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	L8435/2010/3
Licence Holder	GSM Mining Company Pty Ltd
ACN	165 235 030
File Number	2011/000299-3
Premises	Granny Smith Gold Mine LAVERTON WA 6440 Part of mining tenements: L38/329, L38/80, L38/106, L38/144, M38/18, M38/1280, M38/161, M38/162, M38/167, M38/191, M38/205, M38/287, M38/361, M38/380, M38/389, M38/397, M38/440, M38/525, M38/532, M38/690, M38/691, M38/692 and M38/725 As defined by the Premises maps attached to the Revised Licence
Date of Report	17 January 2025
Proposed Decision	Intent to grant revised licence

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1 Decision summary

Licence L8435/2010/3 is held by GSM Mining Company Pty Ltd (Licence Holder) for the Granny Smith Gold Mine (the Premises), located in Laverton WA 6440 and part of mining tenements L38/329, L38/80, L38/106, L38/144, M38/18, M38/1280, M38/161, M38/162, M38/167, M38/191, M38/205, M38/287, M38/361, M38/380, M38/389, M38/397, M38/440, M38/525, M38/532, M38/690, M38/691, M38/692 and M38/725.

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 L8435/2010/3 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 29 February 2024, the Licence Holder submitted an application to the department to amend Licence L8435/2010/3 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Deposition of tailings into tailings storage facility cell 4 (TSF Cell 4) and associated infrastructure constructed under W6449/2020/1.This includes changes to the ambient groundwater monitoring borefield positioned around the TSF.
- Water containment infrastructure:
    - the Water Transfer Pond be used as temporary storage of stormwater, decant water and seepage water
    - Goanna Pit be identified as a discharge location for stormwater and decant water and seepage water from TSF 1, 2, 3 and 4.

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, 33, 52, 54, 64 and 73 have been requested by the Licence Holder.

2.2.1 TSF Cell 4

Deposition of tailings into tailings storage facility cell 4 (TSF Cell 4) and associated infrastructure constructed under W6449/2020/1. Tailings deposition proposed at a production rate of up to 1,750,000 tonnes per annum.

Construction Context:

TSF Cell 4, constructed under W6449/2020/1, consists of two sub cells (north paddock and south paddock) divided by an embankment running west to east, located directly west of the existing TSF Cell 3 and approximately 2.5km south-east of the ore processing plant (Figure 1). Cell 4 is designed to a maximum height of RL 425 m and will cover a footprint area of 104 ha. The anticipated storage capacity of Cell 4 is approximately 16 million tonnes. Deposition and return water pipelines are constructed as per Figure 2.

To manage seepage, inner and outer underdrainage lines, seepage collection sumps, seepage interception trenches and surface water toe drains were installed (Figure 2). Additionally, the foundation/basin of TSF Cell 4 was conditioned and compacted with a 300mm thick layer of low permeability material compacted to >98% standard maximum dry density (SMDD), between 0-4% optimum moisture content (OMC) in the following areas (Figure 2):

- Area B1: a pre-defined easement either side of the decant causeways
- Area B2: Areas where rocky subcrop was exposed, where testing indicated the in-situ permeability was >1x10^-7 m/s.

Proposed Operation:

Tailings slurry will be pumped at approximately 55-65% solids by mass and discharged into TSF Cell 4 north and south paddock through multiple spigots along their perimeter. Deposition is adjusted as required to maintain the supernatant ponds around the decant inlets, located near the centre of the north paddock and south paddock of the TSF Cell 4 basin. The operation of TSF Cell 4 is similar to the existing TSF cells at the Premises.

Water recovery involves a turret pump system that removes supernatant water from the surface of the TSF. This system allows the pond depth and pond surface area to be routinely maintained below the target of 5-10%. Water is pumped from the decant system over the crest of the TSF via return water pipelines to the process water pond located at the processing plant for reuse. Additionally, seepage water from all four TSF Cells reports to the same seepage infrastructure.

Alteration to TSF ambient monitoring bore network

- Removal of 28 monitoring bores and 2 production bores, decommissioned as part of TSF Cell 4 construction.
- Replacement of monitoring bores associated with Cell 1 and 2, which were decommissioned as part of the TSF Cell 2 Buttress construction; noting that these bores have been redrilled in close proximity to the previous locations and have had a new bore ID issued to reflect this change.
- Addition of twelve groundwater monitoring bores installed around the perimeter of TSF Cell 4 as per conditions of Works Approval W6449/2020/1. GSM will monitor the new bores monthly for a period of 6 months from this licence amendment, and then quarterly to align with monitoring regime.

