



## Application for Licence Amendment

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

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<b>Licence Number</b>	L7276/1996/12
<b>Licence Holder</b>	Murrin Murrin Operations Pty Ltd
<b>ACN</b>	076 717 505
<b>File Number</b>	2011/011705-1
<b>Premises</b>	Murrin Murrin Nickel Cobalt Project  Mining tenements: L39/62, L39/81, L39/83, L39/136, L39/168, M39/299, M39/300, M39/301, M39/314, M39/322, M39/421, M39/422, M39/423, M39/435, M39/436, M39/424, M39/342, M39/343, M39/446, M39/553, M39/562, M39/637, M39/651, M39/686, M39/692, M39/714, M39/715, M39/716, M39/737, M39/820  LAVERTON WA 6440  As defined in Schedule 1 of the licence
<b>Date of Report</b>	29 November 2023
<b>Decision</b>	Revised licence granted

**A/MANAGER, RESOURCES INDUSTRIES  
REGULATORY SERVICES**

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

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## 1. Decision summary

Licence L7276/1996/12 is held by Murrin Murrin Operations Pty Ltd (Licence Holder) for the Murrin Murrin Nickel Cobalt Project (the Premises), located on Mining tenements: L39/62, L39/81, L39/83, L39/136, L39/168, M39/299, M39/300, M39/301, M39/314, M39/322, M39/421, M39/422, M39/423, M39/435, M39/436, M39/424, M39/342, M39/343, M39/446, M39/553, M39/562, M39/637, M39/651, M39/686, M39/692, M39/714, M39/715, M39/716, M39/737, M39/820 Laverton, WA 6440.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during operation of the Premises. As a result of this assessment, Revised Licence L7276/1996/12 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 12 July 2023, the Licence Holder submitted an application to the department to amend Licence L7276/1996/12 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments being sought are presented in Table 1.

**Table 1: Proposed Amendments**

Category	Amendment
5	Incorporation of constructed infrastructure relating to stage 2 of 17 Series in-pit tailings storage facility (TSF) into the license from W6526/2021/1.
	Removal of monitoring frequency of groundwater surrounding the paddock TSF.
	Removal of a monitoring location.
6	Increase the mine dewatering limit from 182 500 tonnes per year to 700,000 tonnes per year.
	Addition of pits 2407 and 2503 as dewater discharge locations.
31	Increase to the pre-existing condition SO <sub>2</sub> emission rate from 2.0 to 3.9 kg SO <sub>2</sub> / tonne of 100% acid.
64	<i>[administrative amendment]</i> Update to the figure presenting the new landfill locations.

#### 2.2.1 Category 5: Processing or beneficiation of metallic or non-metallic ore (17 Series in-pit TSF, stage 2)

On 26 July 2021 the Department issued a Works Approval to the Licence Holder to conduct construction works and limited time operations relating to category 5 (W6526/2021/1). The works involved the conversion of six existing open pit mines (Figure 2) into an in-pit tailings storage facility (TSF) at the Murrin Murrin North premises (called 17 series in-pit TSF). The in-pit TSF operation is planned to occur over four stages. The environmental compliance report for stage 1 was submitted to the Department on 16 May 2022.

Licence: L7276/1996/12

Stage 1 of the 17 series in-pit TSF was incorporated in licence L7276/1996/12 in an amendment issued on 31 January 2023 to allow the operation of the 17 series in-pit TSF and associated infrastructure for stage one. The current authorised tailings deposition points are T1 and T2 while the authorised decant water pumping points are D1 (Figure 2).

This amendment will incorporate pipeline and infrastructure relating to stage 2 of the 17 series in-pit TSF into the licence. The environmental compliance report for stage 2 was submitted to the Department on 23 May 2023 triggering the start of the 180-day time limited operations for Stage 2 which is due to expire on 19 November 2023. Stage 2 includes the deposition point T3 and decant point D3 (Figure 2) and is requested to be added to the licence.

Groundwater levels since stage 1 time limited operations began on 16 May 2022 resulted in an increase in groundwater levels in all monitoring bores (Figure 1). Total dissolved solids (TDS) concentrations have also been slowly rising since tailings deposition began. There has been a slight increase in nickel concentrations particularly in monitoring bore IP17-01.

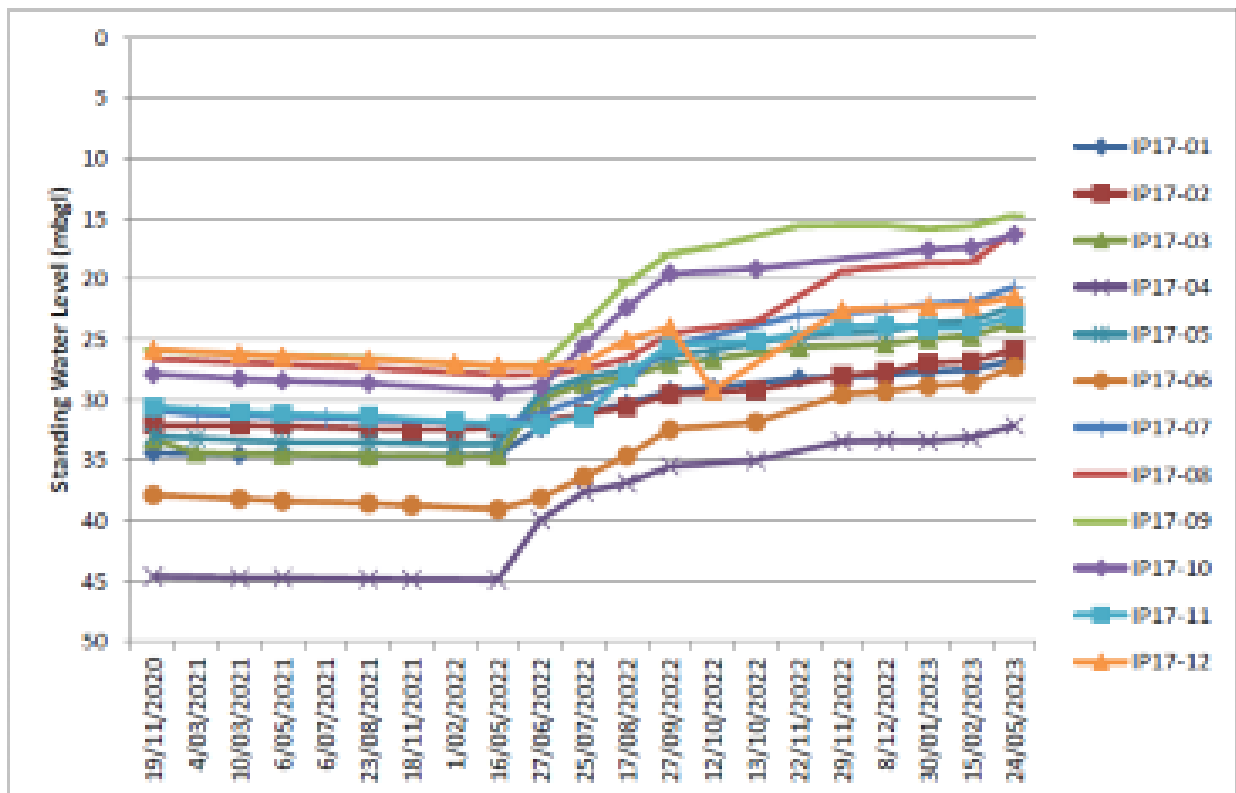


Figure 1: Groundwater levels reported in bores surrounding 17 series inpit TSF



### 2.2.2 Category 5: Groundwater monitoring frequency surrounding the paddock TSF

The paddock TSF at the premises consists of two cells. Supernatant from the paddock TSF is decanted and discharged to four on-site evaporation ponds east of the paddock TSF (Figure 3).

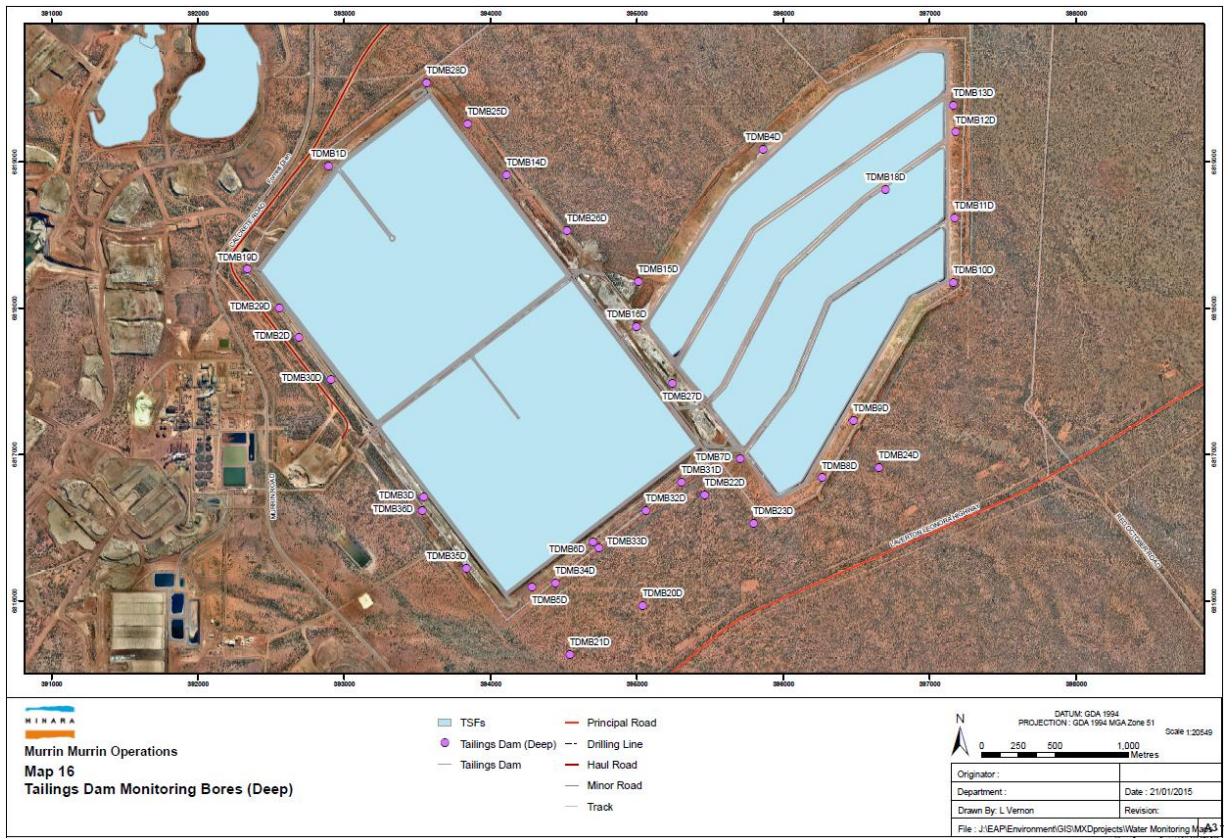
The Licence Holder currently manages the paddock TSF through the “Murrin Murrin Operations Tailings Storage Facility Seepage Mitigation Project,” which has been in effect since the initial 67 recovery bores were installed during the first quarter of 2008 (Minara, 2008). The Seepage Mitigation Project (SMP) now consists of 100 seepage recovery bores around the perimeter of the paddock TSF and four seepage interception trenches that are utilised around the TSF and evaporation ponds (Figure 3).

The goal of the SMP is to remove all surface expression of seepage from around the toe of the paddock TSF (Minara, 2008). Condition 1.3.4 of licence L7276/1996/12 requires the Licence Holder to manage the paddock TSF so that seepage collection and recovery system is used to capture seepage is pumped to the evaporation ponds or processing plant.

Monitoring of the ambient groundwater quality surrounding the paddock TSF and evaporation ponds involves quarterly monitoring and sampling for standing water level (SWL), pH, TDS and various metals. Condition 1.3.7 requires the Licence Holder to manage the paddock TSF in accordance with the SMP and provide the Departments CEO with quarterly and annual updates.

The Licence Holder has requested a reduction of required monitoring surrounding the paddock TSF from quarterly to biannually. The following justification for the proposed amendment has been provided by the Licence Holder:

- Both paddock TSF cells are decommissioned, and the last discharge of tailings occurred in 2015;
- Groundwater levels have been steadily falling over the past five years and pH is steady and close to neutral;
- TDS is mostly steady with exception to monitoring bores situated closer to the TSF and evaporation ponds; and
- The Licence Holder seeks to prioritise monitoring resources towards active in-pit TSFs and higher risk areas.

