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** | L8008/2004/3 |
| **Licence Holder** | FQM Australia Nickel Pty Ltd |
| **ACN** | 135 761 465 |
| **File Number** | DWERVT16538 |
| **Premises** | Ravensthorpe Nickel Operations<br>RAVENSTHORPE WA 6346<br><br>Legal description –<br><br>Mining tenements L74/54, M74/108, M74/114, M74/115, M74/116, M74/123, M74,142, M74/144, M74/145, M74/167, M74/168, M74/173, M74/174, M74/175 and G74/08 as depicted by the premises maps attached to the revised licence |
| **Date of Report** | 7 May 2025 |
| **Decision** | Revised licence granted |

Alana Kidd
Digitally signed by Alana Kidd
Date: 2025.05.07 08:16:58 +08'00'

**Alana Kidd**

**Manager, Green Energy**

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

# Table of Contents

# 1. Decision summary

Licence L8008/2004/3 is held by FQM Australia Nickel Pty Ltd (FQMAN; the licence holder) for the Ravensthorpe Nickel Operations (the premises), located within the Shire of Ravensthorpe, Western Australia.

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 L8008/2004/3 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 30 October 2024, the licence holder submitted an application to the department to amend licence L8008/2004/3 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- co-dispose mineral residues at tailings storage facilities 1 and 2 (TSF1 and TSF2), along with the mine tailings already approved for disposal (see section 2.2.1 for detail);
- establish a category 89 landfill for disposal of up to 2,500 tonnes per annum of non-process waste within the exhausted Halley's pit (see section 2.2.2 for detail);
- transfer tailings storage facility stage 4 operation and stage 5 construction conditions from works approval W6739/2022/1 to the licence (see section 2.2.3 for detail); and
- other amendments which the applicant considers to be administrative (see section 2.2.4 for detail).

This amendment is for changes to category 5 activities from the existing licence and addition of category 89. No changes for other categories 31, 52 and 54 have been requested by the licence holder.

Table 1 below outlines the proposed changes to the existing prescribed premises categories.

**Table 1: Proposed design or throughput capacity changes**

| Category | Current design throughput capacity | Proposed design throughput capacity | Description of proposed amendment |
|---|---|---|---|
| 5 | 21,500,000 tonnes per annual period | N/A | Co-dispose mineral residues at TSF1 and TSF2, along with the production tailings already approved for disposal at TSF2. |
| 89 | New category | 2,500 tonnes per annum | Addition of new category 89 for the disposal of 2,500 tonnes per annum of non-process waste within the exhausted Halley's pit. |

### 2.2.1 Category 5 activities

FQMAN propose to amend the licence to permit disposal of other production mineral waste streams into tailings storage facilities 1 and 2 (TSF1 and TSF2), in addition to the 4.56 million tonnes per annum (Mtpa) of production tailings already authorised:

- up to 500,000 tonnes per annum (tpa) of salt collected from evaporation ponds;
- up to 1,000 tpa sulfur filter residue;
- up to 500 tpa of magnesium oxide; and
- up to 300 tpa of washdown facility silts.

A detailed risk assessment for this amendment is included in section 3.3.

### 2.2.2 Category 89 activities

FQMAN propose to establish a category 89 landfill within part of Halley's pit (Figure 1) for disposal of non-process wastes that cannot be recycled (these wastes are currently disposed of at the Ravensthorpe Shire landfill).

Mining ceased at Halley's pit in 2017. Disposal of coarse beneficiation reject material into a section of Halley's pit commenced during 2014, in accordance with a section 45C amendment to Ministerial Statement 633 (MS 633), approved 23 September 2010 (see section 2.3).

FQMAN proposes to dispose of the following waste types to Halley's pit:

- putrescible wastes (food and packaging wastes) (~70%);
- clean fill and uncontaminated fill (~5%);
- inert waste type 1 (~5%); and
- inert waste type 2 (including scrap tyres, rubber and plastic materials from mine and process waste) (~20%).

The waste types proposed are planned to be covered by the coarse beneficiation reject material and rehabilitated at closure.

### 2.2.3 Transfer of W6739/2022/1 stage 4 operation and stage 5 construction conditions

FQMAN request that licence condition 8 (formerly 11) (tailings storage facility staging) is revised to reflect the new TSF2 embankment lift stages. They state that it is more appropriate to include TSF2 stage 4 and 5 lifts within this amendment (rather than a works approval) given that the TSF is not a new facility. They also request that construction conditions for stage 5, which are not yet completed, be placed on the licence for construction upon recommencement of operations.

**Department outcome**

Compliance documents for the TSF2 stage 4 downstream embankment lift to 129.7 mRL were submitted to the department on 15 January 2025 and determined to be generally compliant with the works approval. One minor departure from the requirements of the works approval was that the fall along the crest of the embankment (designed to direct surface water and/or spilled liquor from tailings distribution pipelines back into the tailings basin) and decant causeway was approximately 0.8%, lower than the design requirement of 2%±0.5%. The insufficient cross fall may increase the risk of water/spills ponding on the surface of the embankment and increase the risk of driving along the embankment/causeway. The department recommends FQMAN corrects this during stage 5 construction.

Whilst there were some other minor departures from the construction specifications noted, these were not considered to pose additional environmental risk.

Given that stage 5 involves construction of a series of catchment paddocks (containment infrastructure) which have minimum permeability and monitoring requirements immediately post construction, it is considered appropriate that the TSF2 stage 5 construction conditions remain within the works approval instrument. After FQMAN has submitted the appropriate compliance documentation for stage 5, an amendment to licence L8008/2004/3 can be requested at that time.

If FQMAN do not plan to recommence operations before the current works approval expiry date (3 May 2027), it is recommended that a works approval amendment is sought to modify the expiry date.

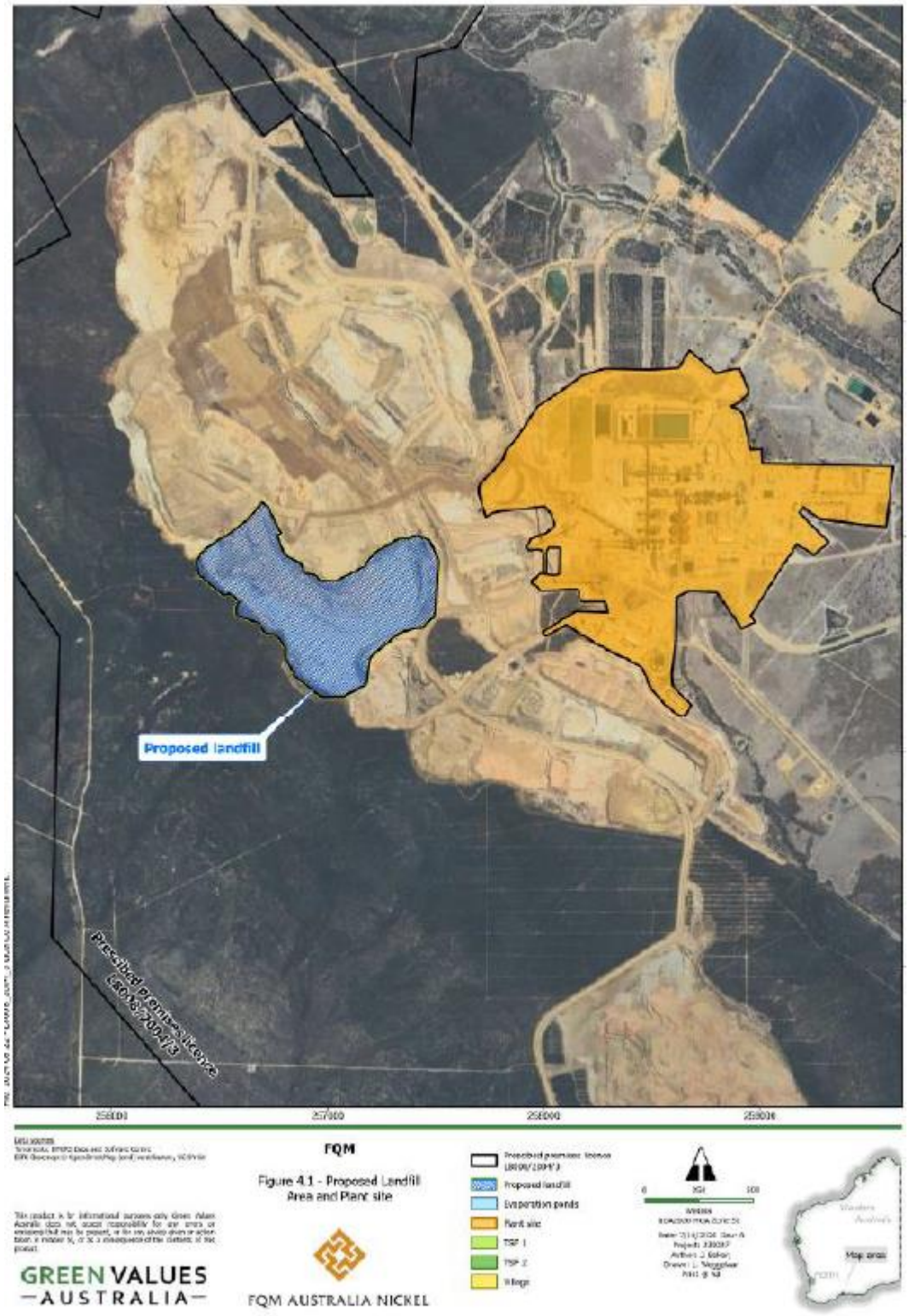


**Figure 1: Proposed category 89 landfill location**

### 2.2.4 Other amendments

**Table 2: Applicant proposed administrative amendments**

| Proposed amendment | Applicant justification | Department outcome |
|---|---|---|
| Conditions 2 and 3, Table 1<br><br>Remove or revise condition 2 as construction of recovery wells has been completed. | Construction of the groundwater recovery wells has been completed. The conditions do not align with the recovery equipment installed. | Groundwater recovery well installation did not comply with the construction and installation requirements of condition 2. Some of the construction requirements were more relevant to groundwater monitoring well installation (i.e. for on-going monitoring of contaminants) rather than seepage recovery bores, however.<br><br>FQMAN has advised that following construction GRW01 seepage recovery has been successful and ongoing, yet low volumes are recovered. A flow meter was installed in late January 2025 to track the volume of seepage recovery.<br><br>GRW02 seepage recovery has reportedly been unsuccessful following installation as the groundwater level has remained lower than the recovery well of 6 m bgl (i.e. dry).<br><br>Given that the site is in care and maintenance, groundwater levels are consequently dropping (refer to section 3.3.2 for further detail).<br><br>Condition 35 (formerly 37) requires that the licence holder submit and implement a seepage management plan when licence trigger levels (6 m bgl) are exceeded. Given falling groundwater levels, condition 35 has been modified that the plan will need to be submitted and implemented once the site exits care and maintenance (if mounding groundwater levels persists as an issue at that time).<br><br>**Given that seepage recovery bores have been constructed, conditions 2 and 3 have been removed.** |