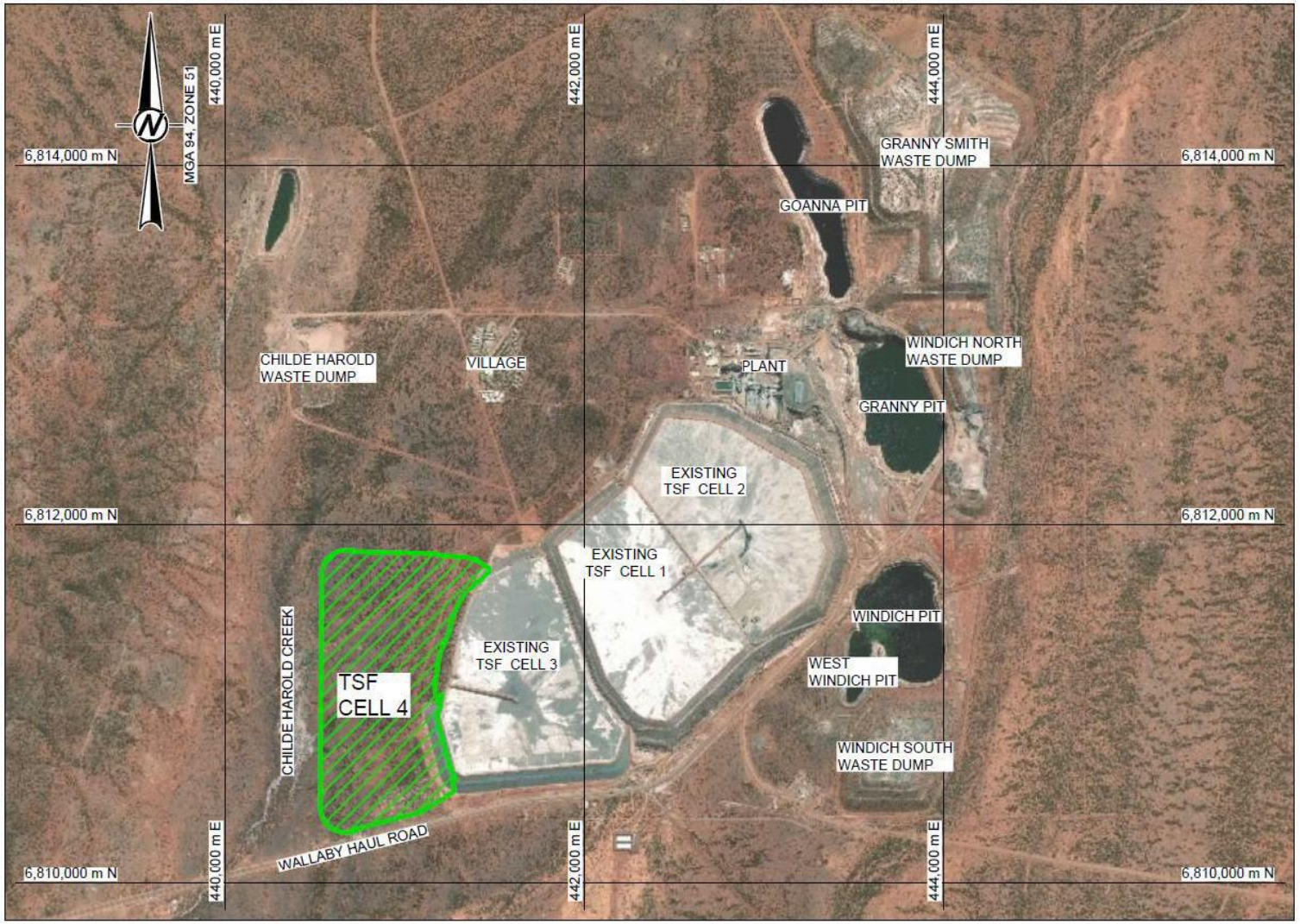

Figure 1: Granny Smith Gold mine site layout and TSF

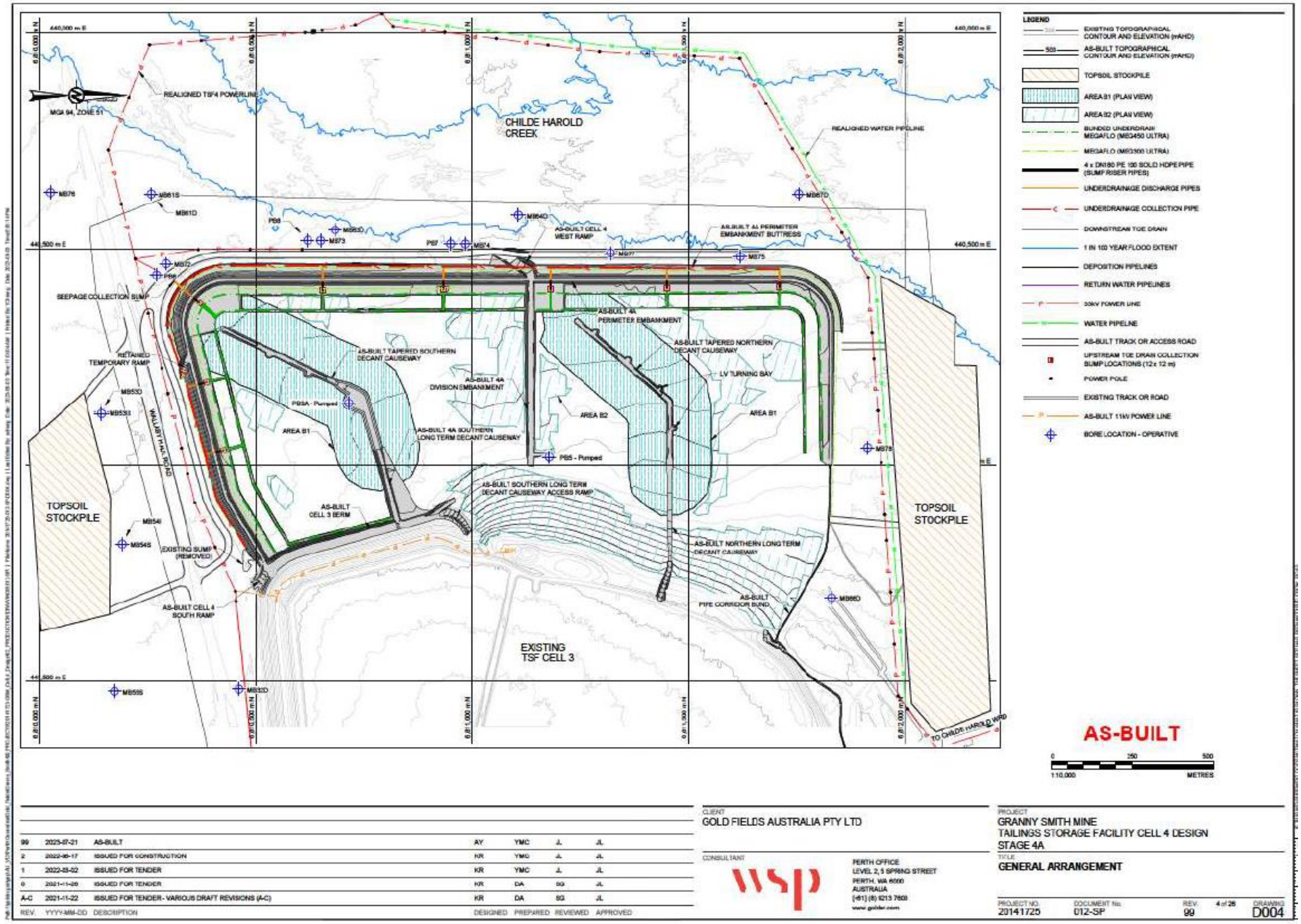

Figure 2: As built TSF Cell 4 design stage 4A

Licence: L8435/2010/3

2.2.2 Water containment infrastructure

Water Transfer Pond as temporary storage use

The Licence Holder proposes the Water Transfer Pond be used as temporary storage of stormwater, decant water and seepage water within this containment infrastructure during periods of plant inactivity, followed by the repumping of the temporarily stored water back into the plant circuit for reuse.

The purpose of this arrangement aims to establish appropriate controls during and after significant rainfall events and ensuring the maintenance of adequate freeboard on the tailings cells to mitigate risks associated with supernatant water management. The licence currently specifies that the Water Transfer Pond has HDPE-lined embankments and a maintained base, an embankment level of 4 m above ground, and undergoes daily visual inspections.

Goanna Pit

Under Condition 17 Table 8, the Goanna pit currently allows the storage of seepage water from TSF Cell 3 and seepage from interception trenches. Additionally, the Licence Holder proposes that the Goanna Pit be identified as a discharge location for stormwater and decant water and seepage water from TSF 1, 2, 3 and 4. Initially this was proposed for emergency situations such as following significant rainfall event. However, with seepage management issues raised at a meeting between the Department and the Licence Holder on 10 October 2024, the Licence Holder proposed that the Goanna pit can be used to store these discharges to manage excess water from the tailings system as deemed necessary. For example, in instances where standing water levels increase, and to allow flexibility to manage water levels proactively.

The Goanna Pit water levels, holding capacity and expected discharges:

- Current water volume: 4,325,389m^3 (49.3% capacity) (on 05/10/2024)
- Remaining holding capacity: 4,449,274m^3
- Monthly discharge volumes have ranged from 2,796 kL to 39,640 kL during typical operations, and future discharge volumes are anticipated to remain within a similar range.

2.3 Other approvals

Mining Proposal 91496 was granted on 25 March 2021 for TSF4 for 2 sub-cells (north paddock and south paddock) and is proposed to store approximately 10 years of tailings (~16 Mt). The Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) notified DWER on 18 January 2023 that no recent proposals in relation to TSF Cell 4 (and modification of the basin liner) had been received and that GSM should liaise with DEMIRS directly to determine if any further approvals are required under the *Mining Act 1978*.

3 Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in Table 1 below. Table 1 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 1: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