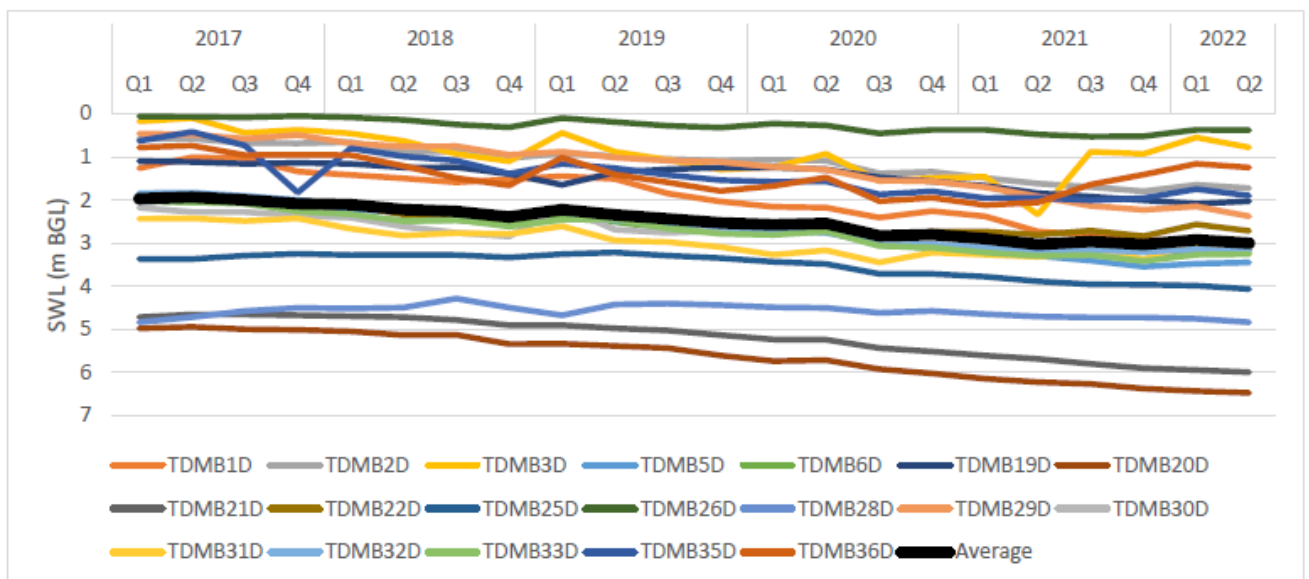


**Figure 3: Paddock TSF, evaporation ponds and groundwater monitoring locations**

### Standing Water level

SWLs of bores surrounding the paddock TSF have shown on average a decreasing trend of approximately 1 metre from 2017 to 2022 (Figure 4).

The Licence holder submitted the latest progress update on the TSF SMP on 31 July 2023 for that SWL monitoring for the second quarter (April – June) 2023. During this monitoring period the average groundwater levels rose 0.03 m with the following groundwater bores recording groundwater levels above ground level in May 2023: TDMB16D, TDMB18D and TDMB27D (Minara 2023c).



**Figure 4: SWL measurements from 2017 to 2022**



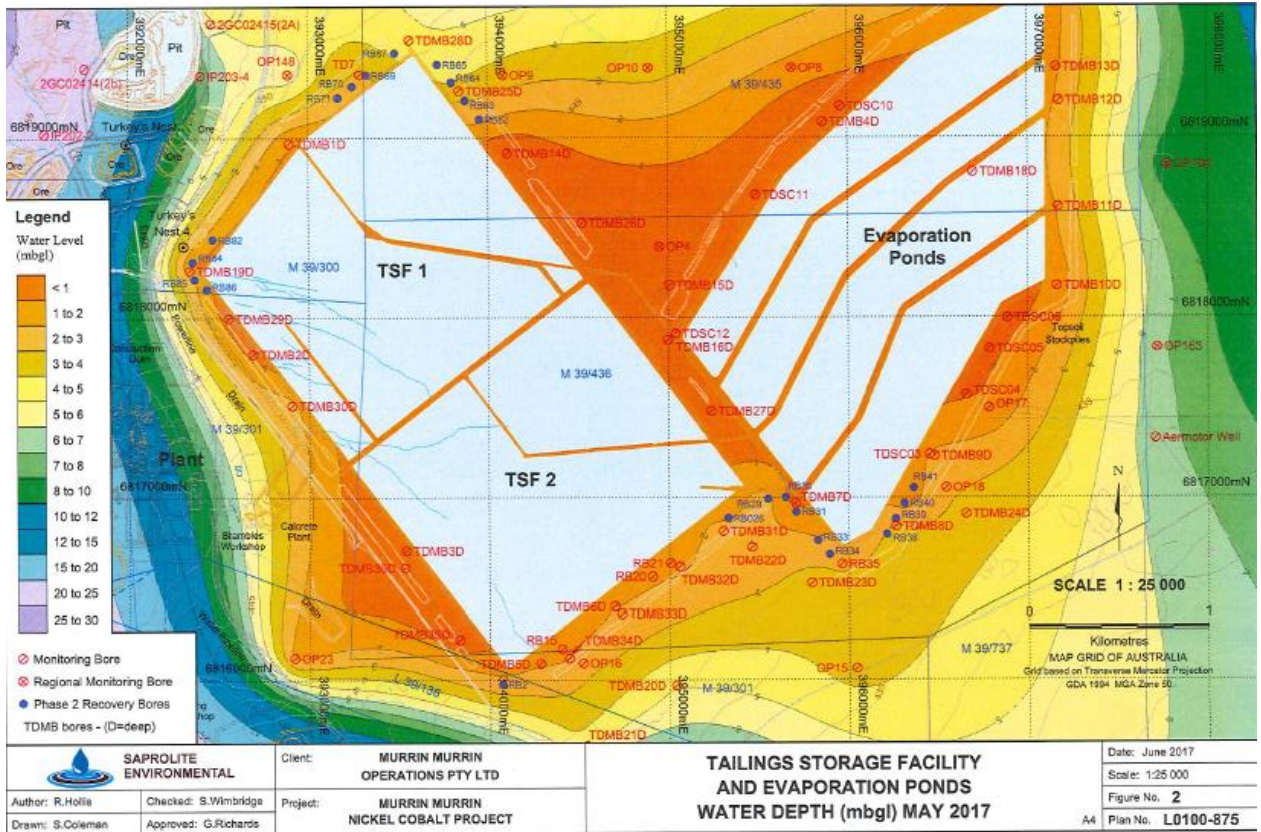


Figure 5: SWL measurements from 2017

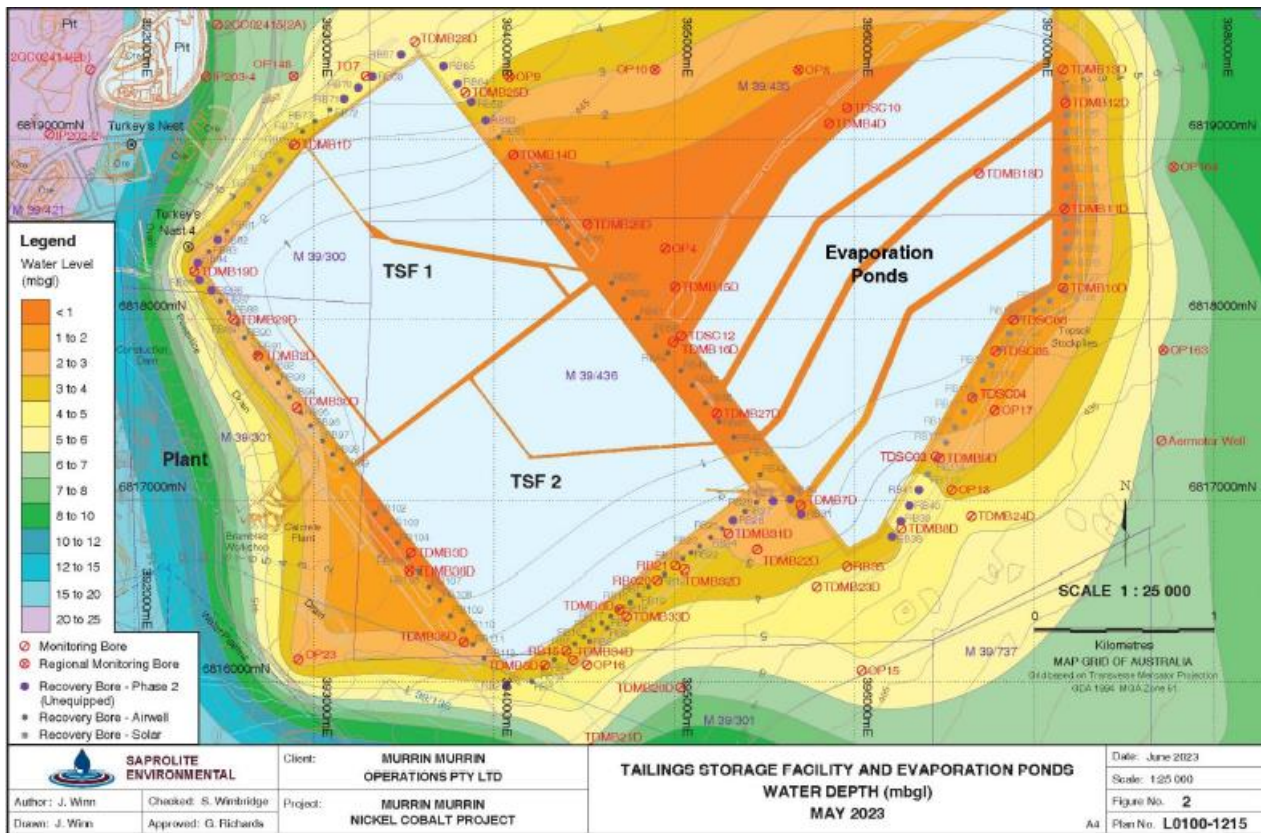
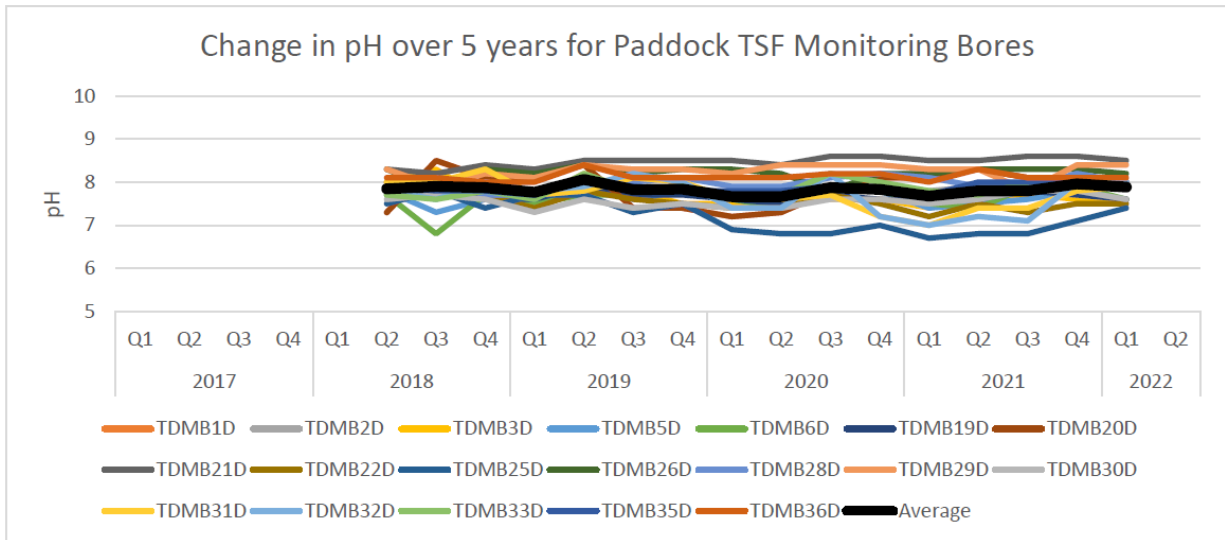


Figure 6: Paddock TSF and Evaporation Ponds SWL May 2023

## pH

Recorded pH concentrations within monitoring bores surrounding the paddock TSF appear to be relatively consistent (Figure 7). The most acidic readings are located within TDMB19D and TDMB22D located at the northwestern and southeastern corners of the paddock TSF. As of February 2023, the average recorded pH is 7.74 (Minara, 2023b).