| | | |
|---|---|---|
| Condition 4, Table 2<br><br>Remove condition 4 and Table 2 as this has been completed (repair of the synthetic liner at evaporation pond 12) | Remove condition 4 and Table 2 as this has been completed. | FQMAN submitted compliance documentation for the completion of these works on 29 September 2023. The department assessed the compliance documentation and determined on 29 November 2023 that it met the requirements of conditions 4, 48 and 49 of the licence (DWER reference: A2233696).<br><br>**Condition 4 and Table 2 have been removed from the licence.** |
| Condition 7, Table 3<br><br>Map reference 19<br><br>Amend the material stored from “saline water” to “stormwater” | The mining turkey’s nest does not contain saline water. | The turkey’s nest is required to be lined with a synthetic liner to be maintained in an intact and unperforated state with a seepage rate of $10^{-9}$ m/s or less. The adjustment from storage of saline water to “stormwater” therefore poses no additional risk and does not require further risk assessment.<br><br>**The condition has been amended.** |
| Condition 8<br><br>Amend licence and condition to remove requirement for stormwater pond freeboard monitoring or limits from the licence. | Stormwater ponds are not associated with category 5 activities.<br><br>The risks associated with stormwater pond management is low and are regulated under the *Mining Act 1978* (Mining Act) approved activities as this water is typically used for dust suppression activities on site. | Given that some of the stormwater ponds are potentially contaminated with hydrocarbons and heavy metals (e.g. the “oily water”, “mine drainage” and “HV workshop” ponds), freeboard requirements will be specified only for “**contaminated** stormwater ponds”.<br><br>**The requested amendment has been partially granted.** |
| Condition 8 and 9<br><br>Review and align condition 8 and Table 4 as there are inconsistencies with the freeboard limits. Request that condition 8 present the freeboard limits in table form for clarity. | Opportunity for improvement to clarify freeboard and inspection limit requirements. | The department will adjust conditions 8 and 9 to provide additional clarity surrounding freeboard requirements and will tabulate the requirements in the new Table 2. The amendment is administrative and requires no further risk assessment.<br><br>**The condition has been amended.** |
| Condition 9<br><br>Replace “visual inspection” for the seawater pipeline with “monitoring of | Condition 5 requires telemetry to detect leaks of pipelines. Remote monitoring via telemetry and alarms provides real time monitoring and is suitable to detect | The department considers that using the wording “monitoring of remote telemetry” is sufficient to mitigate the risk associated with potential leaks/spills |

| | | |
|---|---|---|
| remote telemetry." | leaks or spills.<br><br>Visual inspections can form part of routine maintenance and inspection programs. | from the seawater pipeline. The amendment poses no additional risk and requires no further risk assessment.<br><br>**The condition has been amended.** |
| Condition 17<br><br>Revise or remove as this has been completed in accordance with the requirements of condition 2. | The condition has been completed in accordance with the requirements of condition 2.<br><br>FQMAN have not installed the seepage recovery trench but propose to continue to monitor groundwater levels and investigate alternative seepage management options if groundwater level breaches continue and or impacts are identified. FQMAN are investigating an expansion of the TSF which overlies the proposed trench area.<br><br>Groundwater levels have reduced below the 4 m bgl limit since the site entered care and maintenance. | This condition does not just relate to construction of bores required by condition 2 but also requires the installation of a seepage recovery trench and reducing groundwater levels below 6 m bgl.<br><br>Given that this condition was placed to manage on-going seepage issues at the site, amendment of this condition will require further risk assessment.<br><br>**Further risk assessment required – see section 3.2** |
| Condition 24<br><br>Revise the condition to:<br><br>"The Licence Holder shall ensure that a high-capacity water truck is always available at the Shoemaker-Levy primary crushing facility stockpiles to suppress fugitive dust from the stockpiles during crushing and stockpiling operations." | Risk of dust emissions while not operating is reduced. | Given that crushing and stockpiling will not take place during care and maintenance, the condition will be revised to the following:<br><br>"The Licence Holder must ensure that a high-capacity water truck is always available at the Shoemaker-Levy **during crushing operations and/or whilst stockpiles are present to supress fugitive dust from the stockpiles.**"<br><br>**The condition has been amended.** |
| Condition 34, Table 14<br><br>FQMAN suggests adding the following parameters to the standard monitoring suite: **sodium, chromium (total), chromium (hexavalent).** | The proposed additional parameters are characteristic and/or diagnostic of some of the mineral waste streams and may assist in interpreting monitoring results. | Additional monitoring for the analytes proposed will improve understanding of the groundwater quality.<br><br>**The condition has been amended.** |
| Condition 34, Table 14<br><br>Request removal of MB4 from the licence. | MB4 was destroyed during construction of the TSF2 Stage 4 raise (21 December 2023). | The current monitoring network is considered sufficient to allow for removal of MB4, without requiring a replacement at this time. This is |

| | | |
|---|---|---|
| | | particularly whilst the facility is in care and maintenance. The monitoring network suitability may however be reviewed once the site resumes operations.<br>**The condition has been amended.** |
| Condition 44, Table 16<br>Modify the reporting requirement to include reporting on mineral wastes deposited. | Editorial corrections and alignment with proposed disposal of specified mineral wastes at TSF1 and TSF2. | The requested amendment will allow for more complete annual reporting.<br>**The condition has been amended.** |
| Definitions: Table 19<br>Request amendment to include definitions for tailings, sand rejects and approved mineral wastes. | Amendment provides clarity to the type and source of materials approved for disposal at TSF1 and TSF2. | The requested definitions have been included to provide clarity.<br>**Definitions amended.** |

## 2.3 Part IV of the EP Act

The Ravensthorpe Nickel Project has been assessed under Part IV of the EP Act by the Environmental Protection Authority (EPA). It is subject to the requirements of MS 633 which was published on 5 September 2003.

MS 633 includes conditions to minimise impacts to the following:

- priority flora species within the project area, in particular *Eucalyptus purpurata*, *Spyridium glaucum, Dampiera deltiodea* and *Kunzea similis*;
- significant vegetation communities within the project area, in particular *Eucalyptus flocktoniae – Melaleuca coronicarpa* 'gorse' and *Eucalyptus purpurata* woodland; and
- fauna within the project area and the adjacent Bandalup corridor, in particular Heath Mouse (*Pseudomys shortridgei*) and the Western Mouse (*Pseudomys occidentalis*).

Potential impacts to the above, including any requirements of monitoring in relation to these, have not be considered within the Part V assessment given these are regulated under MS 633.

MS 633 provides commitments to develop management plans, including in relation to the following aspects:

- surface hydrology;
- groundwater;
- flora and vegetation;
- priority flora;
- fauna;
- heritage and Aboriginal sites;
- dust and particulates; and
- noise.

The Delegated Officer notes that the above management plans are not intended to address all Part V prescribed activity emissions and discharges and that there are no specific conditions listed within MS 633 that directly relate to the management or control of Part V prescribed activity emissions and discharges.

Considering the above, emissions and discharges for the amendment related to Part V prescribed activities have been considered and risk assessed under this application.

## 2.4 Incidents and complaints

Over the last 12 months, five environmental incidents were reported to the department. Four environmental complaints from the public were made directly to FQMAN, reported during the 1 May 2023 to 30 April 2024 annual environmental report (AER) reporting period. A summary of incidents and complaints are provided below in Table 3.

**Table 3: Recent reported incidents and complaints**

| Date | ICMS number | Summary | Department outcome |
|---|---|---|---|
| 4/9/2024 | 82737 | Generator diesel spill within processing plant area: 8,500L | Closed – noted for intelligence and potential future inspection. |
| 20/8/2024 | 82111 | Turkey's nest (pond 19) overtopping (regarded as freshwater used for dust suppression). | Closed – noted for intelligence. |

| | | | |
|---|---|---|---|
| 6/5/2024 | 78629<br>(A2276352) | Raw water pond (pond number not provided): water accumulating under the liner. | Closed – Ravensthorpe care and maintenance team is planning to drain the dam to fully inspect and facilitate repairs to reinstate the integrity of the liner during the summer dry season and prior to autumn 2025. |
| 26/3/2024 | 76878 | Buffer pond liner damage | Closed – liner was patched, welded and repaired. |
| 7/2/2024 | 74325 | TSF decant pipeline spill: 3.6 $m^3$ – windrow breached into area of previously disturbed vegetation. | Closed – shut off valve contained the spill and pipeline repaired on the same day. Spill cleaned up. |
| 21/2/2024 | Community complaint to Ravensthorpe reported in 2023-2024 AER | Nearby farmer observed large plume of dust from the TSF – worried about this settling on his roof and running into his potable water tank.<br>FQMAN visited the property and took water samples from the main water tank and made efforts to reduce dust coming off the TSF. | - |
| 21/2/2024 | Community complaint to Ravensthorpe reported in 2023-2024 AER | Call from Jerdacuttup Primary School – large visible dust plume coming off TSF – students kept inside.<br>FQMAN visited the school and made efforts to reduce the dust at the TSF. | - |
| 28/1/2024 | Community complaint to Ravensthorpe reported in 2023-2024 AER | Nearby farmer observed a large plume of dust from the TSF. FQMAN indicated that the sprinklers were blocked and these were subsequently reinstated. | - |
| 20/12/2023 | Community complaint to Ravensthorpe reported in 2023-2024 AER | Nearby farmer reported a very strong sulphur smell at the home on the evenings of 20 and 21 December. Farmer advised it is a lot worse during the summer with the easterly winds.<br>FQMAN to attend the property when the smell is next experienced to do some testing. Installing a newly purchased monitor at the property. | - |

