRL (2.83 Mt of tailings),
- Stage 2 - Lancaster/Eindhoven pit to 515 mRL (6.14 Mt of tailings if Moolart Well processing ends in 2026),
- Stage 3 - Greater Eindhoven (Beaufort/Eindhoven/Lancaster/Lancaster South to 535 mRL (17.4 Mt of tailings), and
- Stage 4 - Greater Eindhoven/Stirling (MLW TSF2) to 537 mRL (21.9 Mt of tailings if Moolart Well processing ends in 2029).

The greater Eindhoven pit comprises the Beaufort and Lancaster pits (including Beaufort Northwest and Lancaster South). The Licence Holder states that backfilling the saddle between Beaufort and Lancaster to 515 mRL will provide a platform for deposition of tailings from the northern end of MLW TSF4 stage 2.

If backfilling has not progressed to the 515 mRL by the time deposition commences, a 30 m wide bund will be installed to provide the platform for tailings deposition. The Licence Holder believes that this will limit tailings to Lancaster/Eindhoven during stages 1 and 2 of MLW TSF4 and encourage earlier recovery of decant water. The internal bund between Lancaster and Beaufort will become redundant in Stage 3, when deposition occurs in Beaufort and Lancaster South as part of the greater Eindhoven pit.

In Stage 4, the spigotting plan extends into Stirling pit with MLW TSF2 being subsumed by MLW TSF4. Both Stages 3 and 4 are contingent on continuation of mining operations.

2.4 Design of TSF4

MLW TSF4 has been designed in accordance with DMIRS guidelines "Code of Practice: Tailings Facilities in Western Australia and Guide to the Preparation of a Design Report for Tailings Storage Facilities (TSFs)". The design for MLW TSF4 is based on:

- Annual tailings production of 3.0 Mtpa.
- Tailings deposited at 45% solids.
- Minimum design life 1.5 to 2 years (to 515 mRL), up to 7 years at 537 mRL.
- Tailings parameters based on testing and MLW TSF2 performance.
- 1 t/m^3 (dry) initial, 1.3 t/m^3 (dry) later in storage life; and
- Average beach slope 0.4%.

As an in-pit TSF, MLW TSF4 does not require construction of external embankments. The Licence Holder classified the in-pit TSF in accordance with Tables 1 and 2 of the DMP (2013) code, which resulted in a hazard rating of 'Category 3 – Low.' The hazard rating is Low as the potential impact to the environment is negligible and there are no external perimeter embankments. Specification of TSF4 is given in Table 1.

Table 1: TSF4 specification – supplied by applicant

MLW TSF4 In-pit TSF Design Feature	Specification
Number of Cells	1
Surface Area of Tailings	85.5 ha (including MLW TSF2)
Storage Capacity	21.9 Mt (Stage 4)
Maximum Pit depth	75 m
Tailings Crest	537 mRL
Embankments	None. If backfilling between Beaufort and Lancaster hasn't progressed to 515 mRL by the time tailings deposition commences for stage 1. The bund will be redundant in stage 3 and will be deposited over.
Freeboard Total Operational/Vertical	 Minimum 500 mm Minimum 300 mm
Design Storm Storage Allowance	1% AEP 72 hour duration (185 mm)
Design Storm Loading (withstand without catastrophic failure)	1% AEP, 72 hour duration storm event plus 200 mm which is 385 mm (185 mm + 200 mm)
Spillway	None
DMIRS TSF Consequence Hazard Ratings	Category 3 - Low

2.4.1 TSF4 freeboard

Based on Bureau of Meteorology rainfall intensity, frequency, and duration data for the area of Moolart Well, the Licence Holder predicts a 1% annual exceedance probability (AEP), 72-hour duration storm event rainfall depth would be 185 mm.

Provision for a minimum of 500 mm total freeboard is factored into TSF4 design, comprising minimum operational freeboard (vertical height between the tailings beach and embankment crest) of 300 mm and a minimum beach freeboard and allowance for the 1% AEP 72 hour event of 185 mm.

2.4.2 Tailing deposition infrastructure

The tailings deposition points will evolve as MLW TSF4 transitions through stages 1 to 4. For stages 1 and 2, several spigots (nominally five) will be located at the northern end of Lancaster/Eindhoven on the backfilled platform bordering Beaufort. As a contingency, if backfilling does not reach the 515 mRL before deposition commences, a 30 m wide bund will be established on the saddle between Lancaster and Beaufort pit. The bund will comprise traffic compacted clayey mine waste with a roller compacted 'core' of clayey mine waste. The internal bund has been designed with slopes of 1(V):1.5(H) upstream and 1(V):2(H).

The bund is redundant in stage 3 as it will be inundated with tailings deposition. For stage 3, deposition will occur from nominally five spigots at the northern end of Beaufort pit, overflowing the backfilled area/internal bund between Beaufort and Lancaster. Deposition will also occur

from nominally five spigots from the southern end of Lancaster South before flowing into Lancaster.