Groundwater quality outside the disturbance footprint (250 m from TSF and evaporation ponds) recorded an average pH of 8.3 (Minara, 2023b) and is considered to likely be the background pH concentrations in the nearby area.

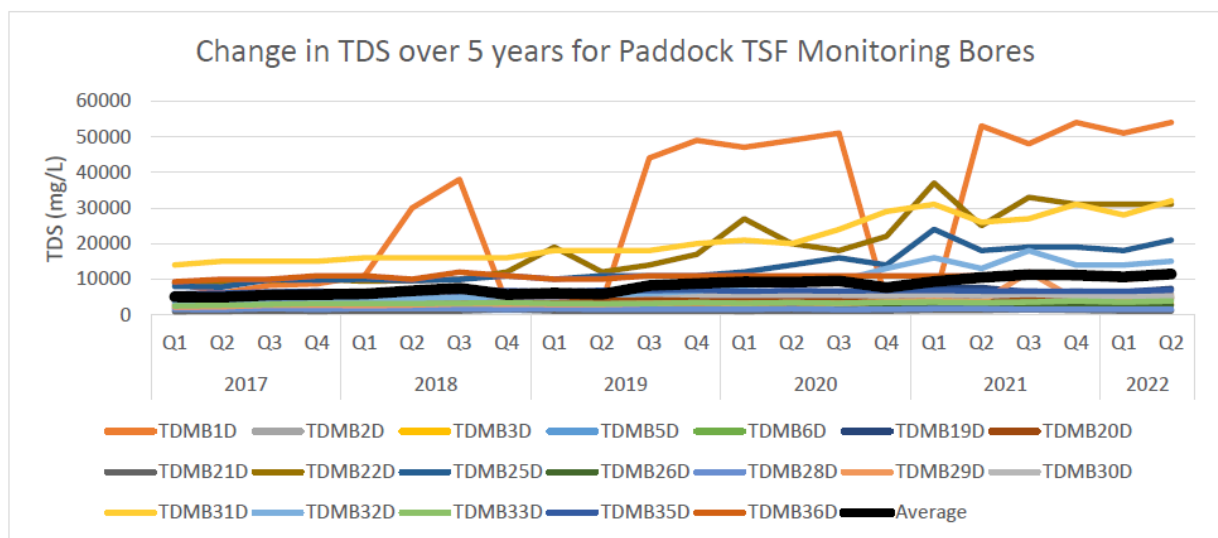


**Figure 7: pH readings from 2018 to 2022**

## Total Dissolved Solids (TDS)

Bores near the toe of the TSF generally have a higher salinity. Minara (2023a) states that the groundwater quality outside the disturbance footprint of the TSF and evaporation ponds has not changed significantly since deposition commenced.

“The average TDS in monitoring bores within the disturbance footprint of the TSF and evaporation ponds is 9,775 mg/L” (Minara 2023b). Groundwater quality outside the disturbance footprint (250 m from TSF and evaporation ponds) TDS average is reported as 2,333 mg/L.



**Figure 8: TDS concentrations from 2017 to 2022**

### 2.2.3 Category 5: Removal of IP904-2 monitoring bore

The Licence Holder developed open pit 815 and as a result monitoring bore IP904-2 was destroyed. IP904-2 was associated with monitoring the in-pit tailings facility 8/5 – 9/4.

The Licence Holder noted that five monitoring bores are available in close proximity of 8/5-9/4 in-pit. IP904-1 is located approximately 300 m south southeast of IP904-2 and monitors the same pit. IP1806-1 is located approximately 260 m northwest of IP904-2.

### 2.2.4 Category 6: Increase in dewatering limit and additional discharge locations

The Licence Holder has requested to include a portion of Works Approval W6365/2020/1 into Licence L7276/1996/12. W6365/2020/1 was granted to the Licence Holder on 5 November 2020. The Works Approval authorised an increase in mine dewatering from 182,500 to 700,000 tonnes per year and authorised the use of Pit 2406 as a mine dewater discharge location. This licence amendment does not add Pit 2406 as Pt 2406 has been backfilled.

The Licence Holder has also requested Pits 2407 and 2503 be added to this licence as additional mine dewater discharge locations as presented in Figure 9. Pits 2402 and 2502 have been backfilled and have been removed from the Licence as part of this amendment. Pit 2704 has not been developed as a Pit and there is no short to medium term plans for the proposed pit and therefore has also been removed from the Licence.

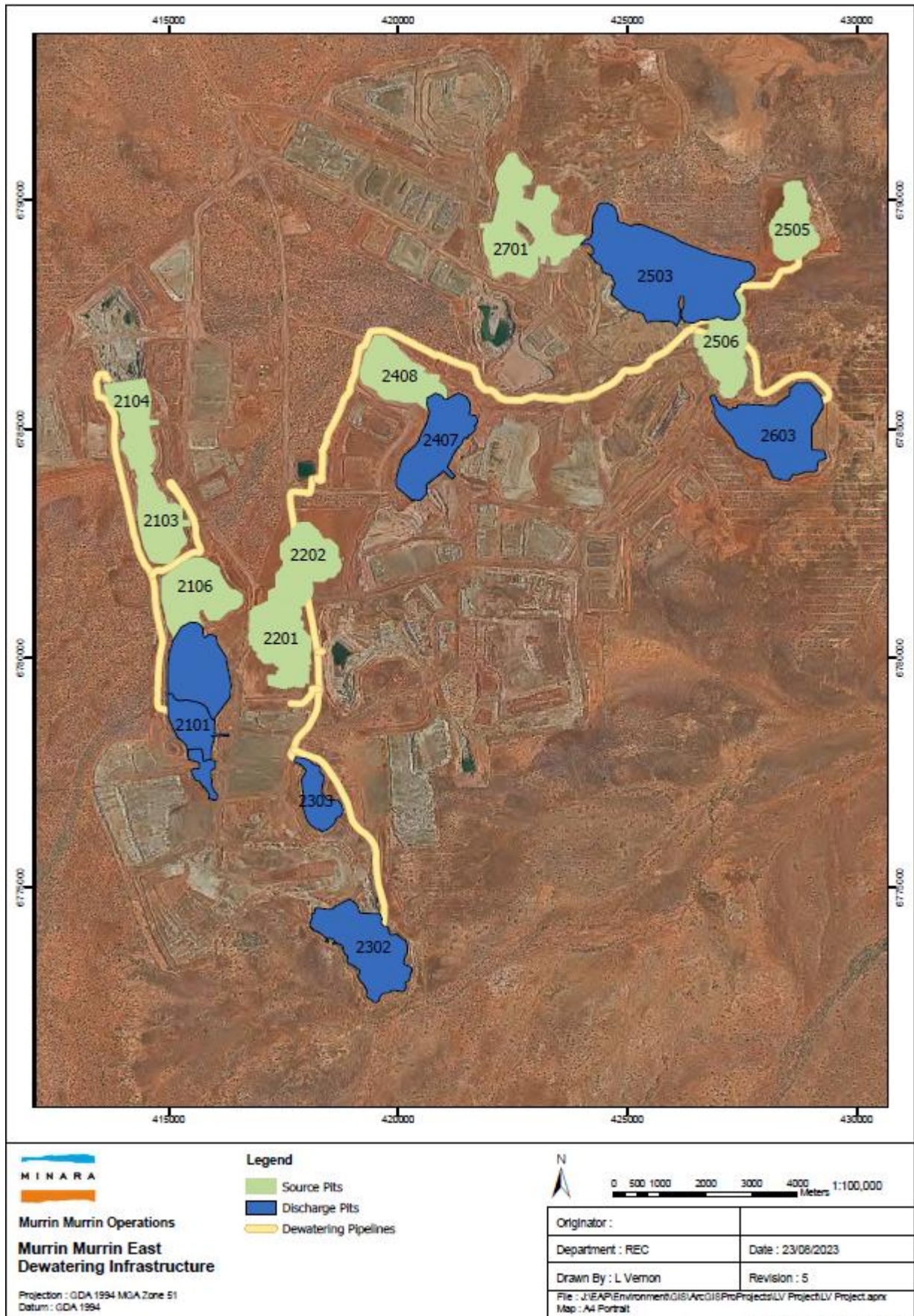
The proposed increase to dewatering output and the additional discharge locations does not involve any additional construction as the pipelines and bunds were already in place from when the pits were being dewatered themselves.

To develop the risk assessment for the amendment, on 25 August 2023 the Licence Holder (at the request of the Department) provided the pit details and capacity of all current and proposed discharge pits as presented in Table 2.

**The total available void volume of current and proposed mine dewatering pits is calculated to be approximately 11,108,468 m<sup>3</sup>. Table 2: Discharge pit volumes heights**

Pite Name	<sup>1</sup> Void Volume (m <sup>3</sup> )	<sup>1</sup> Current Void Volume (m <sup>3</sup> )	Minimum pit crest height (mAHD)	Water Level (mAHD)
2101	1,369,511	1,368,950	411.48	391.51
2302	2,200,000	1,850,000	417.19	398.03
2303	937,187	409,072	419.18	409.71
2407	2,553,815	2,553,815	409.65	NA
2503	4,839,655	2,553,815	402.70	NA
2603	2,372,816	2,372,816	401.48	NA

<sup>1</sup>Volumes calculated excludes a 4 m freeboard.



**Figure 9: Source and Discharge Pits located at Murrin Murrin East**

### 2.2.5 Category 31: An increase of SO<sub>2</sub> emission rate

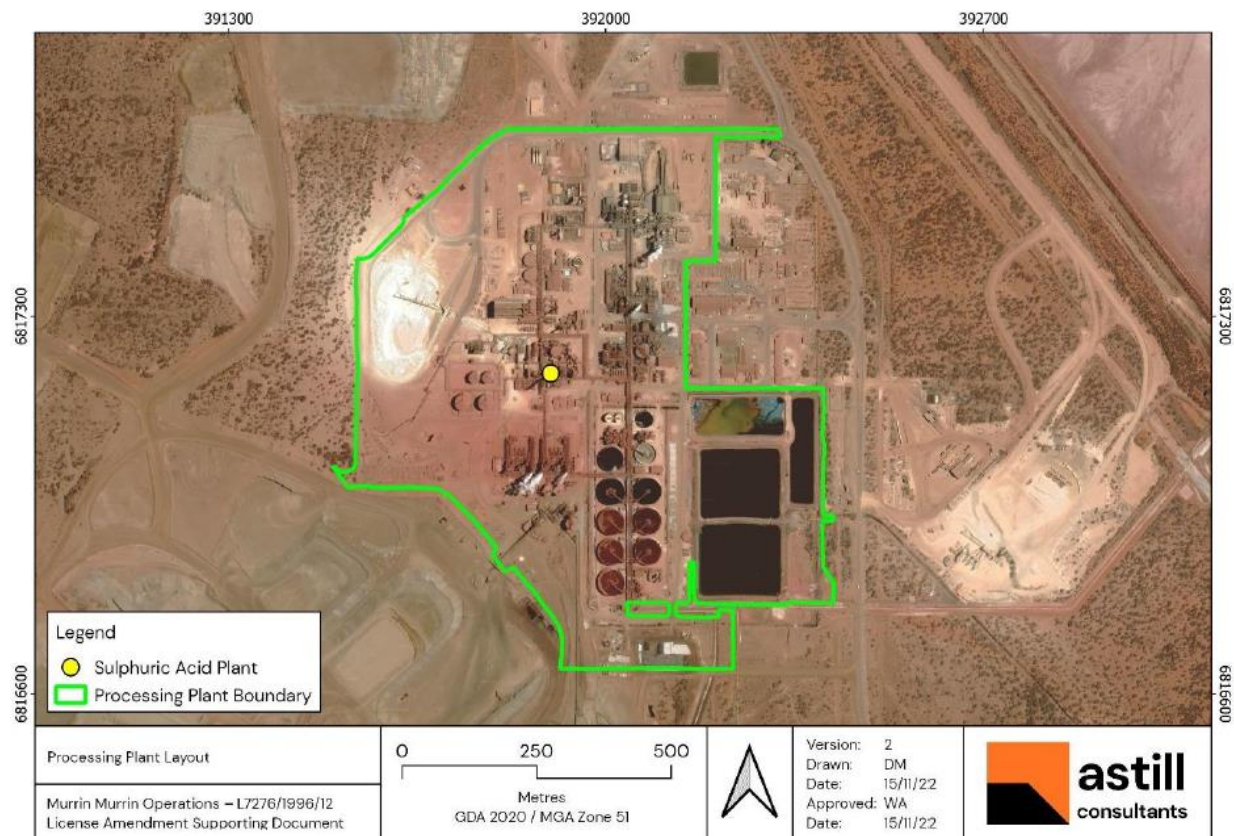
The Licence Holder has applied for an increase in the SO<sub>2</sub> emission limit from the sulfuric acid plant (SAP) from 2.0 to 3.9 kg/tonne of 100% acid or equivalent at location A6 (Figure 10).