# 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 2020b).

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 4 below. Table 4 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

**Table 4: Licence Holder controls**

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| **Category 5 activities** | | | |
| Dust | Co-disposal of other waste streams into TSF1/2 including:<br>• evaporation pond salt;<br>• sulfur filter residue;<br>• magnesium oxide; and<br>• washdown facility silts.<br>Potential additional dust lift off associated with a TSF during care and maintenance. | Air/windborne pathway causing potential impacts to health and amenity | Additional proposed controls during care and maintenance:<br>• use of water spray cannons;<br>• deposition of process systems flush water at an average rate of 50,000 kL per month; and<br>• process systems flush water to consist of raw seawater and rainwater.<br>Existing licence monitoring<br>• condition 20 (formerly 23) requiring inspection of fugitive dust from the TSF during wind speeds of 15 m/s or more and during the months of November to April; and<br>• condition 34 (formerly 36): dust monitoring surrounding on-site with an upper limit of 4 g/m$^2$/month particulate matter (continuous). |
| Additional contamination within seepage associated with co-disposal of other waste streams into the TSF | Co-disposal of other waste streams into TSF1/2 including:<br>• evaporation pond salt;<br>• sulfur filter residue; | Seepage of contaminated water through base and embankments of TSF1/2 into underlying groundwater | The applicant has not proposed additional controls to manage seepage from additional mineral waste streams. They state that mineral wastes will not adversely impact surrounding groundwater, for which they submitted supporting geochemical characterisation.<br>FQMAN has indicated that seepage |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| | • magnesium oxide; and<br>• washdown facility silts. | | from TSF1/2 will continue to be managed and monitored in accordance with existing licence controls.<br><u>Existing licence controls:</u><br>• condition 9 (formerly 12): conduct an annual assessment of groundwater levels and quality against previous modelling (2012);<br>• condition 15 (formerly 18): seepage recovery infrastructure maintained so that groundwater levels remain below 6 m bgl;<br>• condition 34 (formerly 36): existing groundwater level and quality monitoring; and<br>• condition 35 (formerly 37): requires that a seepage management plan, including installation of additional seepage recovery bores is prepared and submitted.<br><u>Additional monitoring</u><br>FQMAN have proposed that additional analytes be included as part of current groundwater monitoring (condition 34, formerly 36), including: sodium, chromium (total) and chromium (hexavalent).<br>FQMAN have proposed to monitor the volume of mineral wastes deposited into TSF1 and 2. |
| Tailings and additional waste streams | Tailings and co-disposal of other mineral waste streams into the TSF, | Overtopping of TSF and direct discharge to land causing poor vegetation health/death and potential contamination of nearby surface water receptors | <u>Existing licence controls</u><br>• condition 5 (formerly 8) includes an operational freeboard of 300 mm for TSF1 and TSF2. |
| Seepage | TSF seepage - remove requirement to install seepage collection trench. | Seepage of contaminated water through base and embankments of TSF1/2 into underlying groundwater | No additional controls proposed.<br><u>Existing licence controls</u><br>• condition 9 (formerly 12): conduct an annual assessment of groundwater levels and quality against previous modelling (2012); |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| | | | • condition 15 (formerly 18): seepage recovery infrastructure maintained so that groundwater levels remain below 6 m bgl;<br>• condition 34 (formerly 34): existing groundwater level and quality monitoring; and<br>• condition 35 (formerly 37): requires that a seepage management plan, including installation of additional seepage recovery bores is prepared and submitted. |
| **Category 89 activities** | | | |
| Leachate | Establish a category 89 landfill within Halley's pit. | Seepage through landfill base to groundwater | <u>Proposed controls</u><br>• separation from groundwater is >4 m from base of landfill in all disposal trench locations. |
| Contaminated fire water and noxious emissions (smoke) | | Potential fire risk associated with tyre and rubber disposal | <u>Proposed controls</u><br>• no more than 100 tyres or rubber equivalent is to be left uncovered within a landfill trench;<br>• tyres and rubber materials to be disposed of within dedicated trenches;<br>• implement Emergency Response Plan in the event of a fire; and<br>• regular covering of tyres and rubber materials: fortnightly during care and maintenance and weekly during operations. |
| Windblown waste | | Air/windborne pathway causing impacts to health and amenity/ odour | <u>Proposed controls</u><br>• regular covering of waste disposed within landfill trenches: fortnightly during care and maintenance and weekly during operations;<br>• compaction of final waste trenches with a minimum of 1m of cover material; and<br>• waste trenches have adequate separation from final external surfaces at closure to ensure no waste exposure. |
| | | Fauna access / | <u>Proposed controls</u> |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| | | scavenging | • regular covering of waste disposed within landfill trenches: weekly during operations and fortnightly during care and maintenance. |
| Dust | | Air/windborne pathway causing poor vegetation health/death for adjacent priority flora and native vegetation | Proposed controls<br>• regular covering of waste disposed within landfill trenches: weekly during operations and fortnightly during care and maintenance.<br>Existing monitoring<br>• existing monitoring locations DDG3 and DDG1 are adjacent to Halley's pit, as per monitoring undertaken in condition 34 (formerly 36). |
| Contaminated surface water | | Surface water run off causing contamination of nearby ephemeral creek lines | Proposed controls<br>• earthen bunds around waste trenches to prevent surface water ingress to waste disposal area. |

### 3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020b), 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 5 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 2020a)).

**Table 5: Sensitive human and environmental receptors and distance from prescribed activity**

| Human receptors | Distance from prescribed activity |
|---|---|
| Rural residential / primary school | The closest rural residential properties and human receptors identified during a review of the department's GIS system (Geocortex) in December 2024 were:<br>• Jerdacuttup Primary School, Lot 17 on Deposited Plan 210294:<br>  ○ 6 km south east from TSF1 and TSF2; and<br>  ○ 11.1 km south east from the landfill.<br>• Lot 4 on Deposited Plan 210294:<br>  ○ 6.6 km south east from TSF1/2; and<br>  ○ 10.5 km south east from the landfill. |

| | |
|---|---|
| | • 342 Fence Road (Lot 779 on DP 209227):<br>  ○ 4.3 km east from TSF1/2; and<br>  ○ 7 km south east from the landfill.<br>• Lot 789 on DP 209229: complaint – dust and nearby potable water tank:<br>  ○ 6.5 km south of TSF1/2; and<br>  ○ 11.7 km south from the landfill. |
| Aboriginal heritage<br>Gnamma hole (ID 18950) | The heritage listing intersects with the northern portion of the site, including the existing processing plant and operational area (see Figure 6).<br>The registered heritage listing is:<br>• 1.2 km east of the proposed landfill; and<br>• 3.2 km north of TSF1 (TSF2 is south of TSF1).<br>Gnamma holes are natural cavities commonly found in hard rock and can act as a source of water for Aboriginal communities. It is unknown if the gnamma holes within this location are in use.<br>Topography of the area indicates a higher landform is situated in-between TSF2 and the heritage site which could act as a buffer for surface water impacts.<br>See Figure 6.<br>**This site is unlikely to be impacted from the proposed amendment and will therefore not be considered further in this risk assessment**. |
| **Environmental receptors** | **Distance from prescribed activity** |
| Surface water<br>Tributaries of Jerdacuttup River:<br>• Minor ephemeral creek lines<br>• Bundalup Creek<br>• Gnamma Creek<br>• Burlabup Creek (ephemeral) | Minor ephemeral creek lines intersect the site:<br>• The closest to TSF1/2 is 300 m east; and<br>• The closest to the landfill is 250 m west.<br>Bundalup Creek (ephemeral):<br>• The closest point to the landfill is 3.7 km west.<br>Burlabup Creek (ephemeral):<br>• Intersects the southern premises boundary; and<br>• The closest point to TSF1/2 is 1.2 km south.<br>Gnamma Creek:<br>• Intersects with the eastern premises boundary; and<br>• The closest point to TSF1/2 is 2.7 km east.<br>See Figure 4. |
| Groundwater<br>The Project is not located within a *Rights in Water and Irrigation Act 1914* (RIWI Act) Surface Water Proclamation Area.<br>The site is immediately adjacent to the Kondinin-Ravensthorpe Groundwater Area | Tailings storage facility<br>The most recent groundwater level data (April 2024) reported during 2023-2024 annual environmental report (AER) indicated standing groundwater levels ranging from 3.79 to 18 m bgl surrounding the tailings storage facilities. Groundwater mounding was highest |