TSF Cell 4			
Tailings seepage water	TSF cell 4	Seepage through base and embankments of TSF to surrounding soil and groundwater	• Low permeability layer constructed over the basin areas by *in situ* treatment of foundation soils and imported mine waste materials from local waste rock dumps to achieve the saturated hydraulic conductivity of 2.0x 10^{-8} m/s. • Groundwater levels and quality monitored routinely at 12 monitoring bores surrounding the TSF. • Seepage collection sump for Cell 4 and pre-existing management via underdrainage and seepage recovery bores. • Seepage discharge to Goanna Pit • Phased seepage management approach (Appendix 2) Further information in section 3.3.
Tailings and slurry	Spillage/leakage/rupture from tailings pipeline or return water pipeline	Direct discharge from pipeline rupture causing discharge to land and infiltration to soils and groundwater	Existing licence controls: • Pipelines contained and maintained within earthen bunds with sumps at low points to ensure leaks contained • Pipelines equipped with isolation valves, flow meters and leak detection sensors which are maintained • Twice daily visual inspection of tailings pipeline and daily visual inspection of

Emission	Sources	Potential pathways	Proposed controls
TSF Cell 4			
			dewatering pipeline
Tailings and slurry	TSF Cell 4	Overtopping causing discharge to land and infiltration to soils and groundwater	• Freeboard maintained to capture rainfall from a 1% annual exceedance probability (AEP) for a 72-hour event - maintain a minimum 500mm total freeboard above the normal operating pond level • Daily inspections (shift based) checking for tailings deposition including location of open spigots, flow rate at spigots, beach formation, beach freeboard, beach erosion, low points
Contaminated stormwater	TSF Cell 4	Stormwater runoff via overland and infiltration to soils and groundwater	• Reinforced buttress wall along toe of the western embankment that protects the TSF embankment from flood water (constructed) • Freeboard maintained to capture rainfall from a 1% AEP 72-hour storm event whilst maintaining 500mm of freeboard. • Any potentially contaminated stormwater from the footprint of the cell, is contained on-site for reuse in the processing system, with proposed discharge options under emergency situations to Goanna Pit.
Dust **Screened out due to no receptors at risk**	Wind erosion from dried tailings surface	Air/windborne pathway	• Observation of dust levels on tailings • Use of dust suppression on Wallaby Haul Road • Management of cells supernatant water levels
Water Containment infrastructure			
Mine dewater	Water transfer pond	Seepage through the base and embankments of the water transfer pond to	Existing licence controls: • HDPE lined embankments and maintained base