For stage 4, spigotting will be located at numerous locations around MLW TSF4, which will subsume MLW TSF2 (Figure 2).

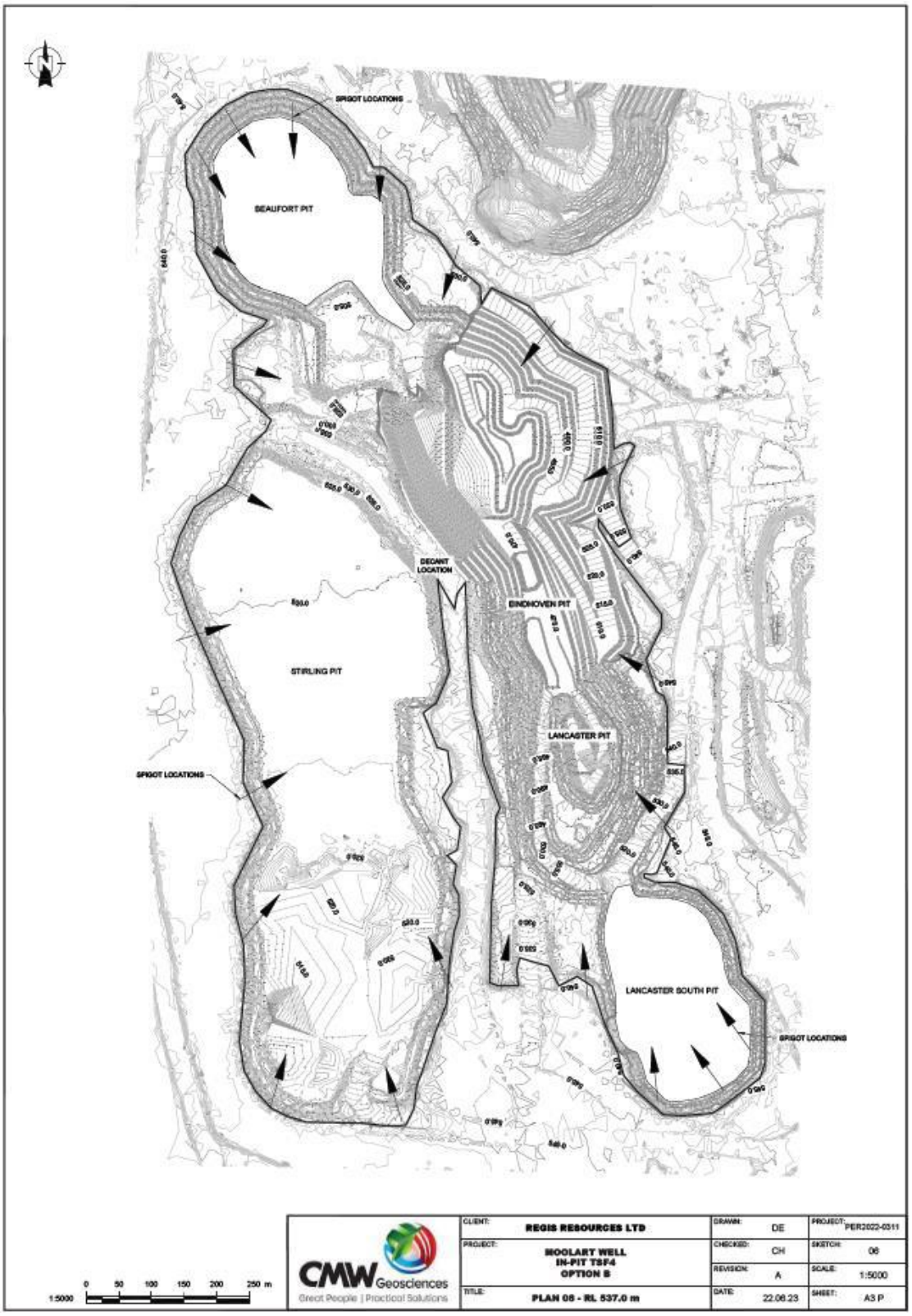

Figure 2: Proposed TSF design at stage 4

The existing tailings line between the Moolart Well process plant and MLW TSF2 will require extension to accommodate all deposition points into MLW TSF4. The pipeline extension will be situated within the catchment of MLW TSF4 to drain into the TSF if a leak occurs (much like a tailings line on an above ground TSF embankment). Extension of the line will include pressure sensors linked to telemetry for leak detection.

2.4.3 Decant system

The Licence Holder proposed the installation of a decant system to recover water from the decant pond. The Licence Holder advises the decant pond will migrate as tailings and water levels rise. The design identifies the decant pond for stages 1 to 2 will be at the southern end of Lancaster, with pumping accessed from the Lancaster South ramp. The decant pump/s will be installed on a floating pontoon or similar.