| | |
|---|---|
| however, along the north-eastern boundary (see Figure 2). | along the southern perimeter of TSF2 (Figure 5).<br><br>Monitoring adjacent to Halley's pit<br><br>The most recent groundwater level data (April 2024) reported during the 2023-2024 AER indicated standing water levels ranging from 7.83 to 18.40 m bgl adjacent to the eastern edge of Halley's pit (Figure 5).<br><br>Baseline quality<br><br>Historical hydrogeology reports provide the following baseline levels of groundwater for the premises (WSP Golder 2021):<br><br>• TDS in the range of 4,000 to 30,000 mg/L.<br>• pH averaging 6.3, with a range of 4 to 7.4.<br><br>Groundwater flow direction<br><br>The regional groundwater system is slow-draining, broadly to the south-east (WSP Golder 2021). This is attributed to the generally low permeability of the rock underlying the area.<br><br>Discharge from the system occurs locally where there are permanent pools in the Jerdacuttup River and regionally in rivers and lakes in the coastal zone. |
| Threatened ecological community<br><br>Proteaceae dominated Kwongkan shrublands of the southeast coastal floristic province of Western Australia'<br><br>This ecological community is listed as Priority 3 (by the DBCA) and as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. | The TEC occurs within the prescribed premises boundary and is immediately adjacent to the landfill and TSF1/2 to the south and west. |
| Reserves<br><br>**Reserve R43060** vested with the Conservation Commission of WA for the purpose of 'Conservation of flora and fauna'<br><br>**Reserve R49742** Jerdacuttup Conservation Park, vested with Conservation Commission of WA for the purpose of a 'Conservation Park'<br><br>**Reserve R27177** vested with the Conservation Commission of WA for the purpose of 'Conservation of flora and fauna' | **Reserve R43060:**<br><br>• 1.7 km south west of TSF1/2; and<br>• 6.9 km south of the landfill.<br><br>Given the distances, reserve 43060 is unlikely to be impacted by the landfill.<br><br>**Reserve 49742**<br><br>• 2.3 km west of TSF1/2; and<br>• 4 km south west of the landfill.<br><br>Given the distances, reserve 49742 is unlikely to be impacted by the landfill.<br><br>**Reserve 27177**<br><br>• 5.7 km north west of TSF1/2; and<br>• 3.8 km west of the landfill.<br><br>Give the distances, reserve 27177 is unlikely to be impacted by either the landfill or TSF1/2.<br><br>See Figure 2. |

| | |
|---|---|
| Livestock drinking water bores | There are no known nearby livestock/pastoral bores. Due to the high salinity, groundwater is generally not suited for livestock or irrigation purposes. |
| Native vegetation / priority flora<br><br>In addition to the Kwongkan shrublands and flora specified in section 2.3, there are 25 other flora species of conservation significance within the project area (EPA 2003). | Native vegetation, including instances of priority flora are adjacent to TSF1/2 to the west and the landfill to the west and south. |

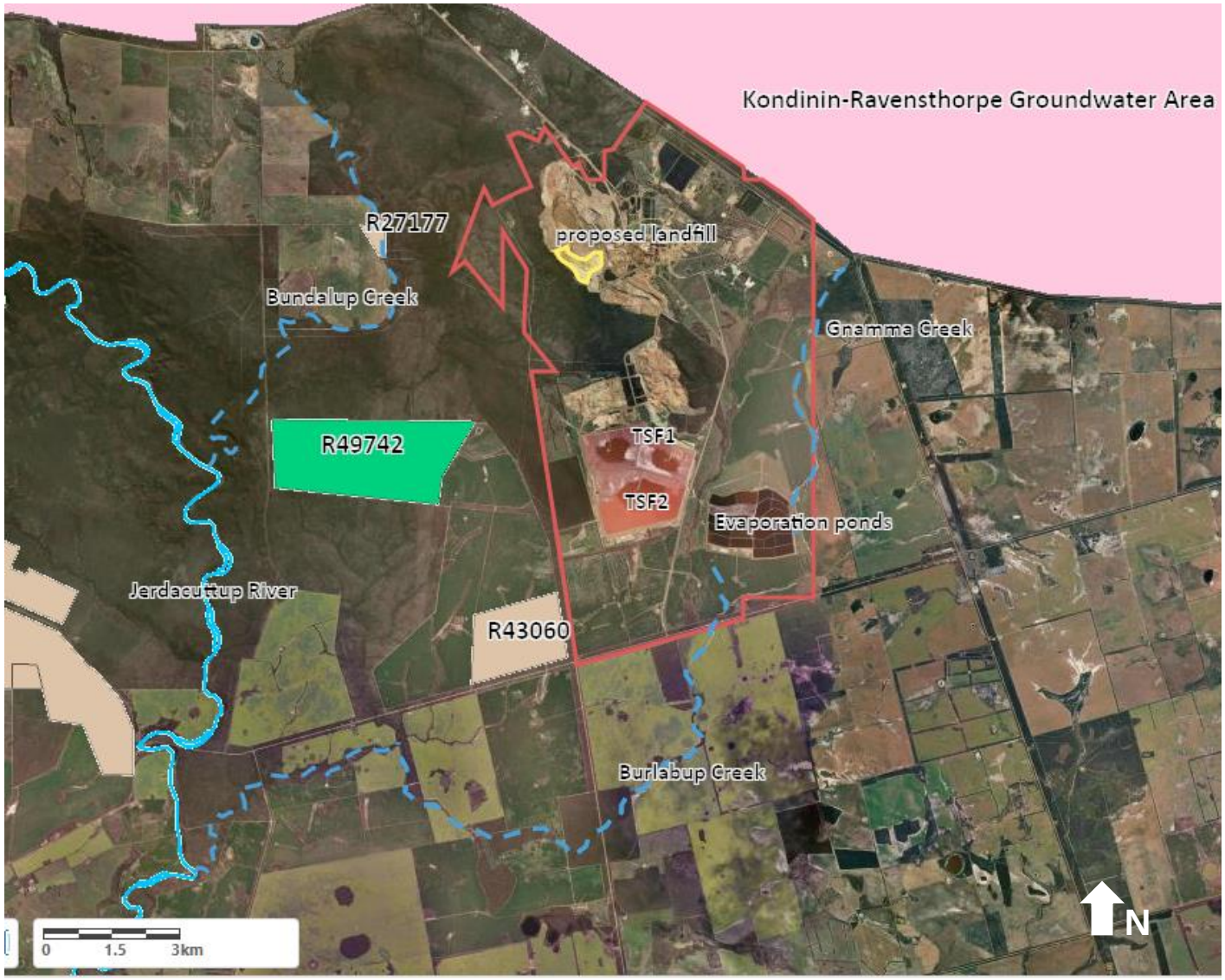


**Figure 2: Distance to sensitive environmental receptors**

## 3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020b) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the 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 6.

The revised licence L8008/2004/3 that accompanies this Amendment Report authorises emissions associated with the operation of the premises i.e. category 5 and 89 activities.

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

## Table 6: 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** | | | | |
| **Operation**<br>**(including time-limited-operations)** | | | | | | | | |
| **Category 5 activities** | | | | | | | | |
| Co-disposal of other waste streams into TSF1/2 including:<br>• evaporation pond salt;<br>• sulfur filter residue;<br>• magnesium oxide; and<br>• washdown facility silts.<br>Potential additional dust lift off associated with a TSF during care and maintenance | Dust | Air/windborne pathway causing potential impacts to health and amenity for nearby rural residential receptors and Jerdacuttup Primary School | Rural residential (closest is 4.3 km east)<br>Jerdacuttup Primary School (6 km south-east) | Refer to Section 3.1 | C = Moderate<br>L = Unlikely<br>**Medium Risk** | Y | New conditions:<br>**Condition 23 – suppression of fugitive dust from the TSF and other areas on-site as required**<br>Existing monitoring:<br>Condition 20 (formerly 23): inspection of fugitive dust from TSF1/2 from November to April<br>Condition 34 (formerly 36): particulate dust matter monitoring (target 4 g/m$^2$/month) | FQMAN has indicated that no new complaints have been received since June 2024 and that they will continue to monitor dust in accordance with the licence and respond to complaints received.<br>FQMAN has proposed suppression of TSF dust with a water spray cannon. This has been placed on the licence as a regulatory control (condition 23). |
| Co-disposal of other waste streams including:<br>• evaporation pond salt;<br>• sulfur filter residue;<br>• magnesium oxide; and<br>• washdown facility silts. | Seepage of contaminated water: additional contamination with seepage associated with co-disposal of other waste streams into TSF1/2 | Seepage of contaminated water through base and embankments of TSF1/2 into underlying groundwater, causing groundwater mounding and impacts to adjacent native vegetation and | Native vegetation and priority flora are immediately adjacent to TSF1/2<br>The closest ephemeral creekline is 300 m east of TSF1/2 | Refer to Section 3.1 | C = Moderate<br>L = Unlikely<br>**Medium Risk** | N | Refer to section 3.3 | Refer to section 3.3 |

| 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** | | | | |
| | | priority flora<br>Groundwater flow causing potential impacts to nearby sensitive surface water receptors | Groundwater (standing water levels recently recorded as shallow as 4.2 m bgl surrounding TSF1/2) | | | | | |
| | Tailings and other mineral waste streams | Overtopping of TSF and direct discharge to land causing poor vegetation health/death and potential contamination of nearby surface water receptors | Native vegetation and priority flora are immediately adjacent to TSF1/2<br>The closest ephemeral creekline is 300 m west of TSF1/2 | Refer to Section 3.1 | C = Moderate<br>L = Unlikely<br>**Medium Risk** | Y | <u>Existing conditions:</u><br>Condition 5 (formerly 8): operational freeboard of 300 mm for TSF1 and TSF2<br>Condition 6 (formerly 9): weekly visual inspection of freeboard during care and maintenance (daily during operation) | FQMAN have advised that TSF2 has sufficient storage capacity for deposition of other mineral waste streams – being 8.1 $Mm^3$ of available capacity following completion of the Stage 4 lift.<br>Existing conditions requiring 300 mm freeboard and visual inspections are considered sufficient to mitigate the risk associated with overtopping. |
| Remove requirement to install seepage collection trench (condition 17) – TSF seepage | Seepage of contaminated water | Seepage of contaminated water through base and embankments of TSF1/2 into underlying groundwater, causing groundwater mounding and impacts to adjacent native vegetation and priority flora<br>Groundwater flow causing potential impacts to nearby | Native vegetation and priority flora are immediately adjacent to TSF1/2<br>The closest ephemeral creekline is 300 m east of TSF1/2<br>Groundwater (standing water levels recently recorded as | Refer to Section 3.1 | C = Moderate<br>L = Possible<br>**Medium Risk** | N | <u>Existing conditions:</u><br>Condition 9 (formerly 12): conduct an annual assessment of groundwater levels and quality against previous modelling (2012)<br>Condition 15 (formerly 18): seepage recovery infrastructure maintained so that groundwater levels remain below 6 m bgl.<br>Condition 34 (formerly 36): existing groundwater level and | The requirement for the seepage recovery trench will be removed given that:<br>• whilst the shallowest recent groundwater level recorded surrounding the TSF was 4.20 m bgl (December 2024), the site is in care and maintenance and groundwater levels are subsequently dropping;<br>• condition 35 (formerly 37) already requires the licence holder to submit a seepage recovery plan when groundwater trigger levels are exceeded (6 m bgl) – noting that whilst one bore is currently |