Emission	Sources	Potential pathways	Proposed controls
TSF Cell 4			
		surrounding soil and groundwater	• Daily visual inspection • Embankment level of 4 m above ground Proposed controls: • Water temporarily stored in the pond will be reintroduced into the plant for reuse, containing any contaminants within the circuit. • Used only following significant rain events and in emergency situations
Mine dewater	Goanna Pit	Seepage through the base and embankments of the water transfer pond to surrounding soil and groundwater	Existing conditions: • Standing water level limit of at least 3 m below crest level • Monitoring and limit of pit lake elevation (419 mRL), pH (6-8) and weak acid dissociable cyanide (0.5 mg/L) and cyanide (1 mg/L) • Daily visual confirmation freeboard capacity • Daily visual checks for avifauna deaths

3.1.2 Receptors

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

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Aboriginal sites and heritage places: 1. Place ID: 20006 – Wallaby 02 – Artefact scatter 2. Place ID: 2061 – Childe Harold mine – mythological	1. 500m south of TSF Cell 4 and 1.3km west of the water transfer pond 2. 1.4km north of TSF Cell 4 and 1.6km west of Goanna pit

Environmental receptors	Distance from prescribed activity
Priority fauna: Long tailed Dunnart *(Sminthopsis longicaudata)*	Banded ironstone Long tailed Dunnart habitat present within the TSF Cell 4 and abundant in adjacent areas.
Surface water: 1. Childe Harod Creek – ephemeral creek which drains into Lake Carey 2. Windich Creek – no longer conveys surface water flow as TSF Cells 1-3 were constructed over this creek 3. Lake Carey Salt Lake 4. Local drainage system displayed in Figure 3	1. 150 m west 2. 700m southeast 3. 5km southwest 4. Drainage line 1km east of Goanna Pit and drainage line 150m west of water transfer pond.
Groundwater: The premises is located within the Goldfields Groundwater Management Area, according to the *Rights in Water and Irrigation Act 1914*. Current groundwater levels are generally in an east-west gradient away from the existing TSF towards Childe Harold Creek. Groundwater levels are currently suppressed due to ongoing abstraction from the seepage abstraction bores. Further information in section 3.3.	Groundwater in TSF area is generally 2-5m below ground level. TSF Cell 4 is located up to 4 m above the groundwater table.
General native vegetation (not known to contain any priority flora)	Adjacent to TSF Cell 4