The design identifies the pumping capacity required to be no less than 450 t/h. For stage 3, the decant pond will be accessed via the eastern ramp of Lancaster pit. For stage 4, the decant pond will be accessed by a peninsula of high ground between the Stirling and Lancaster pits.

The existing return water line to MLW TSF2 will require extension to facilitate maximising recovery decant water from MLW TSF4 as the decant pond migrates. Decant recovery will commence as soon as practicable but may take several months to push the decant pond to the southern end of the MLW TSF4 from where it can be pumped.

Whilst the pipeline extension will be situated within the catchment of MLW TSF4 so will drain into the TSF if a leak occurs, extension of the return water line will include pressure sensors linked to telemetry for leak detection.

2.4.4 Overview of construction

The Licence Holder states that there is almost no construction required for the establishment and operation of MLW TSF4. The primary construction activities will be:

- Extension of the tailings delivery line and establishing spigot points for deposition.
- Installation of the decant pump/s and return water line.
- As a contingency, developing a 30 m wide bund at the northern end of MLW TSF4 to act as a platform for tailings spigots for stages 1 and 2, which will be redundant in stage 3. This will only be constructed if backfilling between Beaufort and Lancaster hasn't progressed to 515 mRL by the time tailings deposition commences for stage 1. Backfilling to the 515 mRL is expected to be completed prior to the end of 2023.

2.4.5 Tailing and return water delivery lines

Tailings delivery line

The existing tailings line between the process plant and MLW TSF2 will be used for tailings deposition into MLW TSF4 as the tailings line runs past MLW TSF4. The tailings line will however require extension to facilitate spigotting into MLW TSF4. Construction activities of the tailing delivery pipeline include:

- Laying pipe sections;
- Connecting pipe sections and tee-ing into the existing tailings line (requires timing with a plant shutdown to connect to the existing line); and
- Installing/relocating deposition spigots.

Return water line

The existing return water line between the process plant and MLW TSF2 will be used for recovery of decant water from MLW TSF4. The return water line will however require extension

and adjustment with changes to the decant pond as deposition progresses. Construction activities include:

- Laying pipe sections;
- Connecting pipe sections; and
- Installing the decant pump/s at MLW TSF4.

At the decant locations, construction of rock rings around the pumps may also be considered if tailings haven't adequately settled prior to decant recovery.

2.4.6 Tailing physical and chemical properties

Tailing physical properties

The Licence Holder states that tailings test work was performed on a sample of mill tailings by a NATA registered laboratory in early 2019. The tailings sample was a non-plastic sandy silt with 73% fines.

The settling test results indicated moderate settling rates with the maximum dry density in the settling tests achieved in five to seven days. The moderate rate of settling is due to the relatively high fines content of the tailings. Tailings physical properties are summarised below (from CMW Geosciences 2023):

- Undrained settled density, 0.92 t/m^3 (dry), with maximum density achieved in five days.
- Drained settled density, 1.10 t/m^3 (dry), with maximum density achieved in five days.
- Air drying test, final density 1.49 t/m^3 (dry) after 16 days.
- Consolidation test, final density 1.57 t/m^3 (dry) at 600 kPa.
- Particle Size Distribution (PSD), 73% passing 75 µm, and 12% passing the 3 µm.
- Slurry density ex-plant approximately 45% solids.
- Effective angle of internal friction, ϕ of 30º (assumed based on PSD testing).
- Tailings beach slope of 0.4%.
- Coefficient of Consolidation, Cv of 200 m^2/year to 1,000 m^2/year.

Tailings chemical properties

The Licence Holder provided a review of 58 past geochemical metallurgical testwork samples that have been conducted on ore types across Duketon North which could be deposited in MLW TSF4.

Using two different methods of classification, most samples across Duketon North Operations are classified as non-acid forming (NAF) except for four fresh rock tailings composites from Wallace/Buckingham and a transitional sample from Mitchell. Depending on analysis type, either one or two other fresh rock tailings composites from Wallace/Buckingham were found to be 'uncertain' along with a transitional sample from Commonwealth.

On balance, between the two analyses, five samples were considered potentially acid forming (PAF), whilst two samples were considered 'uncertain'.

Without any mitigation or blending, most tailings composites are NAF. The only composites which have any PAF results are from fresh or, in one case, transitional ore. However, Moolart Well's is a processing plant that is designed for processing oxide ore, with harder ores blended through the process to avoid reducing processing rates. Given oxide is the most abundant ore type and the process plant has limited ability to process harder ores, tailings blends will >80% oxide ore and will therefore be NAF.

As an indication of water quality, monitoring bores around MLW TSF2 have experienced pH ranges between 6.84 and 9.3 pH .

The Licence Holder considers the geochemical properties of tailings that will be stored in MLW TSF4 to be similar to those previously stored in MLW TSF2, which are overwhelmingly NAF oxide tailings and should not affect groundwater uses.