The onsite SAP is used to leach nickel and cobalt from low grade laterite ore through a high-pressure acid leach (HPAL) circuit and refinery. The SAP produces sulphuric acid and steam from the burning of sulphur and involves three key chemical reactions:

1. Combustion of sulphur to produce SO<sub>2</sub>;
2. Conversion of SO<sub>2</sub> to sulphur trioxide (SO<sub>3</sub>) in the presence of a vanadium complex catalyst; and
3. Absorption of SO<sub>3</sub> to a mixture of sulphuric acid and water.

Condition 2.2.2 in Licence L7276/1996/12 has a limit of 2.0 kg/tonne of 100% acid or equivalent of SO<sub>2</sub> from the SAP averaged over a 60-minute period. The emission point at the SAP is 80 m in height and monitoring is conducted quarterly using the United States Environmental Protection Agency (USEPA) methodology 6C to comply with Condition 2.2.2.

The increase in SO<sub>2</sub> emission volume is due to the Licence Holder intending on maintaining the use of the catalyst (a vanadium complex) at the tail end of its life reducing the conversion efficiency dropping its efficiency from 99.7% to 99.35% resulting in additional SO<sub>2</sub> emissions towards the end of its life.



**Figure 10: Sulphuric acid plant emission location**

### 2.2.6 Administrative Amendments

The Licence Holder has identified typographical errors within Table 1.3.7 Condition 1.3.14 of in Licence L7276/1996/12 relating to the estimated pit volumes and heights for in-pit TSFs 18/3 and 18/6. No risk assessment was completed for this part of the amendment as no operational change is affected.

Works Approval W6365/2020/1 approved the construction and commissioning of a new on-site landfill. Minara has constructed and commissioned the landfill and during the licence amendment issued on 2 December 2021 conditions were incorporated into the licence relating to the newly constructed and operational landfill.

The Licence Holder has requested to include a figure to the Licence within Schedule 1 presenting the newly constructed landfill locations.

## 2.3 Part IV of the EP Act

Ministerial statements for the premises are summarized in Table 3.

**Table 3: Ministerial statements**

Date granted	Ministerial statement	Management of impact to receptors
6 June 1996	0418	Protection for rare flora: Requires development and implementation of a plan for conservation and management of <i>Hemigenia exilis</i> within the project area so that “no significant loss of the species occurs”
5 May 1997	0444	
6 May 1997	0445	
31 May 1999	0506	Stage 2 expansion. For quarrying in calcrete deposits: includes a requirement for development and implementation of a subterranean fauna management plan (for quarrying activities).

Mining and Processing of Nickel-Cobalt ore at the Murrin Murrin Operations were assessed by the Environmental Protection Authority (EPA), and activities authorised under Ministerial Statement 418, 444, 445 and 506. There are no matters in the Ministerial Statements that directly impact this amendment assessment.

## 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 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
Mine dewater	Increase of mine dewatering volume on the premises	Mine water seeping from unlined pits	<ul style="list-style-type: none"> <li>• Monitoring of discharge; and</li> <li>• Maintaining a minimum 4 m</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
			freeboard
	Addition of discharge location Pits 2407 and 2503	Overtopping of pits	<ul style="list-style-type: none"> <li>• Maintaining a minimum 4 m freeboard.</li> </ul>
	Constructed pipelines leading to Pits 2407 and 2503	Pipeline breaks or leakages	<ul style="list-style-type: none"> <li>• A 500 mm deep v-drain surrounds all dewatering pipelines to contain leaks and</li> <li>• 12 hourly inspections of pipeline networks and bunding.</li> </ul>
Tailings and process water	Paddock TSF (north and south cells)	Seepage through paddock base and walls	<ul style="list-style-type: none"> <li>• Biannual monitoring of groundwater bores associated with paddock TSF;</li> <li>• Quarterly monitoring of bores associated with evaporation ponds; and</li> <li>• Utilisation of Minara Environmental Management Plan (EMP) and International Organisation of Standardisation (ISO) 14001 certified Environmental Management System (EMS).</li> </ul>
	Deposition of tailings into in-pit TSF	Tailings seepage through base and embankments to groundwater	<p><b>Proposed controls:</b></p> <ul style="list-style-type: none"> <li>• Standing water levels in proximity of the pit to be maintained at &gt;4 mbgl;</li> <li>• 1Monitoring bores installed capable of being equipped with seepage recovery pumps</li> <li>• Rotational deposition of tailings;</li> <li>• The supernatant pond will be “kept as small as practicable to minimise seepage from the inpit TSF”.</li> <li>• Decant recovery. The original works approval supporting documentation indicates that “water recovered by the decant pump will be pumped to the evaporation ponds have a current capacity of 5,100 Mm<sup>3</sup> and that the average rate of decant recover over the previous five years has been 3,540 mm<sup>3</sup>/year. MMO is not increasing the throughout or changing the rate of tailings discharge – therefore the rate of decant discharge to the evaporation ponds will not change (Minara 2023a).</li> <li>• TSF to “allow tailings to desiccate to reduce seepage”: This will include</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
			<p>vertical deposition cycles of 3 – 4 months with approximately 1 month drying time, however as other in-pit TSF's are approaching capacity, drying times may be reduced during the operational life of the 17 series in-pit TSF as it becomes the primary tailings deposition facility.</p> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>• On-going monitoring of twelve monitoring bores installed around the in-pit TSF.</li> </ul>
		Overtopping and discharge to land	<p><b>Proposed controls:</b></p> <ul style="list-style-type: none"> <li>• Minimum operational freeboard of 300 mm (note, total 500 mm requirement placed on the works approval).</li> </ul> <p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>• Monthly survey of decant ponds; and</li> <li>• 12-hour inspections of in-pit TSF.</li> </ul>
		Pipeline breaks or leakages	<p><b>Existing conditions:</b></p> <p>Condition 1.3.1 within the licence requires all pipelines containing tailings, decant or hypersaline water are either:</p> <ol style="list-style-type: none"> <li>Equipped with telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures;</li> <li>Equipped with automatic cut-outs in the event of a pipe failure; or</li> <li>Provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections.</li> </ol> <p>Condition 1.3.5 requires 12 hour inspections (when operating) of tailings pipelines and return water lines.</p> <p><b>Proposed controls:</b></p> <ul style="list-style-type: none"> <li>• Tailings discharged and decant pipeline corridor bunded;</li> <li>• Leak detection via flow meters with telemetry reporting to the control room;</li> <li>• Scour sump (225 m<sup>3</sup>) installed at the</li> </ul>



Emission	Sources	Potential pathways	Proposed controls
			northern end of the in-pit TSF to capture tailings from pipeline bund. <b>Monitoring:</b> <ul style="list-style-type: none"> <li>Daily inspections in accordance with existing licence conditions.</li> </ul>
Sulphuric dioxide	Sulphuric Acid Plant Stack	Air and wind dispersion	<ul style="list-style-type: none"> <li>Continued quarterly monitoring of stack emissions in accordance with license requirement;</li> <li>Monitoring of complaints from Minara Homestead and other sources; and</li> <li>Utilisation of Minara EMP and EMS.</li> </ul>

<sup>1</sup>DWER notes that the Licence Holders proposed control of converting groundwater monitoring bores into seepage recovery bores is inappropriate. Monitoring bores should be kept separate from seepage recovery to ensure continuity and reliability of monitoring data. The Licence Holder would be required to install fit-for-purpose recovery bores, should they be required.

### 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 5 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 5: Sensitive human and environmental receptors and distance from prescribed activity (excluding 17 series inpit TSF operation)**

Human receptors	Distance from prescribed activity
Town of Laverton (discounted)	20 km southeast of the eastern most portion of the Premises. The receptor is discounted due to the distance of the receptor from the Prescribed Premises.
Minara Homestead	18 km southwest of the SAP (Figure 12).
Environmental receptors	Distance from prescribed activity
Native vegetation	<p>Prominent native vegetation appears to be located approximately 100 m from the base of the paddock TSF outer wall.</p> <p>Native vegetation appears to be present approximately 60 m north from Pit 2023.</p> <p>Remnant vegetation appears approximately 180 m northwest and 500 m south of the 17 series inpit TSF</p>
Ephemeral water line (cement creek)	An ephemeral water line named "cement creek" is located approximately 0.5 kms south of the southern pit south corner

	of the paddock TSF.
Ephemeral water line (near 2503 Pit)	An ephemeral water line is present approximately 40m south of the 2503 Pit. The creek line continues east towards Lake Carey.
Threatened and priority flora	<p>Priority 4 flora is located approximately 60 m north from Pit 2503.</p> <p>Priority 4 flora is located approximately 1.3 km southeast from Pit 2503.</p> <p>Priority 4 flora is located within Pit 2503 and is assumed to be destroyed.</p>
Groundwater	<p>As of October 2019, groundwater is located approximately 7 to 33 meters below ground level (mbgl) across all pits within Murrin Murrin East. Sink pits appear to exist within the region at 2501, 2502, 2104, 2103 and 2201 (Figure 11).</p> <p>RWI proclaimed groundwater area.</p>

All searches completed on Geocortex during April 2023 (DWER 2023).