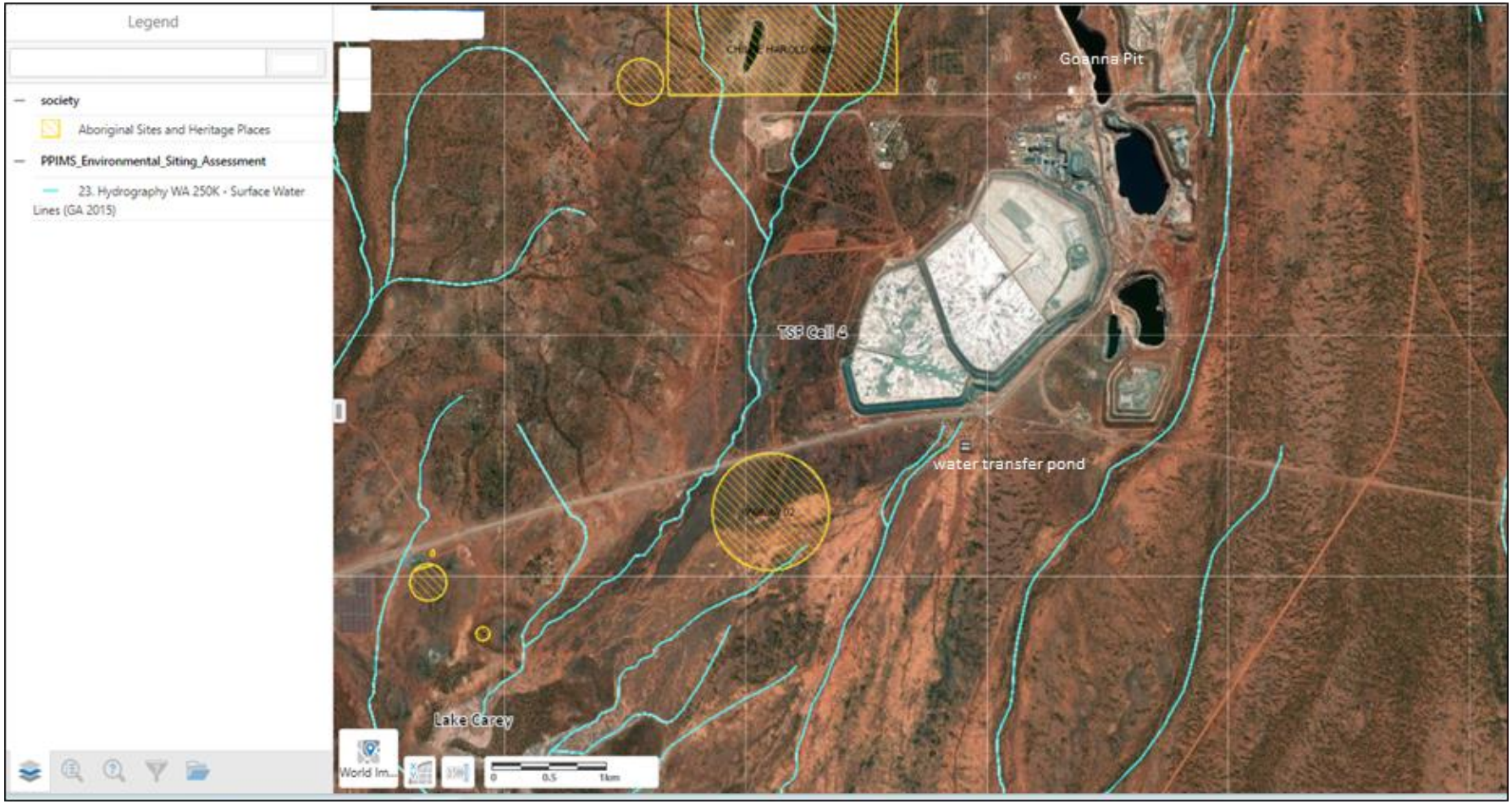

Figure 3: Distance to sensitive receptors

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are 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 3.1), 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 3.

The Revised Licence L8435/2010/3 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. category 5 activities. The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

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

Risk Event					**Risk rating[1]** **C = consequence** **L = likelihood**	**Licence Holder's controls sufficient ?**	**Conditions[2] of licence**	**Justification for additional regulatory controls**
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
TSF Cell 4 Operation								
Deposition and storage of tailings in TSF Cell 4	Tailings seepage water	Seepage through base and embankments of TSF, impacting groundwater and nearby vegetation, and causing groundwater mounding	Groundwater Surface water Native vegetation	Refer to Section 3.1 and Section 3.3	C = Moderate L = Possible **Medium Risk**	Y	Condition 1 – containment infrastructure Condition 4 – seepage collection Condition 5 – inspection of infrastructure Condition 7 –water balance for active TSF Condition 27 – process monitoring **Condition 28 – monitoring bores and standing water level limits**	See detailed risk assessment in Section 3.

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient ?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
							Condition 34 – notification of limit breach Condition 39 – phased Seepage Management Plan	
	Tailings and slurry	Overtopping and direct discharge causing ecosystem disturbance or impacting surface water quality	Aboriginal sites Priority fauna Surface water Native vegetation	Refer to Section 3.1	C = Major L = Unlikely **Medium Risk**	Y	Condition 3 – freeboard Condition 5 – inspection of infrastructure Condition 7 – annual water balance for active TSF Condition 27 – process monitoring	N/A
	Contaminated stormwater	Stormwater runoff potentially causing ecosystem disturbance or impacting surface water quality	Aboriginal sites Priority fauna Surface water Native vegetation	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 3 – freeboard Condition 5 – inspection of infrastructure Condition 7 – annual water balance for active TSF Condition 27 – process monitoring	N/A
Tailings and return water pipeline spillage / leakage / rupture	Tailings and slurry	Direct discharge causing ecosystem disturbance or impacting surface water quality	Aboriginal sites Priority fauna Surface water	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Condition 5 – inspection of infrastructure	N/A
Water containment infrastructure operation								
Temporary storage of stormwater, decant water and seepage water within the water transfer pond	Mine dewater	Seepage through embankments and base contaminating groundwater and impacting nearby	Groundwater	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	<u>Existing controls:</u> Condition 1 – containment infrastructure Condition 5 – inspection of	N/A

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient ?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
		vegetation					infrastructure	
Storage of seepage water in the Goanna Pit, following significant stormwater events.	Mine dewater	Seepage through embankments and base, contaminating groundwater and impacting nearby vegetation	Groundwater Native vegetation	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	<u>Existing controls:</u> Condition 17 – emission points to groundwater Condition 18 – standing water level limit Condition 25 – monitoring	The Licence Holder stated that, since the proposed changes involve the addition of decant water, expected to be of similar quality to the current seepage water, no significant change in the pit water quality is anticipated. It is not anticipated that stormwater (rainfall) will have a detrimental impact to the water quality. Additionally, SWL measurements around the Goanna Pit have remained well below 3 m below ground level limit. The department therefore considers current controls adequate.
		Overtopping and direct discharge causing ecosystem disturbance or impacting surface water quality	Surface water Aboriginal site	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	<u>Existing controls:</u> Condition 5 – inspection of infrastructure Condition 17 – emission points to groundwater	N/A

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

Note 2: Proposed Licence Holder's controls are depicted by standard text. **<u>Bold and underline text</u>** depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment for seepage from TSF Cell 4

3.3.1 Summary of risk event

Seepage of contaminated water through the base and embankments of TSF Cell 4 has the potential to adversely impact groundwater, surface water, soil/sediment and native vegetation.

3.3.2 Characterisation of emission and potential impact

Chemical characteristics of tailings

The department considers the characteristics of tailings and its comparison with groundwater to determine the potential for groundwater contamination and death of nearby vegetation. Golder (2020) conducted a geochemical assessment of sampling and laboratory testings of representative tailings samples to provide an indication of the tailings to be deposited to TSF Cell 4. Key findings from the Golder assessment are summarised below:

- All tailings samples were Non-Acid Forming (NAF) with an excess of acid neutralisation capacity over acid generation potential, thus the risk of acid and metalliferous drainage (AMD) is considered negligible.
- Moderate to high sulphate salinity is expected to develop in the tailings pore water and seepage as a result of long term oxidation of the sulphides in tailings materials. The higher sulphur content of tailings produced from deeper zones of the ore body (when compared to current tailings) suggests that sulphate salinity may become higher in TSF Cell 4 than that of the current tailings.
- Leach tests indicated a low risk of short-term metal leaching, although some readily soluble components can be released from the tailings solids in response to flush or leaching events.
- Overall seepage from TSF Cell 4 is expected to be saline drainage with low concentrations of elements with environmental significance. This however is likely to have a very low impact to the local groundwater given that the groundwaters surrounding the TSF Cell 4 are generally saline to hypersaline.
- The tailings liquor and associated waters were saline, with a circum-neutral pH and high electrical conductivity, containing analytes like Copper, Molybdenum, Nickel, and Sulfate that exceeded Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000) for livestock drinking water. However, significant reductions in Copper, Molybdenum, Nickel, and Tungsten concentrations were observed in toe seepage samples due to natural attenuation processes and cyanide breakdown, confirmed by five-year monitoring results.
- Kinetic testing on waste rock materials from the deeper ore body at the site has not been conducted, but may be considered to verify earlier kinetic leach test results and provide more confidence in long-term seepage chemistry for TSF Cell 4.