Other chemical properties of tailings

There are two primary chemicals added to the slurried ore as part of processing, sodium cyanide and lime.

Sodium Cyanide (NaCN)

Sodium cyanide is the primary reagent used to liberate gold from ore by forming a complex ion, prior to smelting.

In gold processing operations, process slurry containing cyanide is typically maintained at pH levels greater than 8.5 to optimise the content of free cyanide (CN^-) in solution to form complex ions and minimising losses of cyanide as hydrogen cyanide (HCN) gas. The slurry usually contains cyanide concentrations ranging between 100 to 500 parts per million (ppm) or 0.01% to 0.05% and comprises CN^-, HCN along with weak and strong acid complexes of cyanide. The combination of all cyanide species being referred to as total cyanide.

In open air conditions or in oxygenated water such as spigot discharge, tailings beach flow, or during rainfall, cyanide is readily converted to benign compounds of carbon, nitrogen, bicarbonates, and ammonia.

Dissociation of cyanide is also assisted by the action of ultraviolet light in sunlight (known as photolysis). Such conditions are found on a tailings beach or decant pond.

Cyanide released with tailings into TSFs rapidly breaks down to a cyanide content of 20 mg/L to 40 mg/L by the time water is recovered from the decant pond to the process plant for recycling. Open air storage mostly shows a further reduction of cyanide level to 5 mg/L to 10 mg/L after a period of several days.

Lime (CaCO3)

Lime is added to maintain the alkaline pH of the slurry whilst it is being processed to optimise CN^- concentrations.

2.4.7 Monitoring bores

There are currently six groundwater monitoring bores specified in the existing licnece for monitoring around MLW TSF2. With the establishment of MLW TSF4, the Licence Holder is proposing to add an additional three existing monitoring bores to complement the existing bore network around MLW TSF2. Bore RRLMWMB047 will require decommissioning as it is within the MLW TSF4 footprint.

The locations of these bores are shown in Figure 3.