| 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** | | | | |
| | | sensitive surface water receptors | shallow as 4.2 m bgl surrounding TSF1/2) | | | | quality monitoring<br><br>Amended condition:<br><br>**Condition 35 (formerly 37): amended from "seepage recovery bores" to "seepage recovery infrastructure" and specified that the seepage recovery plan must be both submitted and implemented.** | exceeding this trigger limit, groundwater levels are currently dropping whilst the facility is in care and maintenance; and<br><br>• the licence holder may plan to expand the TSF into the proposed trench area.<br><br>Department control<br><br>Condition 35 (formerly 37) will be modified to specify "seepage recovery infrastructure" more generally and be modified to specify that the licence holder must both submit and implement the seepage recovery plan. |
| **Category 89 activities** | | | | | | | | |
| Establish a category 89 landfill within Halley's pit | Leachate – containing organics, nutrients, hydrocarbons | Seepage through landfill base to groundwater and groundwater flow causing potential impacts to nearby sensitive surface water receptors | The closest minor ephemeral creekline to the landfill is 250 m west<br><br>Groundwater levels recorded at 7.83 m bgl adjacent to Halley's pit | Refer to Section 3.1 | C = Minor<br><br>L= Unlikely<br><br>**Medium Risk** | Y | New condition:<br><br>**Condition 14 – minimum separation distance between landfill base and groundwater** | The applicant proposed control for minimum separate distance between the base of landfill and groundwater is considered sufficient and has been placed on the licence as a regulatory control. |
| | Contaminated fire water and noxious emissions (smoke) | Fire risk associated with tyre and rubber disposal | Rural residential (closest is 7 km south east)<br><br>Jerdacuttup Primary | Refer to Section 3.1 | C = Moderate<br><br>L= Unlikely<br><br>**Medium Risk** | N | New condition:<br><br>**Condition 14 – requiring minimum cover material and depth requirements, recording of waste** | The applicant proposed controls for dedicated tyre trenches and no more than 100 uncovered tyres have been placed on the licence as regulatory controls.<br><br>Department control: |

| 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** | | | | |
| | | | School (6 km south-east) | | | | **deposition** | To mitigate potential fire risk, the department has also conditioned minimum tyre/rubber cover requirements (including depth and material type). The department has also conditioned the requirement that the volume and type of waste deposited is recorded. |
| | Windblown waste | Air/windborne pathway causing poor vegetation health/death | Adjacent native vegetation and priority flora | Refer to Section 3.1 | C = Minor<br>L= Unlikely<br>**Medium Risk** | N | New condition<br>**Condition 14 – requiring that waste be covered on a weekly basis during operations and fortnightly during care and maintenance** | Department control:<br>The applicant has proposed "regular" covering of waste but has not detailed a frequency.<br>To mitigate risk associated with windblown waste and fauna scavenging, the department has specified that waste be covered on a weekly basis during operations, and fortnightly during care and maintenance. |
| | | Fauna access/scavenging | Native and threatened fauna | Refer to Section 3.1 | C = Minor<br>L= Unlikely<br>**Medium Risk** | N | | |
| | Dust | Air/windborne pathway causing poor vegetation health/death | Adjacent native vegetation and priority flora | Refer to Section 3.1 | C = Minor<br>L= Unlikely<br>**Medium Risk** | N | New condition<br>**Condition 23 – water cart for suppression of fugitive dust from the landfill and other areas on-site as required**<br>Existing monitoring:<br>Condition 34 (formerly 36) – monitoring locations DDG1 and DDG3 are adjacent to Halley's pit | No additional controls have been proposed by the applicant for dust suppression at the landfill.<br>Department control:<br>Given that no additional controls have been proposed by the applicant for dust suppression from the landfill, and given presence of adjacent native vegetation and priority flora, the department has conditioned that a water truck with a water spray cannon is available to suppress fugitive dust emissions from the landfill and other areas on-site as required. |
| | Contaminated | Surface water run-off causing | Adjacent native | Refer to Section | C = Minor | Y | New condition: | The applicant proposed control to divert surface water around trenches |

| Risk Event | | | | | Risk rating[1]<br>C = consequence<br>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** | | | | |
| | surface water | contamination of nearby ephemeral creek lines | vegetation and priority flora<br>The closest minor ephemeral creekline to the landfill is 250 m west | 3.1 | L= Unlikely<br>**Medium Risk** | | **Condition 14: earthen bunds must be constructed and maintained around waste trenches to prevent surface water ingress** | is considered sufficient and has been placed on the licence as a regulatory control. |

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

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

## 3.3 Detailed risk assessment – additional seepage contamination from co-disposal of other waste streams

### 3.3.1 Source

FQMAN indicate that the additional waste streams are not expected to significantly alter the water balance or quality of the seepage from TSF1 or TSF2 and have provided geochemical characterisation to support this.

Geochemical characterisation

WSP Golder (2024) analysed the geochemical characteristics of samples from the waste streams as part of two blends; one to represent the blended waste streams with no tailings (blend 1) and another representing mixed tailings-waste streams (blend 2):

- Blend 1: a blend of all the waste stream samples in the proportions expected to be deposited into TSF1 or TSF2. This blend represents the resulting drainage from the interaction of individual waste streams. Blend 1 is comprised mostly of evaporation pond salt (98%);
- Blend 2: a blend of waste streams (Blend 1) and TSF2 tailings. This blend represents the anticipated drainage resulting from the interaction of waste streams and TSF2 tailings. Blend 2 is mainly composed of TSF2 tailings (95%).

**Table 7: Notable geochemical parameters for blend 1 and 2**

| Parameter | Blend 1 (waste stream mix) | Blend 2 (TSF2 and waste stream mix) |
|---|---|---|
| Acid forming? | Non-acid forming | Non-acid forming |
| pH | 9.0 | 8.3 |
| salinity | ~300,000 mg/L | ~56,000 mg/L |
| Elevated metals | Mg (53,700 mg/L)<br>Ni (9.4 mg/L)<br>Sr (9.3 mg/L)<br>Li (1.1 mg/L) | Mg (12,000 mg/L)<br>Ni (0.128 mg/L)<br>Sr (2.8 mg/L)<br>Li (0.51 mg/L) |
| Elevated non-metals | $SO_4$ (217,000 mg/L)<br>Total N (<0.50 mg/L) | $SO_4$ (30,000 mg/L)<br>Total N (6.2 mg/L) |

WSP Golder's assessment states that the additional waste streams are unlikely to significantly alter the seepage from the TSFs given that:

- blend 2 is geochemically similar to tailings collected from the surface of TSF2; and
- none of the waste streams have the potential to generate acid mine drainage.

They recommended:

- retesting if waste stream tonnage or proportions change;
- that any new waste streams would require further characterisation; and
- groundwater in the vicinity of the TSF should be monitored (already required by the existing licence conditions).

Water balance

The applicant has indicated that the additional waste streams are unlikely to alter the water balance for the facility. They will be deposited as dry materials (<5% moisture) and will be mechanically hauled and deposited to the TSF.

Department internal technical advice

Internal technical advice from the department's principal hydrogeologist indicates that the additional waste streams are unlikely to alter the water balance or rate of seepage from the facility. This is because the additional waste streams represent only a small proportion of discharge compared to tailings deposition.

It is possible however that the on-going addition of salt from the evaporation ponds may progressively change the quality of seepage from the TSFs. Additional salt may increase the mobilisation of metals from the tailings solids, particularly nickel. This is because nickel may form highly soluble complexes (NiCl and $NiCl_2$) (Wang Wang et. al. 2021) with chloride ions (i.e. from evaporation pond salts) in porewater. Consequently, the proportion of nickel released into solution could progressively increase as the concentration of chloride ions in tailings porewater increases. It is considered likely that this would happen to other metals also. However, it is considered unlikely that the increased metal concentrations in the seepage from the TSFs would significantly change the level of risk to receptors to groundwater contamination from these facilities. This is due to the saline nature of groundwater in the area.

A possible exception would be for the increase leaching of radium isotopes from the tailings materials with increasing porewater chloride concentrations. Whilst this would be unlikely to cause any environmental effects, the potential for percolation into the soil profile and production of radon gas might pose a risk to any buildings present within 1 km of the TSFs. Currently, the closest known residential building to the either of the TSFs is 4.3 km east.

Monitoring of the following radiological parameters, using the below guideline values as trigger values for management, is recommended:

**Table 8: Guideline values for radioactive contaminants (radium) in livestock drinking water (ANZG (2023))**

| Radionuclide | Guideline value (becquerel per litre – Bq/L) |
|---|---|
| Radium 226 | <5 Bq/L |
| Radium 228 | <5 Bq/L |
| Gross alpha | <1 Bq/L |
| Gross beta (excluding K-40) | <5 Bq/L |

### 3.3.2 Pathway

Hydrogeology

The project area is characterised by low permeability rock, overlain and in-filled with deposits of clay, silt and sand. The generally low permeability means the regional groundwater system is slow-draining, broadly to the south-east (WSP Golder 2021).

TSF seepage has impacted surrounding groundwater levels. Groundwater levels recorded from January 2023 to December 2024 indicate standing groundwater levels ranging from 3.09 to 19.80 m bgl surrounding the TSFs. Groundwater mounding is highest along the southern perimeter of TSF2 (Figure 5). Groundwater levels in MB62, immediately along the southern perimeter, exceeded the 4 m bgl licence limit in January 2024 (3.09 m bgl) and April 2024 (3.79 m bgl) but levels have dropped since the facility entered care and maintenance in June 2024.