Seepage modelling

As part of the time limited operations for Works Approval W6449/2020/1, 12 monitoring bores around the perimeter of TSF Cell 4 (TSF MB72 – MB78) were installed and standing water levels monitored (Figure 5). Internal technical advice reviewed the data and supporting document and surmised that it appears a perched aquifer has formed in ferruginous regolith materials that lie above palaeochannel sediments. The most likely source of water in the perched aquifer is considered to be seepage from the TSF, and it is likely that shallow groundwater is flowing in a westerly direction from this facility towards Childe Harold Creek.

Internal advice provided by DWER's Principal Hydrogeologist concluded that water levels in many of the shallow bores are at least periodically less than 3 meters below ground level and therefore exceed the 3 meter deep trigger value that is often set by the department to protect native vegetation from the effects of soil salinisation. Research indicates that soil salinisation could become significant when the water table depth is less than about 1.5 metres. As the standard trigger value cannot be used, they recommended a new trigger value of 1.5 m for the shallow monitoring bores would adequately prevent shallow soil salinisation taking place. Additionally it was recommended that water level elevation in the deep aquifer should not exceed the elevation of the water level measured in the shallow aquifer for more than a two month period, or else the risk of soil salination becomes more significant.

Internal advice also stated that the provided water balance used an inaccurate pan factor of 0.75 times the potential pan evaporation rate for the area which only applies from the surface of a freshwater body not a decant pond containing saline-hypersaline water. DWER requested an updated water balance with an appropriate pan factor. The Licence Holder provided this, and informed DWER that the design of the seepage collection system (already constructed) was not influenced by the water balance, and that it considered an appropriate pan factor of 0.35. The applicant also stated that it has a pumping capacity exceeding the design and current flow requirements of the seepage collection system.

Following from the draft comments received by the Licence Holder and a meeting with the Department on 10 October 2024, the Licence Holder outlined historical seepage management issues have been occurring. This summarised that they were seeing groundwater mounding at the monitoring bores as per Figure 5.

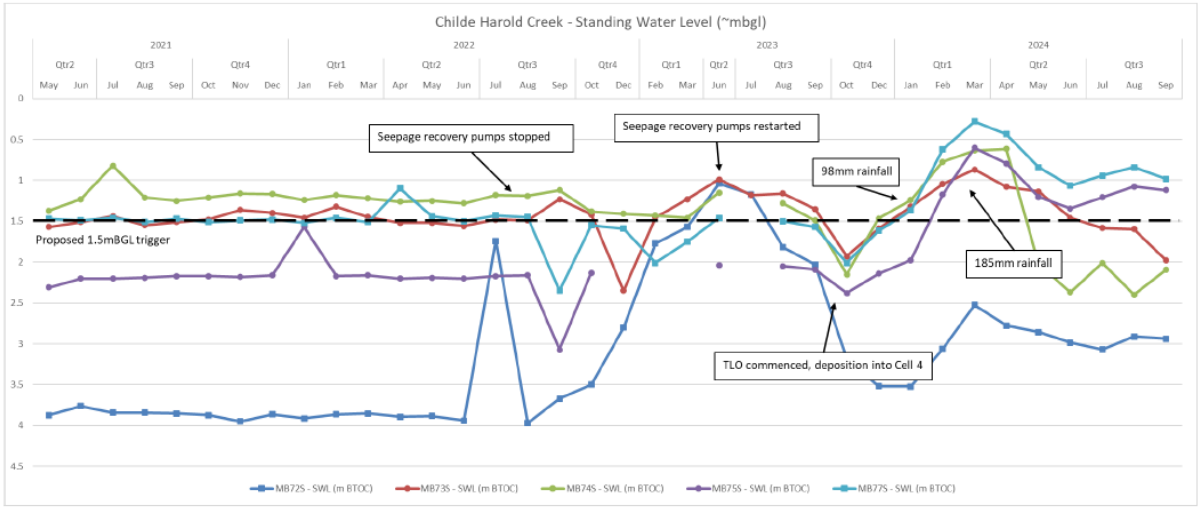

Figure 4: Standing water levels 2021-2024

Figure 5: Monitoring bores

3.3.3 Licence holder controls

The Licence Holder has proposed seepage control measures that mirror the controls in the time limited operations phase from the Works Approval W6449/2020/1. This includes five vibrating piezometers installed beneath the perimeter embankment for pore pressure monitoring. The Licence Holder states that in the event the piezometric level rises above expectations, further investigations will be carried out and controls implemented to maintain an acceptable factor of safety for the embankments. Additionally, survey pins have been installed along the crest of the starter embankment and will be installed on each stage of the upstream raises to monitor embankment and crest movement.