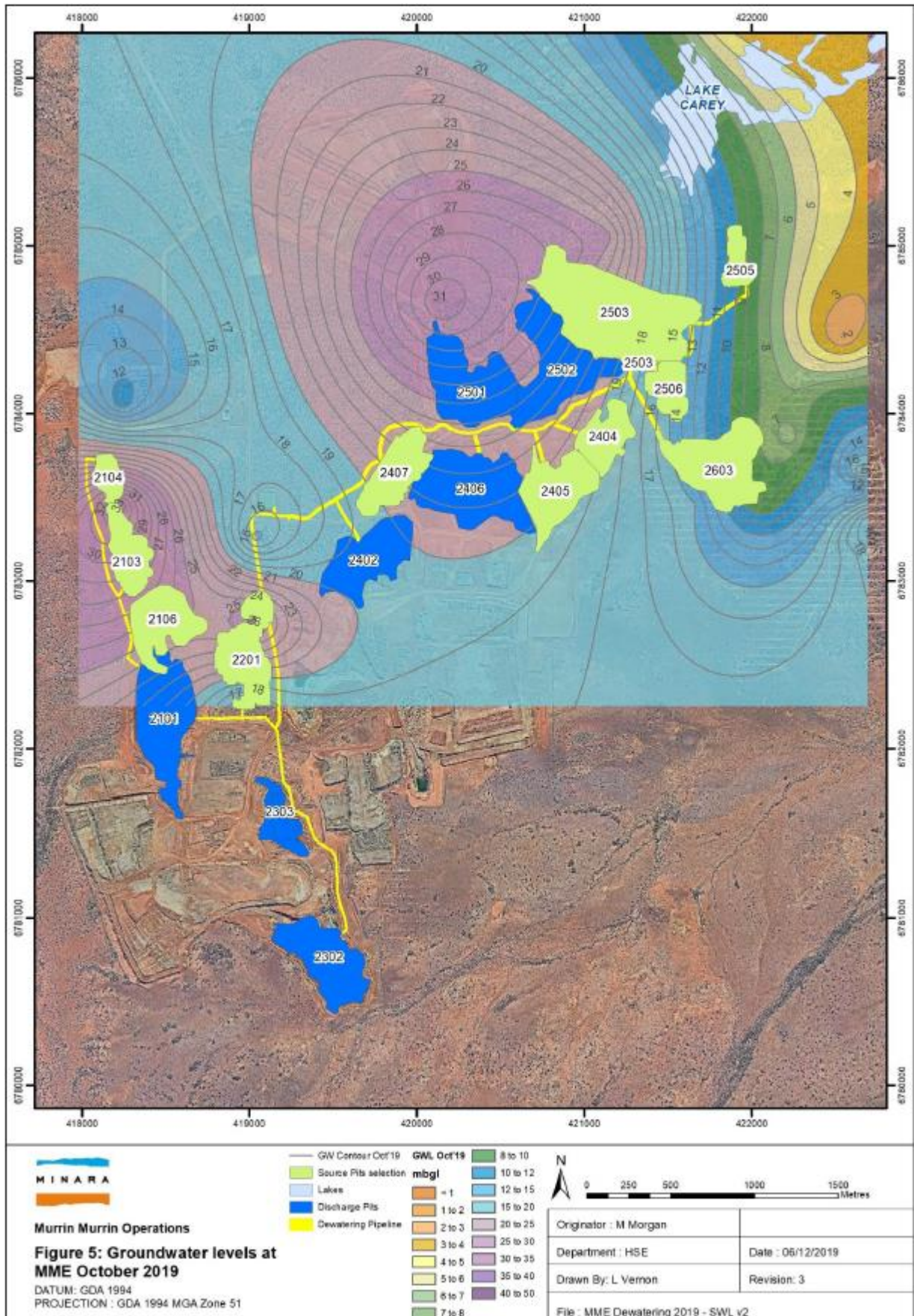
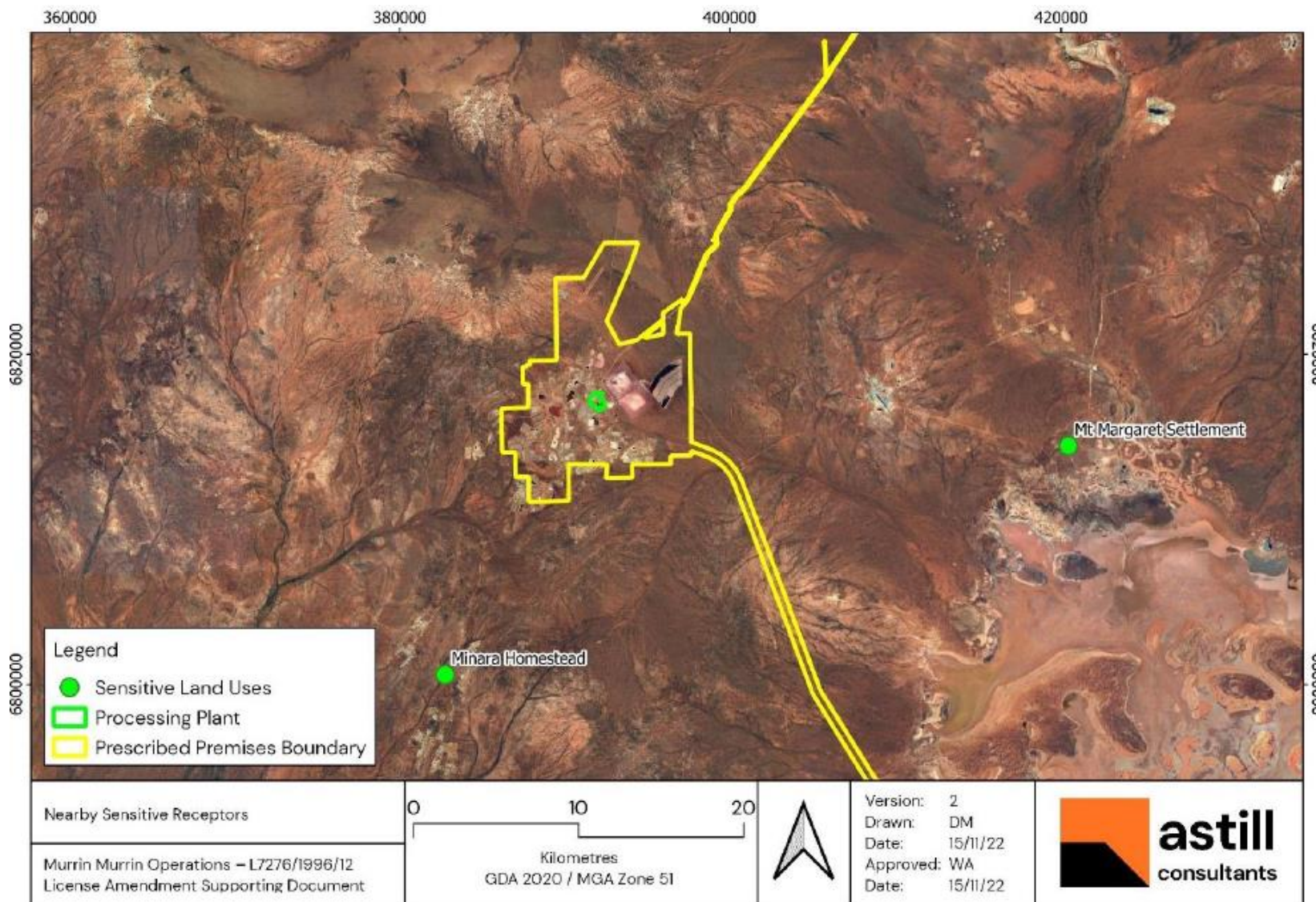


Figure 11: Groundwater contours during October 2019.



**Figure 12: Distance to Minara Homestead from the SAP plant**

Licence: L7276/1996/12

## 3.2 Risk ratings

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

Where the 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 L7276/1996/12 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Category 5: Processing or beneficiation of metallic or non-metallic ore: premises on which tailings are discharged into a containment cell or dam.

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 <sup>1</sup> C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions <sup>2</sup> of licence	Justification for additional regulatory controls / comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
<b>Operation</b>								
Deposition of tailings into in-pit TSF (17 series stage 2)	Tailings and process water	<p><b>Pathway</b> Seepage through base and embankments of pit wall to groundwater.</p> <p><b>Impacts</b> Reduction in groundwater quality, groundwater mounding and damage to surrounding vegetation.</p>	<p>Native vegetation and priority flora</p> <p>Groundwater areas of fresh groundwater ~400 mg/L TDS present)</p>	Refer to section 3.1.1	<p>C = Major</p> <p>L = Possible</p> <p><b>High Risk</b></p>	Yes	<p>Condition 1.3.2 – authorised discharge points (updated to include T3 (stage 2 discharge point)</p> <p>Condition 3.4.1 – monitoring of TSF inputs and outputs</p> <p>Condition 3.5.1 (Table 3.5.2) – monitoring of 17 series in-pit TSF ambient groundwater SWL(with limits) and quality</p> <p>Condition 3.5.2 – SWL trigger response (seepage management plan)</p> <p>Condition 3.5.3 – Implementation of seepage management plan</p> <p>Condition 3.6.1 – Water balance monitoring</p>	<p>Groundwater monitoring data was provided to the Department for the August 2023 sampling event.</p> <p>It was observed that there is a slight increase in SWL during the post winter monitoring event (August 2023) in bores IP17-01 to IP17-05 ranging from approximately 0.3 to 0.5 mbgl.</p> <p>TDS for wells IP17-02 and IP17-09 showed an increase of TDS approximately 400 and 2,600 mg/L respectively when compared with the January 2023 sampling event. All other results were reported at similar concentrations as previous events. Reported nickel concentrations in August 2023 have either slightly decreased or plateaued in all monitoring wells.</p> <p>The previous risk assessment for the inclusion of stage 1 infrastructure and operations into the licence risk resulted in a high risk. This risk assessment is unchanged for the inclusion of stage 2 infrastructure and operation into the licence due to the rise in groundwater levels (Figure 1)</p> <p>Existing conditions on the licence include monitoring requirements and SWL trigger response (condition 3.5.1) and management plan (condition 3.5.2 and 3.5.3).</p> <p>Existing conditions within the licence are adequate to manage this risk event and therefore no additional regulatory controls are required.</p>
		<p><b>Pathway</b> Overtopping and discharge to land.</p> <p><b>Impacts</b> Surrounding vegetation and ephemeral water lines.</p>	<p>Native vegetation and priority flora and</p> <p>Ephemeral water lines</p>	Refer to section 3.1.1	<p>C = Moderate</p> <p>L = Unlikely</p> <p><b>Medium Risk</b></p>	Yes	<p>Condition 1.3.3 and 1.3.14 – freeboard requirements</p> <p>Condition 1.3.5 – inspection requirements</p> <p>Condition 3.6.1 – water balance</p>	Existing conditions on the licence adequately manage this risk event. No additional regulatory controls are required.
		<p><b>Pathway</b> Spill or leak from pipeline discharging to the surrounding environment.</p> <p><b>Impacts</b> Direct contact to receptors degrading environmental values and</p>	<p>Native vegetation and priority flora and</p> <p>Ephemeral waterlines</p>	Refer to section 3.1.1	<p>C = Moderate</p> <p>L = Unlikely</p> <p><b>Medium Risk</b></p>	Yes	<p>Condition 1.3.1 – pipeline requirements</p> <p>Condition 1.3.5 – inspection requirements</p>	Existing conditions on the licence adequately manage this risk event. No additional regulatory controls are required.
Reduction in Paddock TSF monitoring	Tailings and	<b>Pathway</b>	Native vegetation	Refer to	C = Moderate	No	Condition 1.3.4 – seepage	There is a consistent and steady trend of groundwater quality results surrounding the

Risk Event					Risk rating <sup>1</sup> C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions <sup>2</sup> of licence	Justification for additional regulatory controls / comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
	process water	Seepage through paddock base and walls <b>Impacts</b> Reduction in groundwater quality, groundwater mounding and damage to surrounding vegetation.	And Ephemeral waterline (cement creek)	section 3.1.1	L = Possible <b>Medium Risk</b>		collection requirements Condition 1.3.6 -vegetation assessment Condition 1.3.7 – SMP Condition 3.5.1- updated to reduce paddock TSF monitoring to biannually. <b><u>Condition 3.5.2 – added to require quarterly monitoring at the paddock TSF if discharges into the TSF occurs.</u></b>	paddock TSF. A steady general increase of pH (up by 0.07) since January 2017 was observed and is closer to background concentration in the area (8.3). A reduction in groundwater monitoring surrounding the paddock TSF is unlikely to increase risk to receptors so long as the TSF is not used to receive any tailings or additional decant liquor unless in emergency. It is noted that during an inspection undertaken on 19 February 2020 the inspectors observed that effluent water was being discharged from the Reverse Osmosis plant into a small transfer pond and the TSF North paddock Cell which was shortly removed and rectified. It is understood that the Licence Holder wishes to still have the paddock TSF as an authorised discharge location and will only be used in emergency situations (condition 1.3.1). It has been determined that if the paddock TSF is used to deposit tailings or decant liquor at any point then the Licence Holder is required to conduct additional monitoring. While active discharges are occurring at the paddock TSF and for two annual periods following the last deposition of tailings/decant liquor the Licence Holder is required to conduct quarterly monitoring instead of biannual monitoring.
Discharge of mine dewater to Pits 2407 and 2503	Mine dewater (saline)	<b>Pathway</b> Mine water seeping from unlined Pits 2407 and 2503. Or Overtopping of Pits <b>Impacts</b> Raising the saline groundwater into the vegetation root zone. Or Direct with receptors from overtopping.	Native vegetation Lake Carey	Refer to section 3.1.1	C = Minor L = Unlikely <b>Medium Risk</b>	Yes	Condition 1.3.13 – pit freeboard requirements	The 4 m required freeboard is sufficient as vegetation root depth is quite shallow, due to a hardpan within 1 m of the surface (Minara 2023a) that may be impermeable to most species. Local transmissivity is low, and Lake Carey is over 1.5 km from the closest receiving pit. Existing conditions have been updated to include the new discharge pits. Existing conditions adequately manage this risk event and no further regulatory controls are required.
		<b>Pathway</b> Mine water leaking or spilling from pipelines <b>Impacts</b> Direct with receptors and/or degrading					Condition 1.3.1 – pipeline requirements Updated condition 1.3.5 - inspections	The licence holder has stated that dewatering pipelines are inspected for signs of leaks 12 hourly when operating. This control has been added to existing inspection condition 1.3.5
Increase in total dewatering volume on the Premises from .182 500 to 700,000 tonnes per year.		<b>Pathway</b> Mine water seeping from	Native vegetation	Refer to section 3.1.1	C = Minor L = Unlikely	Yes	Condition 1.3.13 – pit freeboard requirements	Dewatering is from nearby pits, with expected similar water chemistry. Current pit availability capacity of all six mine

Risk Event					Risk rating <sup>1</sup> C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions <sup>2</sup> of licence	Justification for additional regulatory controls / comments
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
		unlined pits <b>Impacts</b> Potentially changing the chemistry (particularly increasing salinity) of groundwater which could potentially impact Lake Carey.	Lake Carey		<b>Medium Risk</b>			dewater discharge locations is approximately 11,108,460 m <sup>3</sup> as presented in Table 2. Existing conditions have been updated to include the new discharge pits. Existing conditions adequately manage this risk event and no further regulatory controls are required.
Increase in SO <sub>2</sub> emissions from Sulphuric Acid Plant	SO <sub>2</sub>	<b>Pathway</b> Air and wind dispersion <b>Impacts</b> Human respiratory damage and reduced amenity at residential location	Minara Homestead	Refer to section 3.1.1	C = Minor L = Possible <b>Medium Risk</b>	Yes	Condition 2.2.1 – authorised emissions to air Updated Condition 2.2.2 – emissions to air limits Condition 3.2.1 – air emission monitoring <b><u>Condition 3.1.3 – SAP catalyst screening data to be collected.</u></b> <b><u>Condition 4.2.2 updated to require the AER to include an assessment of the SO<sub>2</sub> monitoring data for the SAP plant and the sampling data for the catalyst screening to be undertaken against the assumptions made within the Murrin Murrin Sulphuric Acid Plant – Air Quality Assessment, by Environmental Technologies &amp; Analytics, August 2022.</u></b>	Refer to Section 3.3

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. **Bold and underline text** depicts additional regulatory controls imposed by department.