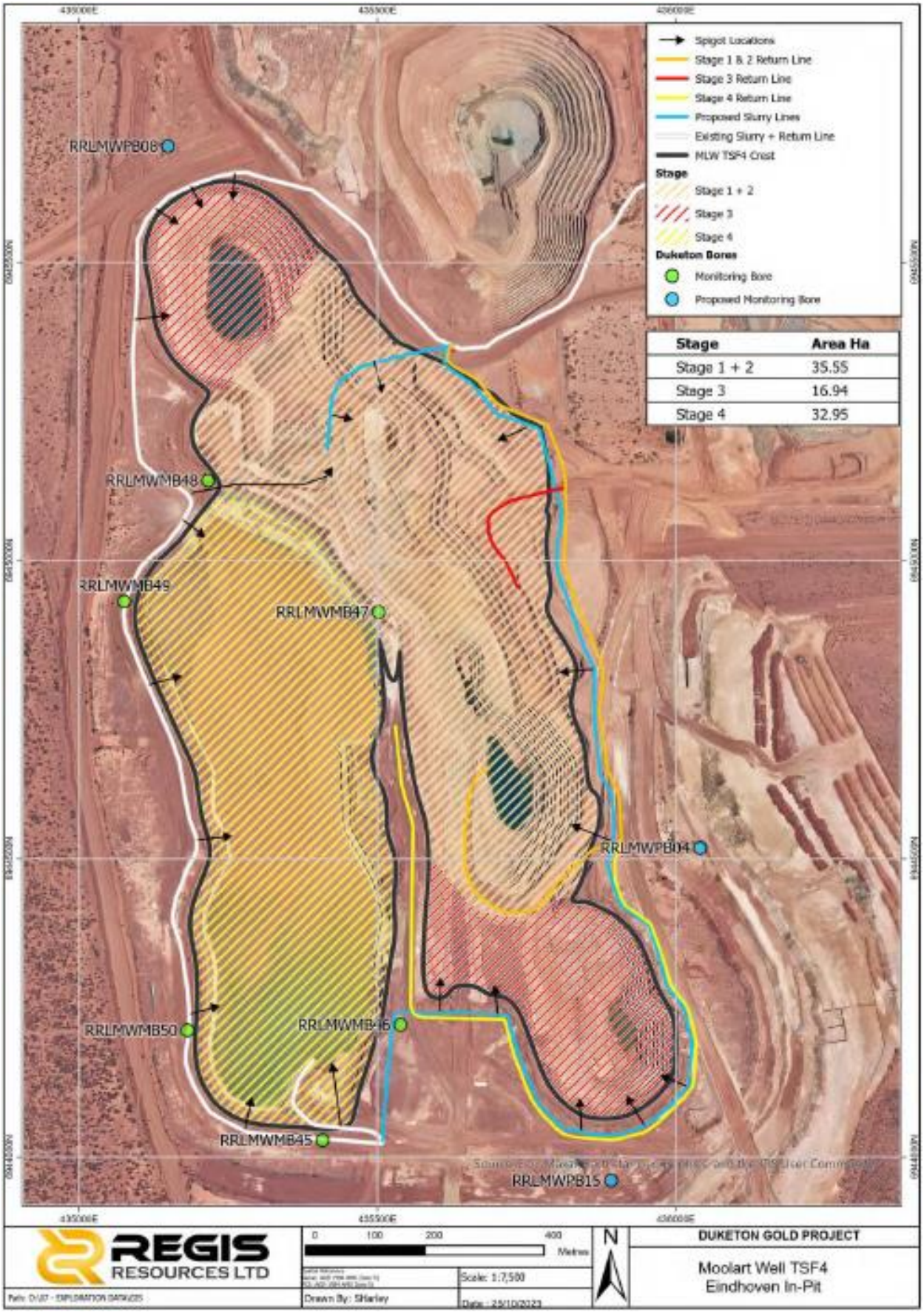

Figure 3: Proposed TSF4, tailings and return water lines and monitoring bore locations

3. Groundwater monitoring and modelling

The Licence Holder provided data showing pre-mining groundwater levels between 15 and 20 m below ground level, which equates to approximately 520 to 525 mRL (KH Morgan and Associates 2018). Following commencement of mining, groundwater levels have been locally altered by groundwater abstraction and tailings deposition activities resulting in:

- Lowering of groundwater proximal to open pit areas; and
- Increase of groundwater levels proximal to tailings storage facilities (MLW TSF1 and MLW TSF2).

Groundwater level monitoring has been ongoing for twelve years at Moolart Well and the Licence Holder has noted four main patterns of groundwater behaviour around Moolart Well:

- Near MLW TSF1 water levels had a gradual increase between 2010 and 2019 when MLW TSF1 was decommissioned.
- Near MLW TSF2, water levels had a steep increase between 2019 and 2021.
- Water levels close to open pit mining areas had observable decreases in water levels associated with cones of depression (within 1 km of groundwater abstraction locations).
- Water levels remaining steady in regional bores located 1-3 km from mining activities.

Prior to commencement of deposition into MLW TSF2, groundwater levels ranged between 470 and 480 mRL (60 to 70 mbgl), due to groundwater abstraction from the mining in Stirling pit. Following commencement of tailings deposition, groundwater levels increased to 490 to 510 mRL (30 to 50 mbgl).

With deposition of tailings into MLW TSF2, seepage was expected to migrate downwards through the base of Stirling pit, then laterally via the saprock layer to Lancaster pit, where seepage would evaporate in the pit void (see Figure 4).

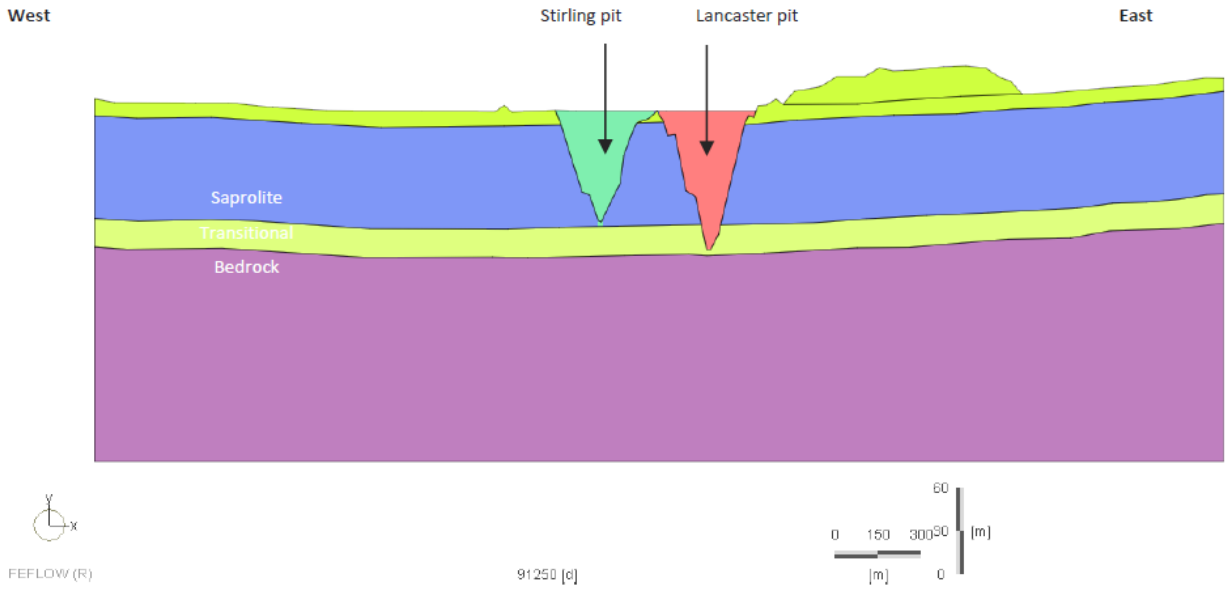

Figure 4: Hydrogeological profile at Moolart Well – supplied by applicant

The Licence Holder notes that within the aquifer, minimal to no changes in the regional groundwater surface (i.e. mounding) were observed in the model. The Licence Holder believes that the low hydraulic conductivity saprolite material effectively held water within the pit, and the transitional material allowed dissipation of the slow seepage flow rates.