Groundwater monitoring bores (TSF MB72 – MB78) were installed in April 2021 around the perimeter of TSF-Cell 4 for monitoring of standing water levels in accordance with Condition 8, Table 4 of Works Approval W6449/2020/1. A shallow (10 m) and deep (30 m - 70 m) bore were constructed at each location. As the Licence Holder has stated they cannot meet the standing water level limit originally proposed by the Department, they have proposed to use the Goanna Pit to manage seepage as deemed necessary for example where standing water levels increase, and to allow flexibility to manage water levels proactively. The Licence Holder also initially requested that all shallow bores MB72 – MB77 be exempt from the 1.5 m limit, however new limits were proposed as per Figure 5 and discussed in the next section.

Additionally, the Licence Holder has proposed a phased timeline approach (Appendix 2) as summarised:

1. Immediate actions – enable discharge to goanna pit and review of water levels, pumps and site water balance
2. Establish monitoring plan – for groundwater and vegetation health data (developed over 6 weeks)

Implement monitoring plan – over 24 months with specific milestones

The Licence Holder states that ongoing seepage management strategies in action whilst the phased Seepage Management Plan is in place include:

- Maximise TSF decant abstraction and management of supernatant tailing water below 15%.
- Adherence to a design two-to-three month tailings deposition strategy.
- Continuous abstraction from the Cell 3 Seepage Interception Trench, constructed to a depth of 5-6 mbgl.
- Continuous abstraction from Seepage Recovery Bores within Cell 4.
- Continue to monitor water quality and SWL for bores as per works approval, ensuring early detection of any changes. And continued routine seepage infrastructure inspections.

3.3.4 Assessment criteria, risk assessment

The geochemical characteristics of tailings, seepage modelling and proposed controls are considered in the department's risk assessment for seepage.

Based on the geochemical assessment provided by Golder, a key concern is the sulphate concentrations due to the expected moderate to high sulphate salinity in the tailings pore water and seepage. The long-term oxidation of sulfides in the tailings material is likely to sustain this concern. High sulphate salinity can lead to increased salinity in soil and water, which can adversely affect plant growth as it can make it difficult for plants to uptake water and essential nutrients. However the department notes that local groundwater ranges from saline to hypersaline, implying the environment is already adapted to high salinity levels, potentially mitigating the impact of seepage.

Whilst there are initial exceedances of copper, the study indicates a significant reduction in copper concentrations in toe seepage samples. While initially a concern, copper concentrations appear to be mitigated over time through natural attenuation processes. However, ongoing monitoring is essential to confirm the effectiveness of these natural processes.

The department had intended to place a 1.5 m limit or deeper for shallow bores as advised by internal advice to minimize significant risk of soil salination. However, the Licence Holder advised that that is currently unachievable due to existing limit breaches. Whilst all bores should not be excluded from the limit, the department and Licence holder found common ground to agree that the limit should apply to MB72s, MB74s and MB78s (Figure 5). Justification is provided in Table 4.

Regarding the bore limit for when the water elevation level in the deep bores exceeds the water level in the shallow aquifer for more than a two month period can be extended to three months. This ensures that the frequency aligns when sampling becomes quarterly. If this limit is breached, condition 34 requires the Licence Holder to notify the department. Additionally, internal advice recommended that the water balance for Cell 4 is determined at least quarterly on an ongoing basis to ensure that seepage rate from this TSF cell does not increase over time. Condition 7 has been updated accordingly.

Regarding the proposed a phased timeline approach, the department has specified condition 39 in the Licence. This requires the Licence Holder to conduct their phased Seepage Management Plan and prepare and submit an interim report based on monitoring findings before the proposed date of 30 November 2025.

DWER notes that future water quality impacts associated with waste and waste rock dumps, particularly concerning post-closure, are managed through the Mine Closure Plan regulated by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS). DWER supports the potential need for kinetic column leach tests to provide information of long-term seepage chemistry during and post mine closure – and that this be addressed in the Mine Closure Plan.

4 Consultation

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

Table 4: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 10/05/2024.	No comments received.	N/A
Department of Mines, Energy, Industry Regulation and Safety (DEMIRS) advised of proposal 09/05/2024.	No comments received.	N/A
Licence Holder was provided with draft amendment on 11/09/2024	Comments received on 18/10/2024. and further clarification received on 31/10/2024.Refer to Appendix 1.	Refer to Appendix 1
Licence Holder was provided with 2nd draft amendment on	Comments received on 22/12/2024: SWL on bores:	DWER agrees that these changes to bores with the SWL limit are justified. Figure 4 illustrates that

12/12/2024.	• Supportive of >1.5 m SWL applied to MB72. • Request MB75s be excluded from the limit due to location outside immediate drawdown zone of existing seepage recovery infrastructure and highly impacted by rainfall. • Propose the limit be applied to MB74s instead due to good location west of the TSF for spatial spread, water levels influenced by seepage pump utilisation from recovery bore PB07. • Suggested limit be applied to MB78s located north for spatial distribution. Note there is no seepage pumping infrastructure at this site which may limit its responsiveness to seepage optimisation. Administrative: • Remove MB76 as it was never drilled due to falling within registered heritage site. • Remove annual SWL reading requirement for MB56 as quarterly readings is required and supersedes. • Remove water transfer pond as an emission to groundwater as it is more appropriate to call containment infrastructure. The pond is fully lined and poses no pathway to groundwater. Replace/add figures for clarity. • Replace figure 1 of prescribed premises • Add additional figure to include TSF Cell 4 monitoring locations	MB75 and MB74 is both impacted by the rainfall events, however MB75 has taken longer to adjust afterwards compared to MB74 which spikes and then decreases under the limit. Additionally adding the limit on the third bore MB78 will provide more monitoring north of the TSF. Changes made.

5 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.