### 3.3 Detailed risk assessment for an increase of SO<sub>2</sub> emissions

The premises uses a High-Pressure Acid Leach (HPAL) circuit and refinery to produce nickel and cobalt products. The nickel and cobalt production process involves the manufacture of sulphuric acid for use within the HPAL circuit. The Licence Holder is proposing to increase the annual production of sulphuric acid. To do this they need to extend the period of time between replacements of the catalyst used in the sulphuric acid plant (SAP). This allows the plant to be available more often so an increase in productivity can occur (i.e. reduce the frequency of shutdown periods). This will result in a reduced efficiency of the sulfuric acid plant as the catalyst deteriorates over time resulting in an increase in emissions of sulphur dioxide (SO<sub>2</sub>) into the atmosphere. Therefore, the licence holder is requesting an increase in the limit outlined in condition 2.2.2 of their licence from 2.0 to 3.9 kg/tonnes of SO<sub>2</sub>.

To assist with the licence application the Licence Holder engaged Environmental Technologies & Analytics (ETA) to undertake an updated Air Quality Assessment. ETA are an accredited National Association of Testing Authorities (NATA) company for sampling and analysis of air pollutants from industrial sources (Minara 2023a).

#### 3.3.1 Identification and general characterisation of emission

The assessed emission for this detailed risk assessment is Sulfur Dioxide (SO<sub>2</sub>). The Department of Climate Change, Energy, the Environment and Water (DCCEEW) describes SO<sub>2</sub> as a colourless non-flammable gas with a strong suffocating odour (DCCEEW 2023).

The expected increased emission rate of SO<sub>2</sub> is caused by using the catalyst at the tail end of its life. The conversion efficiency of the acid plant is expected to drop from 99.7% to 99.35% resulting in additional SO<sub>2</sub> emissions towards the end of its life (Figure 13) (Minara 2023a). Worst case operating conditions for the SAP occur during a cold acid plant start-up, where the conversion efficiency can drop to as low as 95% (approximately 6,075 ppm) and result in increased emissions. Cold start-ups last less than four hours and occur approximately 1.3 times per year from 2012 to 2021.

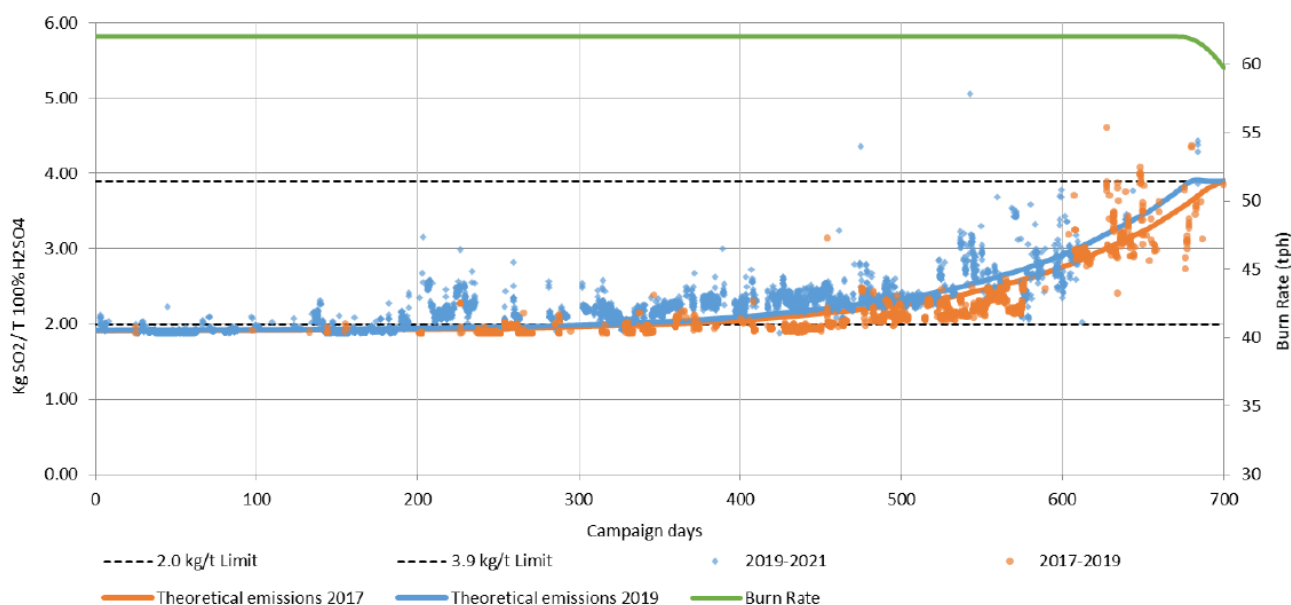


Figure 13: Theoretical SO<sub>2</sub> emissions (ETA, 2022)

#### 3.3.2 Description of potential adverse impact from the emission

Within the risk assessment (Table 6) the Minara Homestead was identified as a sensitive receptor that could be affected by the increase of SO<sub>2</sub> emission level limit from 2.0 to 3.9 SO<sub>2</sub> kg/tonnes by the onsite SAP. The Minara Homestead is located approximately 12 km

southwest of the Prescribed Premises (Figure 12) and 18 km southwest from the SAP (Figure 12).

It is noted that the Department does not consider onsite employees or visitors to the Prescribed Premises as a receptor for this risk event as this is regulated under the *Mining Act 1978*.

Impacts identified due to the increased emission could result in respiratory damage, a reduction in health to homestead occupiers and reduced amenity. It is noted that individuals with an impaired heart or lung function and asthmatics are at an increased risk of detrimental effects (DCCEEW 2023).

### 3.3.3 Criteria for assessment

The National Environmental Protection Measure (NEPM) for Ambient Air Quality (NEC 2021) provides standards which have been derived to provide a suitable protection limit for human health and well-being. Recently the standards and criteria have been reviewed and new standards will apply in 2025 from 0.1 to 0.075 parts per millions (ppm) and 262 to 196 micrograms per meter square ( $\mu\text{g}/\text{m}^3$ ) over a one-hour exposure period for  $\text{SO}_2$  (Table 7). The Licence Holder has applied both the current and future criteria to the assessment.

It's noted that the Department can only assess current and active assessment criteria and cannot implement future criteria but can take it into account to assist with decision making.

**Table 7: Adopted air quality assessment criteria**

Pollutant	Air quality assessment criteria		
	ppm	$\mu\text{g}/\text{m}^3$	Averaging Period
Sulfur dioxide ( $\text{SO}_2$ )	0.1	262	1-hour
	0.075 (from 2025)	196 (from 2025)	
	0.02	52	24-hour

Assessment criteria sourced from National Environmental Protection Council (2021)

### 3.3.4 Modelling

The CALMET/CALPUFF/WRF suit of models were used to predict the ground-level concentrations (GLCs) of  $\text{SO}_2$  relating to the closest receptor (Minara Homestead). Various parameters were used in order to construct the models including: land use, topographical data, meteorological model data, meteorology, temperature and wind speed and direction.

The CALPUFF model is an advanced non-steady-state puff model designed for assessments involving a high degree of spatial variability of the flow with the boundary layer (ETA 2022). It's noted by the department's internal technical experts that the dispersion models used in the assessment is considered appropriate and meets the requirements of DWER'S *Air Quality Modelling Guidance Notes*. Results and summaries derived from the models and predictions are presented in Section 3.3.5.

It is noted by the department's internal technical experts that ETA's air emission assessment report mentions that emission assumptions made are based on the "worst-case scenario" however it was observed that the  $\text{SO}_2$  emission rates used in the modelling assessment have been obtained using a mass balance method instead of the stack testing data which was available. Concentrations of 1.8 kg/t  $\text{H}_2\text{SO}_4$  were used for the existing SAP while previous testing results were measured at 1.9 kg/t  $\text{H}_2\text{SO}_4$ . It is observed that predicted GLCs are still to

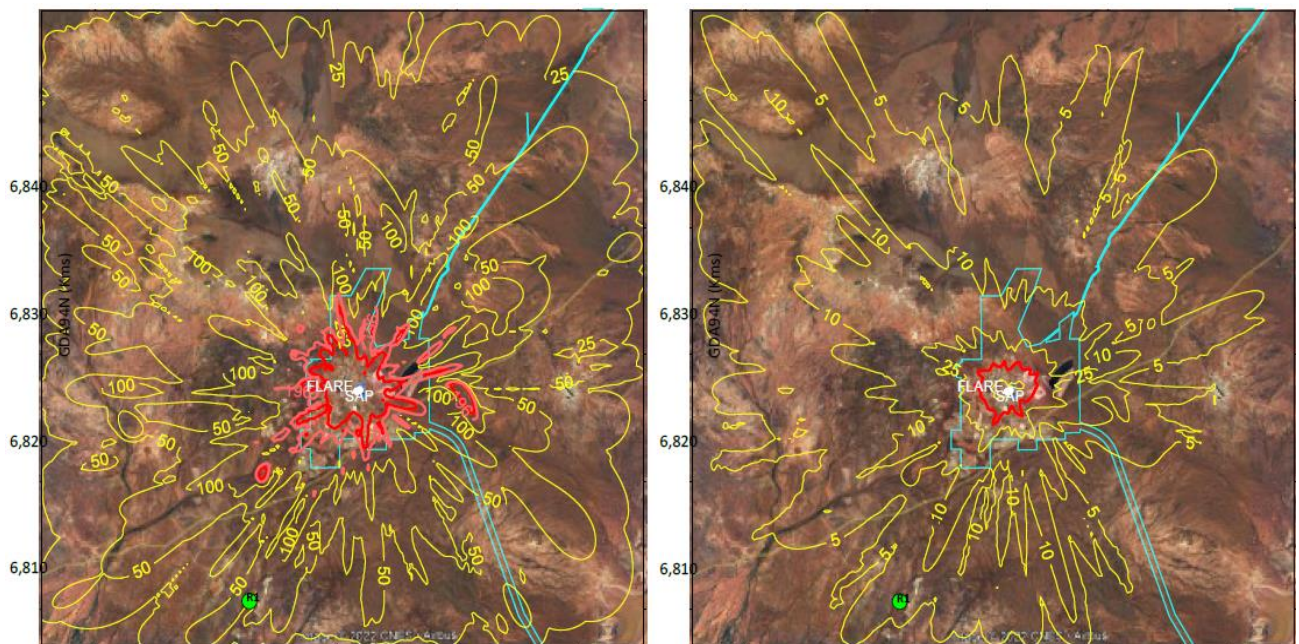
be expected to be below the NEPM criteria and does not change the outcome of this risk assessment.