3.1.1 Groundwater use

The beneficial uses of groundwater at Moolart Well are mining. Whilst the site is fenced to exclude access to livestock, water quality is generally brackish and is therefore suitable for livestock. The closest active livestock watering point (potential receptor) is Bella Well. At approximately 25 km from MLW TSF4 Bella Well is too distant to be impacted.

3.1.2 Seepage modelling of TSF4

In previous modelling for MLW TSF2 the Licence Holder predicted that seepage would report from MLW TSF2 to Lancaster pit (see Figure 4). Incorporating Lancaster into MLW TSF4 it is expected that this will drive the seepage north toward the cone of depression caused by the Buckingham pit (which encompasses both the Wellington and Wallace pits).

The pathway involves either seepage migrating via the transitional zone with its relatively higher permeability than the fresh rock and saprolite zones (at Lancaster) or slower downward migration through the low permeability saprolite layer until reaching the transitional layer. This slower path reflects the shallower pit depths at Beaufort (stage 3) and Stirling (currently MLW TSF2 and stage 4 of MLW TSF4).

The Licence Holder commissioned EMM to model seepage (EMM 2023), which noted “within the aquifer, minimal to no changes in the regional groundwater surface (i.e. mounding) were observed in the model. The low hydraulic conductivity saprolite material effectively held water within the pit, and the transitional material allowed dissipation of the slow seepage flow rates.”

The seepage model identifies approximately 200 ML of seepage from MLW TSF4 during the operational phase, peaking when the tailings level is at its highest, followed by 1,200-1,450 ML over the following 250 years. Seepage will report primarily to the Buckingham (Wellington) pit as an evaporative sink. Water levels would then stabilise with the regional groundwater head, with the open pit/s becoming sinks. Peak seepage rates (of ~0.1 kL/d/m) are an order of magnitude lower than evaporative capacity of Buckingham pit.

3.2 DWER Contaminated Sites Branch (CSB) review

The departments Contaminated Sites Branch (SCB) was provided a copy of the Licence Holder’s supporting documentation, along with a draft of this Amendment Report for review. The Delegated Officer requested advice from CSB on the likelihood of acid leachate forming due to elevated levels of cyanide in tailings, along with whether CSB considered the seepage modeling and proposed groundwater monitoring network was adequate.

CSB considers that it would be unlikely that acidic leachate would be produced by tailings in the proposed TSF. However, it is considered likely that tailings pore-water and seepage from the facility would contain elevated concentrations of some metals and metalloids.

CSB suggests the Licence Holder consider reducing the water content (*i.e.*, to increase the density) of the discharged tailings. The current water content of the tailings slurry that is produced at the Moolart Well processing plant is high (about 55%) which would increase the risk of seepage taking place if water recovery from the decant pond in the TSF is inefficient. Reducing the water content of the tailings slurry would reduce this risk.

CSB considers the most significant environmental receptors that could be affected by seepage from the facility would be livestock and wildlife that utilise pumped groundwater as a source of drinking water. The Delegated Officer notes that while the prescribed premises is surrounded by pastoral stations, the closest pastoral well (Bella Well) is 25 km from TSF2 / proposed TSF4.

CSB considers that the estimated seepage rate from the TSF is likely to be approximately correct based on the modelling and water balance work that was undertaken. However, CSB consider the current estimates of monthly evaporation from the facility to likely be unreliable, as

they are based on measurements that have been collected at a weather station that is located some distance from the TSF. CSB considers that the most important controls to mitigate the potential impacts of seepage from the TSF would be to accurately measure the water balance for the facility on an ongoing basis, and to increase the density of the discharged tailings. CSB recommends that evaporation measurements are made within the Greater Eindhoven mine void to increase the accuracy of the water balance for the TSF.

CSB considers that the number of monitoring bores and their spatial distribution around the footprint of the TSF is reasonable and has recommended a suite of analytical parameters for the monitoring bores:

- Major ions and field parameters: (i.e., sodium, potassium, calcium, magnesium, sulfate, bicarbonate, chloride, pH, conductivity, TDS).
- Metals and metalloids: (e.g. cobalt, copper, lead, molybdenum, selenium, vanadium, zinc, arsenic, antimony, mercury, nickel, chromium, uranium, iron, manganese); and
- Nitrogen compounds: (WAD-cyanide, Total cyanide, nitrate).