Groundwater levels in RWC 42 have also exceeded the licence trigger level of 6 m bgl for management action and have remained at ~5.60 m bgl for all readings taken in 2024. Groundwater levels for monitoring bores surrounding the TSF have either remained the same or dropped since the facility entered care and maintenance (Figure 3).

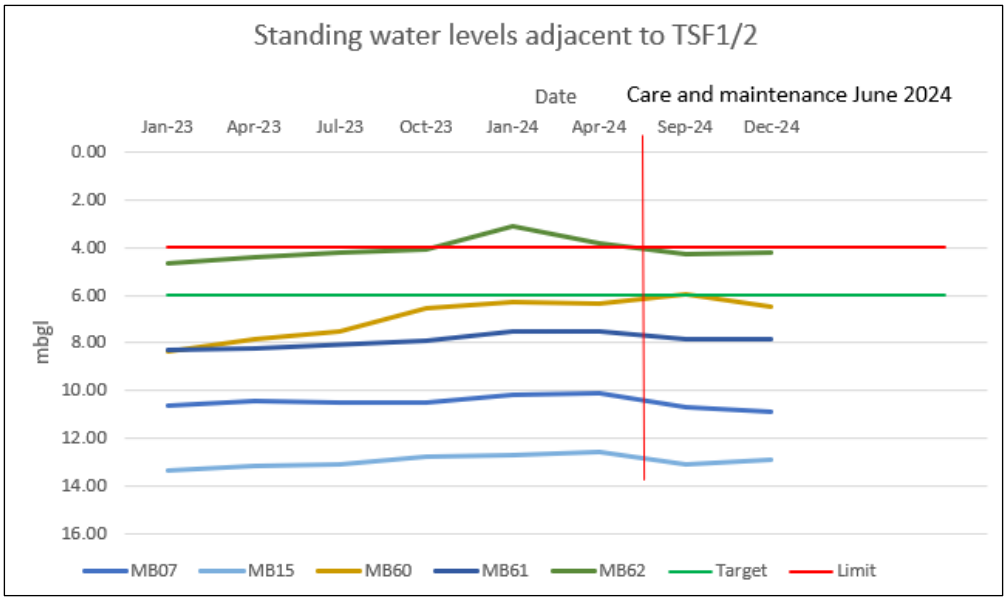


**Figure 3: Standing water levels surrounding TSF1/2**

### 3.3.3 Department assessment and regulatory controls

The consequence rating for rating for potential additional seepage contaminant loading is considered **moderate** given the potential for additional metal mobilisation and additional radium leaching. The likelihood of impacts to receptors is considered **unlikely** due to:

1. additional waste streams are unlikely to alter the water balance or rate of seepage from the facility;
2. the high salinity of groundwater is generally not suited for livestock or irrigation purposes; and
3. the currently closest residential receptor is 4.3 km from the TSF (however this could change in future).

The overall risk rating for potential additional contaminant loading of seepage is therefore **medium**.

Given the medium risk rating, the following regulatory conditions/controls will be placed on the licence.

**Table 9: Department conditions/controls and justification**

| Condition/control | Justification |
|---|---|
| Limits of disposal of mineral wastes<br>Condition 4 (formerly 7)<br>Condition 33 (formerly 35) | Applicant proposed<br>Applicant proposed monitoring for volume of mineral residues deposited has been placed on the licence (amendment to condition 33 (formerly 35), Table 12).<br>Department condition<br>Upper limits for the disposal of mineral wastes, with the tonnages suggested by the applicant, have been placed on condition 4 (formerly 7), Table 1. This is because geochemical characterisation has only been undertaken for these tonnages and proportions (i.e. different tonnages of mineral residue waste may alter contaminant loading within the seepage). |
| Groundwater monitoring<br>Condition 34 (formerly 36) | Applicant proposed<br>Applicant proposed additional monitoring has been placed on the licence for: sodium, chromium (total) and chromium (VI).<br>Department condition<br>For potential additional radium leaching, annual monitoring of radium 226, radium 228, gross alpha and gross beta has been placed on the licence as an amendment to condition 34 (formerly 36), Table 14 for select monitoring bores surrounding the tailings storage facility.<br>Monitoring frequency for the facility whilst in care and maintenance, has been reduced from quarterly to biannually. |
| Radium leaching<br>Condition 36 (new condition) | Department condition<br>Where an exceedance to trigger levels for radium 226, radium 228, uranium 238, gross alpha and gross beta is detected, the department has placed a requirement that the licence holder must:<br>- contact the Radiological Council and the Department of Health for guidance; and<br>- submit a report to the department. |
| Seepage management<br>Modification to condition 35 (formerly 37) | Department condition<br>Condition 35 (formerly 37) requires that a seepage management plan be submitted upon exceedances of the 6 m bgl trigger level. Both the trigger level and upper limit were exceeded during 2023-2024 monitoring.<br>Given that groundwater levels are either stable or dropping since the facility entered care and maintenance, the condition has been amended so that a seepage management plan will need to be submitted within 3 months of recommencing operations.<br>The department's compliance and assurance branch have been notified of these exceedances. Assurance will be advised that condition 35 has been modified to adjust for care and maintenance. |

# 4. Consultation

Table 10 provides a summary of the consultation undertaken by the department.

**Table 10: Consultation**

| Consultation method | Comments received | Department response |
|---|---|---|
| Application advertised on the department's website (3/01/2025) | None received | N/A |
| Shire of Ravensthorpe advised of proposal (19/12/2024) | None received | N/A |
| Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) advised of proposal (19/12/2024) | DEMIRS responded on 16/1/2025:<br>With regard to the licence amendment and requirements under the Mining Act, the following comments were provided:<br>• The co-disposal of mineral residues other than production tailings at TSF1 and TSF2 has not been approved under the Mining Act;<br>• The disposal of salt collected from evaporation ponds to TSF1 and TSF2 has been discussed as part of the landform closure strategy within Mining Proposal Registration ID 56253 and 53080, however this was not part of the approved design criteria;<br>• The use of Halley's pit as a landfill has not been approved under the Mining Act; and<br>• The proponent is responsible for meeting their obligations under the Mining Act and are encouraged to liaise with DEMIRS regarding the activities proposed under the licence amendment. | FQMAN is responsible for meeting their obligations under the Mining Act and DEMIRS have since notified the department that FQMAN have contacted them regarding the proposed amendments. |
| Licence Holder was provided with draft amendment on 20/03/2025 | The applicant responded on 28/03/2025.<br>The following comments were provided on the draft decision report:<br>• Minor administrative changes and typos to correct;<br>• The applicant noted that "contaminated stormwater ponds" are not defined in Table 1 of the licence; | The department provides the following response to the comments provided on the draft decision report:<br>• Administrative changes have been made and typos have been corrected;<br>• Table 1 has been amended for clarity regarding "contaminated |

| | | |
|---|---|---|
| | • The applicant provided requested information on the volume and quality of process systems flush water;<br>• Applicant suggested wording in Table 6 should be amended to "the requirement for the seepage recovery trench will **not** be removed"; and<br>• The applicant confirmed the distance of the closest known residential building to the TSF.<br>Refer to Appendix 2 for comments on the draft licence. | stormwater ponds" (refer Appendix 2);<br>• Additional information provided by the applicant has been included in the decision report;<br>• The requirement for the seepage recovery trench (condition 17) has been removed from the licence (refer Table 11). The wording in Table 6 has therefore not been amended; and<br>• The department acknowledges the applicant's confirmation of the location of the closest known residential building to the TSF, and notes that the proponent has a duty of care to staff onsite.<br>Refer to Appendix 2 for the department's response to the comments received on the draft licence. |

# 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 11 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 11: Summary of licence amendments**

| Condition no. | Proposed amendments |
|---|---|
| Cover page | Prescribed premises categories revised to include category 89. |
| Delete conditions 2 - 4 | Conditions and associated tables deleted given that the compliance requirements have been met. |
| Conditions renumbered | Conditions and tables have been renumbered as a result of condition additions and deletions. |
| Condition 3 (formerly 6) | Revised to include mineral residues and correct contradictory administrative error to specify that deposition can occur into both TSF1 and TSF2. |
| Condition 4 (formerly 7) | Revised Table 1 to specify stormwater for material stored within the "mining turkey's nest".<br>Revised Table 1 to amend infrastructure requirements for the "SML HV workshop oily water pond" and "SML mining turkeys nest".<br>Revised Table 1 to allow containment of mineral residues within the tailings storage facilities. |

| Condition no. | Proposed amendments |
|---|---|
| | Revised Table 1 to amend “Limonite pond (sands rejects storage facility)” to “Sands rejects storage facility (SRSF)” to align with label on reference map figure.<br><br>Revised Table 1 to remove specification of “(Stage 3)” under the infrastructure requirements for the “stormwater infrastructure associated with TSF2”. |
| Condition 5 (formerly 8) | Revised into a table format (Table 2).<br><br>Freeboard requirements revised so that only contaminated stormwater ponds require a minimum 800 mm freeboard.<br><br>Amended the description of where operational freeboard is measured from. |
| Condition 6 (formerly 9) | Amendment to Table 3 to allow monitoring of the seawater pipeline by real time remote telemetry instead of visual inspection.<br><br>Administrative correction to remove contradictory freeboard requirements (already specified in condition 5 (formerly 8). |
| Condition 8<br><br>(formerly 11) | Revised to allow operation of the TSF stage 4 downstream construction to embankment height 129.7 m RL.<br><br>Subsequent stages deleted for clarity. |
| New condition 14 | New condition to include operational requirements for the category 89 landfill. |
| Condition 17 | Removed. |
| Condition 21 (formerly 24) | Amended to specify that a water truck only needs to be available at the Shoemaker-Levy primary crushing facility “during crushing operations and/or whilst stockpiles are present”. |
| New condition 23 | New condition requiring a water truck with a water spray cannon to suppress fugitive dust from the tailings storage facilities, landfill, and other areas as required. |
| Condition 33<br><br>(formerly 35) | Amended Table 12 to include monitoring of volumes of mineral residue deposited. |
| Condition 34 (formerly 36) | Amendment to groundwater monitoring analytes in Table 14.<br><br>Amended bore names to align with relevant figures. |
| Condition 35<br><br>(formerly 37) | Amended to specify “seepage recovery infrastructure” instead of “seepage recovery bores”.<br><br>Amended to specify that the licence holder must submit and implement the seepage recovery plan. |
| New condition 36 | Action for exceedance of trigger criteria for radium 226, radium 228, uranium 238, gross alpha or gross beta. |
| Condition 44<br><br>(formerly 45) | Annual report requirement amended to include volume of other approved waste disposal. |
| Condition 47<br><br>(formerly 50) | Amended Table 18 to refer to new condition 36. |
| Delete conditions 48 and 49 | Redundant conditions: these relate to submission of compliance documents associated with Tables 1 and 2. |
| Figures 2a, 2b and 2c<br><br>(formerly 2a and 2b) | Replacement of old figures with updated figures to improve clarity and amend map reference numbers to align with new Table 1. |

| Condition no. | Proposed amendments |
|---|---|
| Figures 7a, 7b and 7c<br><br>(formerly 7) | Replacement with updated figures showing the locations of the groundwater monitoring bores, including those not previously shown on the former Figure 7. |
| Figure 8 | Replacement with updated figure to also show the location of the seepage collection sump, seepage collection trench and stormwater diversion drain. |
| New Figure 10 | New figure added in schedule 1 showing location of landfill. |