### 3.3.5 Predicted SO<sub>2</sub> emissions under normal proposed operating conditions

Under the new proposed normal operations (non-cold start-up) ETA's air emission assessment concluded that:

- The 1-hour ground-level SO<sub>2</sub> concentration remained below the current and future assessment criteria for the Minara Homestead.
- The 24-hour ground-level SO<sub>2</sub> are predicted to increase but remain below the assessment criteria for the Minara Homestead.
- The predicted GLCs at Minara Homestead were reported below the adopted assessment criteria during the 1-hour exposure concentrations.
- Air Quality Guidelines were exceeded both within and offsite of the Prescribed Premises for the future NEPM criteria.
- Air Quality Guidelines were only exceeded within the Prescribed Premises for the current NEPM criteria.

See Figure 14.



**Figure 14: Predicted GLCs of SO<sub>2</sub> under proposed normal operation, for 1-hour exposure concentrations (left) and 24-hour exposure concentrations (right). Red and pink outline depicts exceedances for current and future guidelines (respectively) R1 presents location of Minara Homestead (ETA, 2022)**

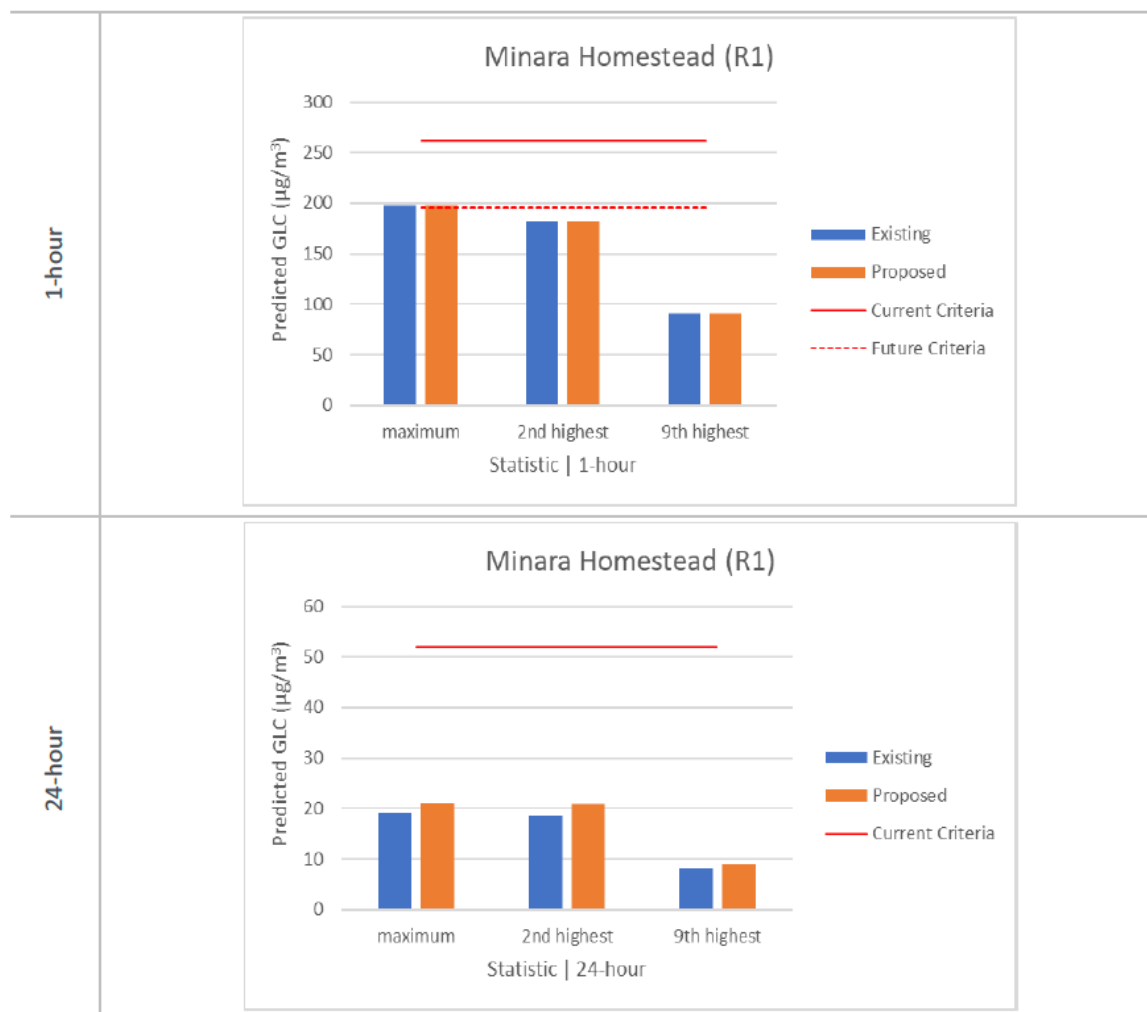
### 3.3.6 Predicted SO<sub>2</sub> emissions under cold start-up proposed operating conditions

In order to take into account the variable level of SO<sub>2</sub> emissions caused by different situations i.e. catalyst campaign date or cold startups the Air emission assessment by ETA (2022) modelled concentrations statics of different events. The highest, second highest and ninth highest monitoring recordings of previous cold startups were used in the assessment.

Predicted GLCs of SO<sub>2</sub> results during a cold start proposed scenario are presented in Figure

15. The main observations and summaries are relating to prediction cold start-ups are:

- At the maximum emission GLCs are predicted to be below the current 1-hour assessment criteria ( $262 \mu\text{g}/\text{m}^3$ ) and marginally above the future NEPM assessment criteria ( $196 \mu\text{g}/\text{m}^3$ ).
- At the second highest emission GLCs are predicted to be below both current and future NEPM assessment criteria.
- At the maximum emission GLCs are predicted to be below the 24-hour NEPM assessment criteria.



**Figure 15: Summary of predicted SO<sub>2</sub> concentrations ( $\mu\text{g}/\text{m}^3$ ) at Minara Homestead (R1) (ETA 2022).**

### 3.3.7 Licence Holder controls

The Licence Holder controls relating to the management of SO<sub>2</sub> emissions from the SAP involve quarterly monitoring of stack emission, monitoring of complaints from Minara Homestead and others and the utilisation of Minara Environmental Management Plan and Environmental Management System.

### 3.3.8 Technical review of Air emission assessment

Technical review of the updated air quality assessment carried out by ETA (2022) indicated

that:

- In general, the Licence Holder's modelling assessment meets the requirements of DWER's Air Quality Modelling Guidance Notes, however, there are some limitations with emissions estimation and the approach adopted for assessing upset (start-up) emissions.
- The SO<sub>2</sub> emission rates used in the modelling assessment have been obtained using a mass balance method, however project-specific data from stack emission testing are available. Stack testing data are generally preferred over the use of emission estimations for dispersion modelling.
- The proposed stack emission rate for SO<sub>2</sub> exceeds international guideline limits (USEPA and IFC Guidelines) of 2 kg/t H<sub>2</sub>SO<sub>4</sub>, and consequently appears to be well above good practice for SO<sub>2</sub> emission levels. Some consideration by the licence holder should be given to implementing tail gas treatment, especially with regard to start-up emissions.
- Start-up emission conditions (an infrequent event) were modelled using a full year's meteorology and the results have indicated potential exceedances. It is, however, not sufficient to then state that the modelling was conservative. In such cases, the licence holder should consider using a probabilistic approach to better quantify the risk of exceedances.
- The model results presented are:
  - The maximum predicted SO<sub>2</sub> concentrations at the nearest sensitive receptor do not exceed the current NEPM 1-hour and 24-hour criteria under normal operating conditions.
  - The maximum predicted SO<sub>2</sub> concentrations are 76% and 101% of the current and future (2025) NEPM 1-hour criteria respectively for start-up operating conditions, noting that start-up emissions were modelled as if they occur continuously.

As discussed above, based on DWER's understanding that start-up operations occur over a few hours several times per year, these results do not represent a significant risk at the closest sensitive receptor location.

## Recommendations

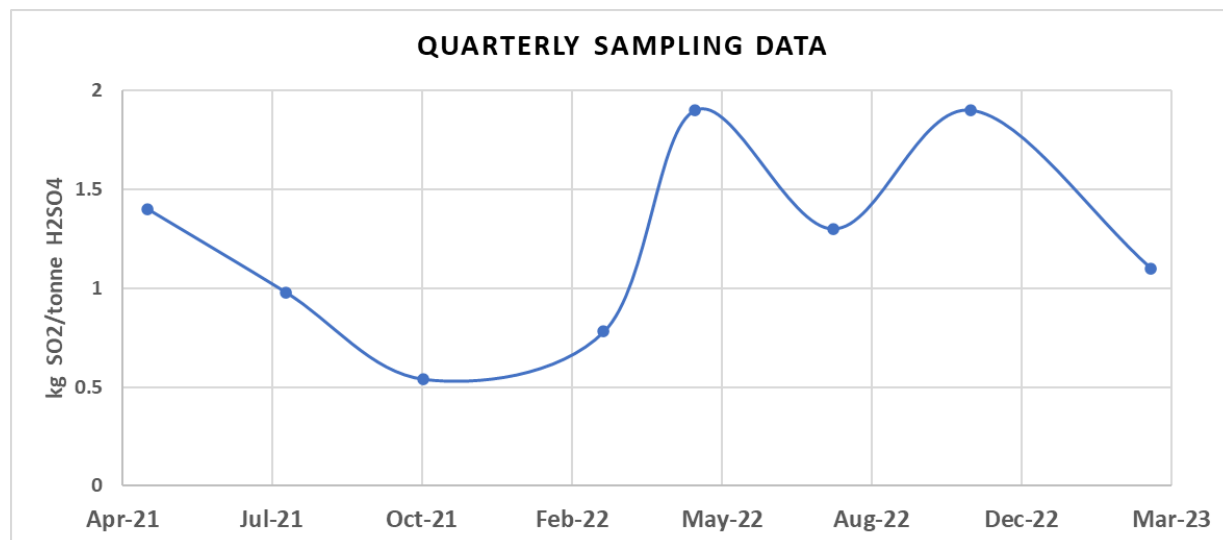
It is recommended that the licence holder is required to verify the emissions assumptions on an ongoing basis by providing catalyst performance data to complement stack testing data.

The licence holder states that the proposal to extend the period between the replacement of the catalyst used in the sulphuric acid manufacturing process will reduce the frequency of shutdowns and cold start-ups.

Based on a theoretical prediction of SO<sub>2</sub> emissions provided, it is anticipated by the licence holder that the SAP will operate at the higher emission output for short periods of time and SO<sub>2</sub> emissions would not exceed 2 kg/t H<sub>2</sub>SO<sub>4</sub> until approximately a year into the biennial catalyst campaign life, and that operation at the 3.9 kg SO<sub>2</sub>/t H<sub>2</sub>SO<sub>4</sub> limit will only occur in the final stages of the campaign, that is, from day 600 onwards. The theoretical emissions curve is reproduced in Figure 11.

However, analysis carried out by DWER, of SO<sub>2</sub> stack testing data for a similar period (two years of monitoring data measured as required by licence) indicates that the SAP SO<sub>2</sub> emission pattern is different from the theoretical emissions curve provided by the applicant (Figures 11 and Figure 15). For example, according to Figure 15, the SO<sub>2</sub> emission can rapidly vary from minimum to the highest levels (Licence limit) and vice versa. Therefore, DWER cannot verify whether theoretical predictions provided by the licence holder for SO<sub>2</sub> emissions is valid.

DWER understands that catalyst screening requires collecting samples for chemical analysis. Based on the activity of the catalyst measured and the stack emission levels of SO<sub>2</sub>, the length of time that the plant can continuously operate and the amount of catalyst which needs to be replaced in the next shut down can be estimated. It is recommended that catalyst screening information is provided to the department to verify the assumptions made and to inform future regulatory controls.



**Figure 15: SO<sub>2</sub> emissions based on two years monitoring data conducted as part of the Licence requirement.**

### 3.3.9 Consequence of Risk Event

It has been determined that SO<sub>2</sub> ground level concentrations at the Minara Homestead are likely to meet the existing NEPM air quality guidelines and therefore minimal - low level impacts to site amenity and public health are expected. Therefore, the Delegated Officer considers the consequence of this Risk Event to be 'Minor'.

### 3.3.10 Likelihood of Risk Event

The air quality assessment to address the increase of SO<sub>2</sub> emissions from 2.0 to 3.9 kg/tonne from the SAP would result in a minor exceedance of the future 2025 NEPM air quality guidelines approximately once per year for one hour at the Minara Homestead (ETA 2022). ETA notes that the predictions in the modelling report incorporated some conservatism and is expected that actual ground-level concentrations would be lower (than modelled) for the emission.