The full suite of major ions is recommended given these ions control the chemical composition of groundwater. Small changes in the chemical composition of groundwater (particularly relative increases in the proportions of sulfate, calcium, and magnesium) are often early indicators that the groundwater is being contaminated by seepage from TSFs.

4. Risk assessment

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

4.1 Source-pathways and receptors

4.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operations which have been considered in this Amendment Report are detailed below.

Table 2 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Dust	Earthworks to construct tailings deposition and decant infrastructure, as well as contingency bund between Beaufort and Lancaster pits.	Air/windborne pathway	• Deposition well below pit crest limiting dust generation. Even at the completion of stage 4, MLW TSF4 will be below ground level. • Fine textured materials such as tailings have high water retention and dust emission is unlikely. • Water carts used by mining fleet as part of mining operations
Tailings	Brackish tailings	Leak or rupture	• The existing tailings line will be

Emission	Sources	Potential pathways	Proposed controls
pipeline	containing 45% solids	releasing tailings to vegetation	extended around MLW TSF4 inside the active mining envelope, which has previously been cleared of vegetation. • Tailings line located to drain into MLW TSF4 if pipeline leak occurs. • Pressure sensors linked to telemetry. • Pipeline inspections
Tailings overtopping MLW TSF4	Overotpping event caused by severe rainfall event. Stormwater mixed with decant water	Stormwater accumulating in MLW TSF4 towards the end of stage 4 exceeds freeboard resulting in overtopping	• Operational freeboard designed to be a minimum 300 mm. • MLW TSF4 storm loading can contain 1% AEP, 72-hour duration storm event.
Decant water	Return water line leak containing decant water	Leak or rupture releasing decant water to vegetation	• Return water line located to drain into the open pits of MLW TSF4 if pipeline leak occurs. • Pressure sensors linked to telemetry. • Pipeline inspections. • Decant water is brackish and unlikely to impact vegetation
Seepage	Brackish seepage, potentially containing cyanide	Seepage through the base of pits or through saprock (where intersected)	• Low permeability geological conditions result in slow groundwater movement. • Seepage preferentially drawn to the cone of depression associated with Buckingham pit. • Decant recovery to maximise recovery and minimise seepage. • Decant pumps to be rated to 450 tph. • Three bores to be added to the monitoring schedule for MLW TSF4. *Note: Licence condition 3.4.1 requires standing water levels at monitoring bores to be greater than 4 mbgl*

4.1.2 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 3 below provides a summary of potential human and environmental receptors that may

be impacted because of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental siting* (DWER 2020b)).

Table 3: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
Surrounded by active pastoral stations. Pastoral bore (Bella Well) Receptor screened out of assessment due to separation distance.	25 km from the prescribe premises.
Environmental receptors	**Distance from prescribed activity**
Multiple small aboriginal heritage sites	Within 1 km of proposed TSF
Aboriginal heritage site – Walgarana (lodged with DPLH; Place Type: Artefacts / Scatter; Water Source)	1.5 km south of proposed TSF
Underlying groundwater (non-potable purposes) Goldfields groundwater area. Groundwater quality in this area is good – 1,000 mg/L – 5,000 mg/L TDS.	Underlying the proposed TSF
Native vegetation, including Priority Flora: • *Eremophila pungens* (Priority 4) • *Calytrix praecipua* (Priority 3) • *Phyllanthus baeckiodes* (Priority 3)	Located within prescribed premises

4.2 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 considers potential source-pathway and receptor linkages as identified in Section 4.1. 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 4.1), 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 4.

The Revised Licence L8578 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Category 5 tailing discharged into a TSF activities.

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

Table 4. Risk assessment of potential emissions and discharges from the Premises during construction, commissioning and operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Justification for controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
Construction								
In-pit bund construction Installation of new tailings deposition and decant infrastructure including pipelines and decant system	Dust	Air/windborne pathway causing impacts to health and amenity	Vegetation	Refer to Section 4.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	N/A The Delegated Officer considers the nature of the premises, short period of construction and distance to sensitive receptors will result in a negligible risk of impact from construction.
Operation								
TSF4 - overtopping due to insufficient freeboard capacity	Tailings / water potentially containing elements of environmental significance	Uncontrolled release / overland flow / infiltration	Soil and vegetation	Refer to Section 4.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1.2.7 – Containment infrastructure Condition 1.2.10 – Inspection of infrastructure Condition 1.2.11 – Pipeline construction and operation requirements.	Licence conditions for the operational freeboard of the TSF to be maintained at 300 mm at all times. The tailing pipelines is to be visually inspected daily as per existing licence conditions.
Tailings / water pipelines (leaks of rupture)	Tailings / water potentially containing elements of environmental significance	Uncontrolled release / overland flow / infiltration	Soil and vegetation	Refer to Section 4.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 1.2.7 – Containment infrastructure Condition 1.2.11 – Pipeline construction and operation requirements	Licence conditions exist for TSF construction and operational requirements, including the construction and operation of pipelines to have telemetry systems and pressure sensors installed, along with