# References


1. Australian National Committee on Large Dams (ANCOLD) 2012, *Guideline on Tailings Dams Planning, Design, Construction, Operation and Closure*.
2. ANZG (Australian and New Zealand Governments) 2023, *Livestock drinking water guidelines (DRAFT)*. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra.
3. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Environmental Siting*, Perth, Western Australia.
5. DWER 2020b, *Guideline: Risk Assessments*, Perth, Western Australia.
6. Environmental Protection Authority (EPA) 2003, *Section 46 Report and Recommendation Bulletin 1093, Ravensthorpe Nickel Operations Pty Ltd*, Perth, WA.
7. FQM Australia Nickel Pty Ltd (FQMAN) 2024, *Annual Environmental Report Licence L8008/2004/3, 2023 – 2024*.
8. Wang Wang, L., Yang, X., Liu, W., Liu, M. and Chen, H. 2021, *Nickel contamination of lateritic soil by hydraulic fracturing flowback water: Geochemical behaviour and policy implications*. Soil Use and Management, 37, 330-341.
9. WSP Golder 2021, *Works Approval Application – Ravensthorpe Nickel Operations – Tailings Storage Facility 2 Stage 3* (DWERDT465229).
10. WSP Golder 2024, *Technical Memorandum - static waste stream geochemical characterisation*.