It is possible that the Minara Homestead will be exposed to SO<sub>2</sub> exceeding the future 2025 NEPM criteria at some point in time. It's noted that until the future air quality limits are in place there is next to no risk of the event occurring.

The Delegated Officer has determined that the likelihood of Minara Homestead being exposed to SO<sub>2</sub> exceeding the NEPM air quality guidelines could occur at some time and therefore the Delegated Officer considers the likelihood of this Risk Event to be 'Possible'.

### 3.3.11 Overall rating of increase of SO<sub>2</sub> emissions

The Delegated Officer has compared the consequence and likelihood ratings described above within the risk rating matrix (outlined within the department's Guideline: Risk Assessments 2017) and has determined that the overall rating for this risk event is 'Medium'

### 3.3.12 Regulatory controls

It has been determined that the limit for SO<sub>2</sub> can be amended from 2.0 to 3.9 kg/tonne of 100% acid or equivalent.

A requirement to include the collection of sampling data for the SAP catalyst screening under condition 3.1.3 has been added to the licence. Condition 4.2.2 has also been updated to require the Annual Environmental Report to include an assessment of the SO<sub>2</sub> monitoring data for the SAP plant and the sampling data for the catalyst screening to be undertaken against the assumptions made within the *Murrin Murrin Sulphuric Acid Plant – Air Quality Assessment, by Environmental Technologies & Analytics, August 2022.*

## 4. Consultation

Table 8 provides a summary of the consultation undertaken by the department.

**Table 8: Consultation**

Consultation method	Comments received	Department response
Department of Planning Lands and Heritage (DPLH), advised of proposal on 14 September 2023.	No comments received	N/A
Licence Holder was provided with draft amendment on 29 November 2023	MMO has requested for the North and South Cell TSF (paddock TSF) to remain as an authorised discharge point for tailings and decant for emergency situations.  MMO has proposed that whenever discharge occurs to the paddock TSF MMO will continue to monitor groundwater surround the paddock TSF on a quarterly basis for two annual periods.	Approved, the Department has added Condition 3.5.2 and amended Table 3.5.1 to the Licence to require quarterly monitoring if discharge occurs at the Paddock TSF.
	MMO requested to retain a note in Table 2.2.2 stating 'The SO <sub>2</sub> limits do not apply during cold acid plant startups or shutdowns.' MMO has advised that the conversion efficiency of the acid plant is lower during start up and shutdown and the limits cannot be complied with during the infrequent, short duration events.	The Department has reinstated the note to allow SO <sub>2</sub> limits to not be imposed during cold start ups and shut downs.
	MMO has advised that it is not the catalyst that reduces in efficient resulting in additional SO <sub>2</sub> emissions but instead the conversion efficiency of the acid plant drops.	Amended statement within the amendment report

## 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 9 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 9: Summary of licence amendments**

Condition no.	Proposed amendments
Front page	Category 6: Mine dewatering assessed production / design capacity changed from 182,500 tonnes to 700,000 tonnes per year.
Instrument Log	Added works approval number into last amendment granted on 31 January 2023 to allow transparency between works approvals and the licence.
	Added summary of this licence amendment
1.3.2	Added an additional discharge point (T3) to the 17 series in-Pit TSF.
1.3.2	Amended Table 1.3.1 that discharge to North and South cells is only permitted in an emergency situation.
1.3.13	Removed discharge pits 2402, 2502 and 2704 from Table 1.3.6 and inserted pits 2407 and 2503.
1.3.14	Corrected out crest heights and estimated volumes for pits 18/3 and 18/6.
2.2.2	Amended emission limit to air for SO <sub>2</sub> at emission point A6 from 2.0 to 3.9 kg/tonne of 100% acid or equivalent.
3.1.2	Inserted monitoring condition relating to biannual periods.
3.1.3	Included condition to collect data for the Sulfuric Acid Plant catalyst screening.
3.5.1	Tailings dam monitoring wells (TDMB series) has been split so that monitoring wells surrounding the evaporation ponds are monitored quarterly and the tailings dam wells are monitored biannually.
	Removed IP904-2 from Table 3.5.1.
3.5.2	Added condition requiring the Licence Holder to conduct quarterly groundwater monitoring for two annual periods surrounding the paddock TSF if authorised discharge occurs.
4.2.2	Condition added to include an assessment of the data contained within the Annual Environmental Report with the assumptions made within the <i>Murrin Murrin Sulphuric Acid Plant – Air Assessment</i> .
Figure 23	Updated location of landfill figure.
Figure 24	Updated figure to include stage 2 infrastructure and discharge location.
Throughout licence	Correction of general format and typographical errors.



## References

1. Department of Climate Change, Energy, the Environment and Water (DCCEEW), Substance fact sheets: Sulfur dioxide, sourced from <https://www.dcceew.gov.au/environment/protection/mpi/substances/fact-sheets/sulfur-dioxide> on November 2023.
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
5. Environmental Technologies & Analytics (ETA) 2022, Murrin Murrin Sulphuric Acid Plant, Air Quality Assessment.
6. Minara Resources 2008, Murrin Murrin tailings storage facility seepage mitigation project. Letter dated 24 April 2008.
7. DWER 2023, Geocortex, searches completed in July 2023.
8. Minara Resources 2023a, L7276/1996/12 License Amendment Supporting Document, Version: 5.1.
9. Minara Resources 2023b, Murrin Murrin Nickel Cobalt Project, Annual Environmental Report 2022/2023.
10. Minara Resources 2023c, Murrin Murrin Nickel Cobalt Project, Quarterly Report 2023 standing water levels and tailings storage facility seepage mitigation project.

## Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY				
Application type				
Works approval	<input type="checkbox"/>			
Licence	<input type="checkbox"/>	Relevant works approval number:		None <input type="checkbox"/>
		Has the works approval been complied with?		Yes <input type="checkbox"/> No <input type="checkbox"/>
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?		Yes <input type="checkbox"/> No <input type="checkbox"/>
		Date Report received:		
Renewal	<input type="checkbox"/>	Current licence number:		
Amendment to works approval	<input type="checkbox"/>	Current works approval number:		
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L7276/1996/12	
		Relevant works approval number:	N/A	<input type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:		None <input type="checkbox"/>
Date application received		12 July 2023		
Applicant and Premises details				
Applicant name/s (full legal name/s)		Murrin Murrin Operations Pty Ltd		
Premises name		Murrin Murrin Nickel Cobalt Project		
Premises location		Premises is located on the following tenements; L39/62, L39/81, L39/83, L39/136, L39/168, M39/299, M39/300, M39/301, M39/314, M39/322, M39/342, M39/343, M39/421, M39/422, M39/423, M39/424, M39/435, M39/436, M39/446, M39/553, M39/562, M39/637, M39/651, M39/686, M39/692, M39/714, M39/715, M39/716, M39/737 and M39/820		
Local Government Authority		Shire of Laverton and Shire of Leonora		
Application documents				

Licence: L7276/1996/12

HPCM file reference number:	DWERDT806993, DWERDT806992 and DWERDT806988
Key application documents (additional to application form):	L7276/1996/12 Licence Amendment Supporting Document 17 Series In-Pit Tailings Storage – Stage 2 Commissioning Report Acid Plant Campaign Emissions Overview Murrin Murrin Sulphuric Acid Plant – Air Quality Assessment Murrin Murrin SO <sub>2</sub> Dispersion Modelling (ETA 2022)
<b>Scope of application/assessment</b>	
Summary of proposed activities or changes to existing operations.	<p><u>Licence amendment</u></p> <p>The applicant is applying for a license amendment under the EP Act to alter conditions related to three (3) categories of L7276/1996/12. Typographical amendments are sought after and amendments relating to the prescribed activities are presented below:</p> <p><u>Category 5</u></p> <ul style="list-style-type: none"> <li>• Incorporation of constructed infrastructure relating to stage 2 of the 17 Series in-pit TSF into license from W6526/2021/1.</li> <li>• The removal of monitoring locations, and frequency.</li> <li>• The removal of monitoring frequency of groundwater surrounding the paddock TSF.</li> </ul> <p><u>Category 6</u></p> <ul style="list-style-type: none"> <li>• Increase the mine dewatering limit from 182 500 tonnes per year to 700 000 tonnes per year; and</li> <li>• The addition of two pits as dewater discharge locations.</li> </ul> <p><u>Category 31</u></p> <ul style="list-style-type: none"> <li>• An increase to the pre-existing condition SO<sub>2</sub> emission rate from 2.0 to 3.9 kg/tonne of 100% acid. <ul style="list-style-type: none"> <li>○ The increase emission rate is due to the applicant maintaining the use of the catalyst at the tail end if its life dropping its efficiency from 99.7% to 99.35% resulting in additional SO<sub>2</sub> emissions.</li> </ul> </li> </ul>

**Category number/s (activities that cause the premises to become prescribed premises)**

**Table 1: Prescribed premises categories**

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity
<b>Category 5:</b> Processing or beneficiation of metallic or non-metallic ore	5 000 000 tonnes per annual period	
<b>Category 6:</b> Mine dewatering	182 500 tonnes per year	Increase mine dewatering limit to 700 000 tonnes per year
<b>Category 12:</b> Screening etc. of material	1 500 000 tonnes per annual period	
<b>Category 31:</b> Chemical manufacturing	1 718 100 tonnes per annual period	
<b>Category 44:</b> Metal smelting or refining	55 000 tonnes per annual period	
<b>Category 52:</b> Electric power generation	87.5 MW in aggregate	
<b>Category 54:</b> Sewage facility	300 m <sup>3</sup> per day	
<b>Category 57:</b> Used tyre storage (general)	500 tyres stored at any one time	
<b>Category 63:</b> Class I inert landfill site	Combined maximum limit of 7 000 tonnes per annual period	
<b>Category 64:</b> Class II or III putrescible landfill site		

**Legislative context and other approvals**

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input checked="" type="checkbox"/> Assessed under Part IV <input type="checkbox"/> Ministerial statement 444 and 506 approved the implementation of the proposal.
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Ministerial statement No: <b>MS 444 MS 506</b> EPA Report No:

<p>Has the proposal been referred and/or assessed under the EPBC Act?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Reference No:</p>
<p>Has the applicant demonstrated occupancy (proof of occupier status)?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Mining lease / tenement <input checked="" type="checkbox"/> Expiry:</p> <p><u>17 Series in-pit TSF</u> M39/343 – 9/06/2039 M39/342 – 9/06/2039 M39/553 – 16/09/2041</p> <p><u>Monitoring well IP904-2</u> M39/421 – 25/07/2038</p> <p><u>Murrin Murrin Paddock TSF</u> L39/136 – 1/03/2026 M39/300 – 23/11/2035 M39/301 – 23/11/2035 M39/435 – 2/06/2039 M39/436 – 2/06/2039</p> <p><u>Discharge Pit 2407</u> L39/136 – 1/03/2026 M39/314 – 11/12/2036 M39/322 – 30/01/2037</p> <p><u>Discharge Pit 2503</u> M39/314 – 11/12/2036 M39/562 – 9/09/2041</p> <p><u>SO<sub>2</sub> emission rate from sulphuric acid plant stack</u> M39/301 – 23/11/2035 M39/421 – 25/7/2038</p>
<p>Has the applicant obtained all relevant planning approvals?</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/></p>	<p>Approval: N/A Expiry date: N/A If N/A explain why? Amendment does not include any new construction of infrastructure and all amendments is located on tenements held by the licence holder.</p>

Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Application reference No: N/A Licence/permit No: GWL98841(4) Annual water entitlement: 1 000 000kL.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Regional office: N/A
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: N/A Are the proposed activities/landuse compatible with the PDWSA (refer to <a href="#">WQPN 25</a> )? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Note: (P1) Laverton Water Resrve and Catchment Area located approximately 8km east of the northeastern premises. (P1) Leonora Water Reserve located approximately 35kms west of the western most portion of the prescribed premises.
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004</i> , <i>Environmental Protection (Controlled Waste) Regulations 2004</i> , <i>State</i>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<i>Mining Act 1978</i> <i>Dangerous Goods Safety Act</i> <i>Environmental Protection (Controlled Waste)</i>

<i>Agreement Act xxxx)</i>		<i>Regulations 2004</i>
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Classification: N/A Date of classification: N/A