5.1 Summary of amendments

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

Table 5: Summary of licence amendments

Condition no.	Proposed amendments
2	Inclusion of TSF 4 in the containment point reference to receive tailings material in Table 1. Addition of stormwater, decant water and seepage water to the material list of the water transfer pond in Table 1.
3	Addition of TSF 4 freeboard
7	Changed frequency of undertaking water balance from annually to quarterly.
28	Addition of TSF 4 monitoring bores MB72 – MB78 (excluding MB76) and parameters to be monitored, and standing water level limit for shallow and deep bores.

	Replacement and removal of monitoring bores associated with Cell 1 and 2.
39	Phased Seepage Management Plan condition and requirement to submit report no later than 30 November 2025.
Figure 1	Replaced for clarity
Figure 6	Added figure 6 (as built TSF Cell 4) and adjusted following figure numbering.
Figure 14	Added figure 14 for clarity

References

Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.

1. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
2. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
3. Gao, H., Fu, T., Wang, F., Zhang, M. and Liu, J., 2024. Influence of groundwater table depth on the evolution of saline-alkali land in a coastal area. *Land Degradation & Development*, **35(8)**, 2857-2866.
4. Golder 2020. Engineering Design of TSF Cell 4 Project – Geochemistry and Water Quality Study at Granny Smith Mine. Memorandum. Reference No. 20141725-005-M-Rev0.
5. GSM Mining Company Pty Ltd 2024, Granny Smith Gold Mine Licence Amendment Supporting Information L8435/2010/3, Perth, Western Australia.
6. Shokri-Kuehni, S.M.S, Raaijmakers, B., Kurz, T., Or, D., Helmig, R. and Shokri, N., 2020. Water table depth and soil salinization: from pore-scale processes to field-scale responses. *Water Resources Research*, **56**. The paper is available from the following website: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019WR026707.

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

Condition	Summary of Licence Holder's comment	Department's response
Cover Page	Update business address to: Level 4, 235 St Georges Terrace, Perth WA 6000 Update date of amendment to current amendment date	Change made to Licence
17 (Table 8)	Emission point reference Goanna pit to include "Seepage water from TSF 1, 2, 3 and 4 seepage interception trenches, decant water, stormwater" Water transfer pond to be used not just in emergency situations Rationale: Initially the Goanna and water transfer pond were proposed to hold stormwater and decant water in emergency situations. However, they propose to use it as an alternative source to store stormwater, decant water and seepage water when deemed necessary to provide operational flexibility and as another mechanism to manage seepage if standing water levels increase.	Requested further clarification regarding estimated discharge to Goanna Pit and potential impact to sensitive receptors and water quality contamination. Licence Holder's response captured into section 3.2 of the amendment report and have permitted request into licence.
2 (Table 1) and 3a	Reword the freeboard definition to: "Maintain Freeboard above the Normal Operating Pond of 1:100 AEP 72-hour storm plus an additional 500mm (Total Freeboard)." Rationale: To align with requirements of DEMIRS Code of Practice and ensure consistency throughout licence.	Change made to Licence.
28 (Table 17)	Update monitoring bores that were decommissioned as they were not removed on licence and remove TSF Cell 4 bores from Cells 1-3. Rationale: Administrative error and redundant duplication.	Change made to Licence
28 (Table 17)	Proposed phased Seepage Management Plan: 1. Immediate actions – licence amendment discharge to goanna pit and review of water levels, pumps and site water balance 2. Establish monitoring plan – for groundwater and vegetation health	The department requested current seepage management actions in place until the Seepage Management Plan is implemented and while monitoring and data is collected. This response is captured in Section 3.3.3. The department cannot justify exempting all bores from the limit.

Condition	Summary of Licence Holder's comment	Department's response
	data (developed over 6 weeks) 3. Implement monitoring plan – 24 months milestones indicated in Appendix 2. Suggested excluding all bores MB72 – MB77 from the 1.5 m limit. Rationale: Seepage management measure for Cell 4 of maintaining a >1.5 m water table depth for shallow bores is not currently achievable for the Licence Holder, as standing water levels are currently in breach.	Figure 4 illustrates that with proper seepage management, MB72 and MB75 may be managed below the limit (later changed to MB72, MB74, MB78 as outlined in Table 4)

Appendix 2: Actions for seepage management phased approach

Item Number	Action:	Due by:
1.	Install water level loggers at a minimum of 6 representative locations.	1st January 2025
2.	Implement recovery system optimisation improvements, if identified in review.	31st January 2025
3.	Initiate quarterly monitoring of vegetation health at transect locations defined by specialist botanist, via remote sensing multispectral UAV.	1st January 2025, ongoing
4.	Review of existing vegetation monitoring program. Define vegetation impact zones, supported by specialist botanist.	30th April 2025
5.	Define groundwater levels and Cell 4 seepage pathways (e.g. non invasive geophysics).	31st October 2025
6.	6 months monitoring period (Mar-Aug 2024).	30th September 2025
7.	Complete hydrogeological review of data, including an assessment of the effectiveness of existing systems. Delivery to DWER.	30th November 2025
8.	Delivery to DWER interim TSF Groundwater and Seepage Management Plan, with update groundwater management zones, staged implementation of seepage management strategies, ongoing impact management, trigger levels and monitoring.	30th November 2025
9.	Investigate and develop viable options for specific engineering controls for seepage recovery, based on above studies. The engineering controls may include production bores, additional regional monitoring bores, seepage management infrastructure, potentially installed during future TSF lifts, or upgraded pumps. *If emerging seepage issue with impacts to receptors is identified at any prior stage, this process will be fast tracked and actions communicated to DWER.	31st March 2026*
10.	Review and finalise TSF Groundwater and Seepage Management Plan with all relevant studies and control options detailed based on specialist reviews.	Q4 2026