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Justification for controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
								automatic cut-outs and secondary containment in the event of a pipe failure.
MWL TSF4	Tailings / decant water potentially containing elements of environmental significance.	Seepage / infiltration of decant water through pit basin and walls adversely impacting groundwater quality Potential groundwater mounding causing adverse impacts to vegetation health via root uptake	Underlying groundwater Native vegetation Surface waters / Aboriginal heritage water source 1.5 km to the south	Refer to Section 4.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 1.2.9 – Operation requirements for TSF Condition 1.2.12 – Water balance to be undertaken for any active TSFs, including evaporation rates in these calculations. Condition 1.2.13 – Infrastructure approved for construction to include new monitoring bores for groundwater quality. Condition 3.3.1 – Process monitoring **Condition 3.4.1** – Ambient environmental quality monitoring, with addition parameters including Al, Be, B, Cd, F-, Mo, Se and V.	Process monitoring includes volume of seepage recovered and reused in the process plant. Operational conditions exist in the licence to report on water balance and evaporation rates, along with ambient environmental quality monitoring. The Delegated Officer has added additional groundwater monitoring parameters.

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.

5. Consultation

Table 5 provides a summary of the consultation undertaken by the department.

Table 5: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website 9 January 2024.	None received	N/A
Department of Mines, Industry Regulation and Safety (DEMIRS) advised of proposal 9 January 2024	DMIRS replied on 15 February 2024 confirming that a Mining Proposal (REG ID 122868) from Regis Resources which includes the Moolart Well in-pit TSF 4 - Stages 3 and 4 raise to 537 mRL (combined with the Stirling in-pit TSF 2), has been received and is currently being assessed by the department (DEMIRS).	The Licence Holder is responsible for ensuring their operations (and any changes) are approved by DEMIRS under *the Mining Act 1978*.
The Licence Holder was provided with draft amendment on 8 April 2024	The Licence Holder provided comment and waived the remainder of the comment period 17 April 2024. The Licence Holder clarified that, as well as using meteorological data from nearby weather stations (managed by the Bureau of Meteorology), pan evaporation systems are already installed at Duketon Gold Project to provide accurate water balance calculations. The Licence Holder agrees to monthly measurement of pan evaporation at any active TSF but considers the reference to McJannet et al. to be superfluous and requests that it be removed.	The requirement for monthly pan evaporation rates for any active TSF has been conditioned within the licence, and the Delegated Officer agrees with the proposed change to licence, that the reference to McJannet et al. is unnecessary. The Licence Holder is already able to obtain accurate evaporation rates and water balance calculations at the Duketon Gold Project.

6. 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.

6.1 Summary of amendments

Table 6 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 6: Summary of licence amendments

Condition no.	Proposed amendments
Introduction	Include MLW TSF4 into premises description and licence summary

Definitions	Add ‘Minimum Construction Requirements for Water Bores in Australia’, ‘suitably qualified geotechnical engineer’, ‘suitably qualified hydrogeologist’, ‘SWL’, and ‘WAD cyanide’ to the list of defined terms.
Table 1.2.3 - Containment infrastructure	Include MLW TSF4 as a containment point reference.
Table 1.2.5 – Infrastructure approved for construction	Added rows 5 -8, MLW TSF4 Stage(s) 1 to 4 infrastructure and design and construction requirement and location
	Added row 9, MLW TSF4 tailings delivery pipeline extension construction requirements and location.
	Added row 10, MLW TSF4 groundwater monitoring bores to infrastructure and design and construction requirements and location.
Condition 1.2.12 – Annual water balance	Clarify monthly measurement of evaporation rate in TSF pits.
Table 3.4.1 – Monitoring of ambient groundwater quality	Add reference to MLW TSF4, add monitoring bores RRLMWPB004, RRLMWPB008, RRLMWPB015, remove monitoring bore RRLMWMB047.
	Add parameters to monitoring of ambient groundwater quality schedule.
Figure 17 - Map of monitoring bores around Stirling in-pit TSF	Updated figure to show proposed expansion of TSF2 / TSF4 and changes to monitoring bore network.

References

1. CMW Geosciences 2023, *In-pit Tailings Storage Facility TSF4 Moolart Well Gold Mine WA Design Report*, Wembley, Western Australia
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Risk Assessments*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2020b, *Guideline: Environmental Siting*, Perth, Western Australia.
5. EMM 2023, *MLW TSF4 Tailings Study – Two Dimensional Numerical Groundwater Flow Model,* Perth, Western Australia
6. KH Morgan and Associates 2018, *Proposed tailings deposition Stirling Open Pit Moolart Well Gold Mine*, Bentley, Western Australia