# Appendix 1: Additional figures

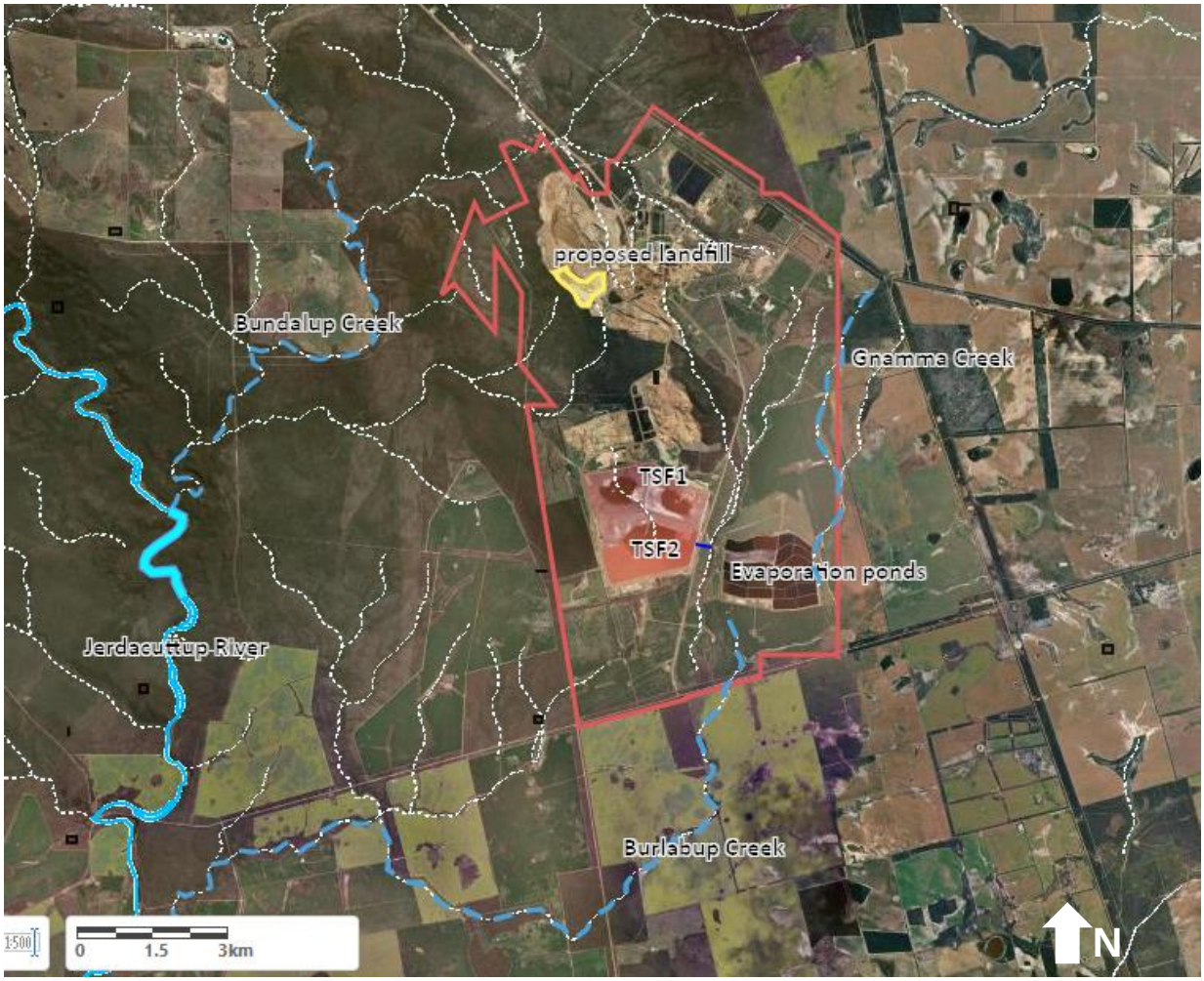


**Figure 4: Surface water receptors surrounding the site**

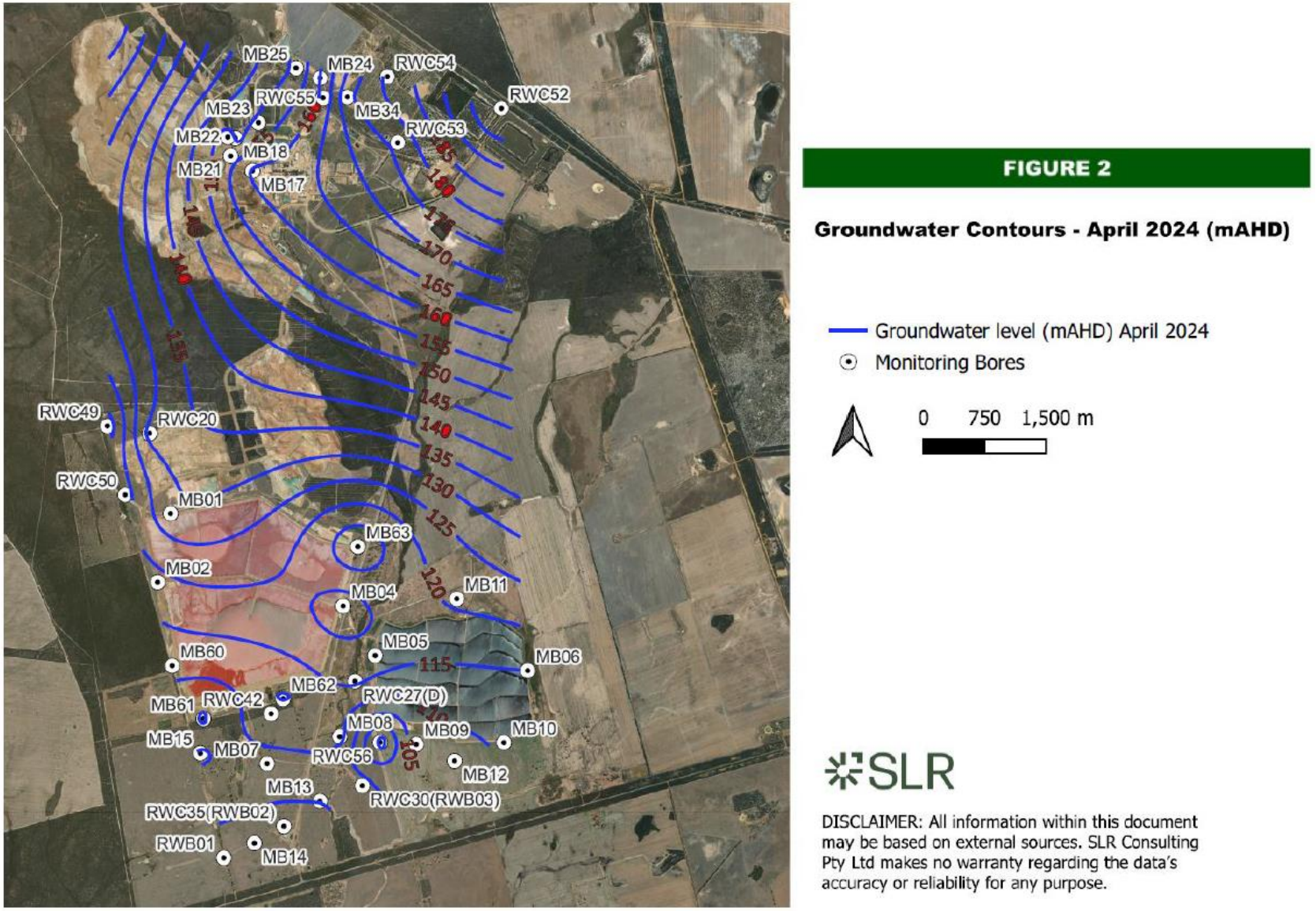


**Figure 5: Groundwater contours for monitoring on-site – April 2024**

Licence: L8008/2004/3

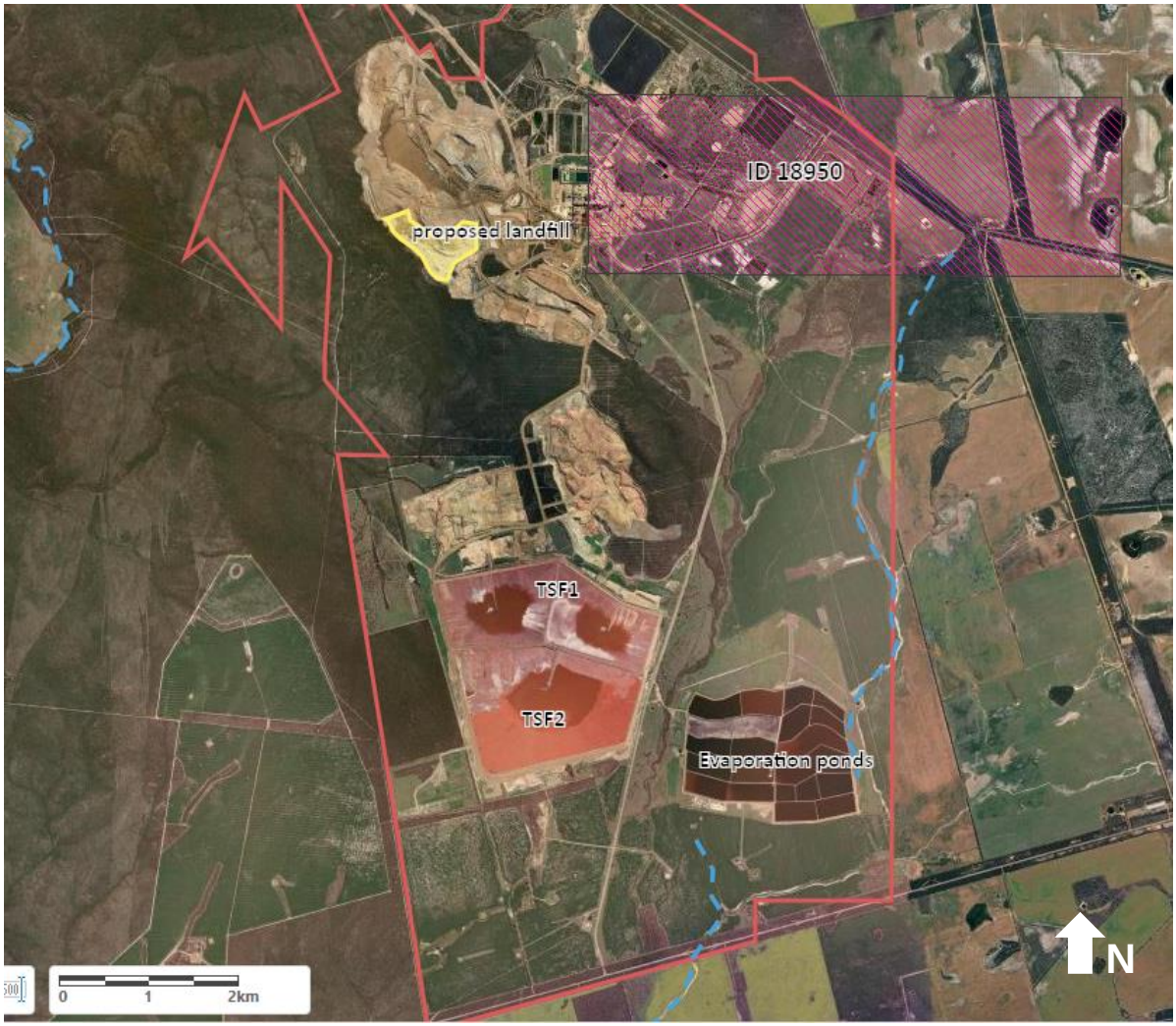


**Figure 6: Aboriginal Heritage registered site**


**Figure 7: Nearby human receptors**

# Appendix 2: Summary of Licence Holder's comments on risk assessment and draft conditions

| Condition | Summary of Licence Holder's comment | Department's response |
|---|---|---|
| Licence History | Stage 5 construction conditions from W6739/2022/1 stated to be transferred into the licence, but this is not the case. | This statement has been removed. |
| Condition 4<br>Table 1 | Infrastructure requirements for "SML HV workshop oily water pond" and "SML mining turkeys nest" appear incorrect. | The department reviewed previous licence amendments and information and determined that the infrastructure requirements were incorrectly and unintentionally changed during a previous amendment (licence version issued on 22/08/2023).<br>The infrastructure requirements have now been reverted to the previously correct requirements (licence version issued on 04/10/2022). |
| Condition 4<br>Table 1 | The name "Limonite pond (sands rejects storage facility)" is incorrect. | The name has been amended to "Sands rejects storage facility (SRSF)" to align with the name on new Figure 2a. |
| Condition 4<br>Table 1 | Remove specification of "(Stage 3)" under the infrastructure requirements for the "stormwater infrastructure associated with TSF2". | "(Stage 3)" has been removed, given that Stage 4 has now been constructed. The amended wording is now consistent with the works approval (W6739/2022/1) and applies to all stages, avoiding the need for future amendments. |
| Condition 5<br>Table 2 | Various comments regarding clarity and requesting that references to infrastructure listed in Table 1 of the licence align with how they are named in Table 1 of the licence. | Table 2 has been amended to align with the naming format in Table 1. A 'containment point reference' column has been added for further clarity. |
| Condition 5<br>Table 2 | Request to define "contaminated stormwater ponds". | Table 2 has been amended and now specifies which ponds are considered "contaminated stormwater ponds". |
| Condition 5<br>Table 2 | Request to change description of where operational freeboard is measured from, replacing "bottom of the spillway" with "embankment crest". | The department notes that the spillways were designed according to ANCOLD 2012, and that the height of the spillways are aligned with the height of the embankment crest. ANCOLD 2012 uses 'embankment crest' in its definition of operational freeboard, rather than 'spillway'.<br>The text has therefore been amended to refer to the embankment crest, rather than the bottom of the spillway. The |

| Condition | Summary of Licence Holder's comment | Department's response |
|---|---|---|
| | | description now aligns with the description of operational freeboard in ANCOLD 2012. |
| Condition 6<br>Table 3 | Type of inspection for "evaporation ponds/ wastewater treatment ponds/ buffer ponds/limonite pond" is inconsistent with Table 2. | The type of inspection has been amended to be consistent with Table 2. |
| Condition 14<br>Table 5, Item 1 (d) | Maintaining a logbook stating permitted and prohibited waste streams at the landfill entry will not be practicable, and Table 5, Item 1 (b) is suitable for managing records. | Wording has been amended to "signage at the landfill entry stating permitted and prohibited waste streams". |
| Condition 14<br>Table 5, Item 1 (i) | Table 5, Item 1 (i) is a duplication of Table 5, Item 1 (c). | Table 5, Item 1 (i) has been removed. |
| Condition 15<br>Table 6 | Include "TSF" before "seepage" in the table name for clarity. | "TSF" has been added. |
| Condition 21 | Amend wording to state "the Licence Holder shall ensure that a high-capacity water truck is ~~always~~ to be available at the Shoemaker-Levy primary crushing facility stockpiles to supress fugitive dust from the stockpiles during crushing operations and/or whilst stockpiles are present". | The department considers that ensuring that a high-capacity water truck is always available during crushing operations and/or whilst stockpiles are present is a necessary control to appropriately manage dust emissions and potential impacts.<br>The use of the word "always" in this condition provides assurance that a high-capacity water truck will be present to suppress fugitive dust emissions when needed.<br>The department notes that a high-capacity water truck is only required to be available during crushing operations and/or whilst stockpiles are present, which is when there is a risk of fugitive dust emissions.<br>The requested wording change has not been applied, however the wording has been rearranged to state "the Licence Holder shall ensure that a high-capacity water truck is always available at the Shoemaker-Levy primary crushing facility stockpiles *during crushing operations and/or whilst stockpiles are present to supress fugitive dust from the stockpiles*" for clarity regarding when the truck needs to be present at the stockpiles. |
| Condition 34 | The names for some of the bores have been changed, and the bore names in Table 14 no longer align with the bore names in the relevant | The names of the relevant bores have been amended to align with the new Figures 7a, 7b, and 7c in the licence. |

| Condition | Summary of Licence Holder's comment | Department's response |
|---|---|---|
| Table 14 | figures. | |
| Condition 36(a) | The applicant has advised that the closest residential premises is approximately 4 km from the TSF and request to remove the requirement to review if there are any residential premises within 1 km of the tailings storage facilities. | The department acknowledges that there are no residential premises within 1 km of the TSFs and has removed requirement (a) from condition 36. |
| Condition 36(b)<br>(formerly 36(a)) | As per comments for condition 36(a), there are no residential premises within 1 km of the TSFs. The applicant requests that this condition is amended or removed. | The department acknowledges that there are no residential premises within 1 km of the TSFs, but notes that the proponent has a duty of care to staff onsite.<br>The specification of "if residential premises within 1 km" has been removed from this condition as requested.<br>In addition, the department notes that the applicant may have obligations to inform the Department of Health of any drinking water events, sample results or incidents (including drinking water provided on the Premises) that could represent a public health risk.<br>A requirement to contact the Department of Health for guidance has therefore been added. |
| Definitions<br>Table 19 | Include a definition for "contaminated stormwater ponds". | The amendments to Table 2 clarify what is considered a "contaminated stormwater pond". A definition has therefore not been added to Table 19. |