



## Application for Works Approval

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

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<b>Works Approval Number</b>	W6526/2021/1
<b>Applicant</b>	Murrin Murrin Operations Pty Ltd
<b>ACN</b>	060 717 505
<b>File Number</b>	DER2021/000132
<b>Premises</b>	Murrin Murrin North Murrin Murrin Nickel Cobalt Project  Legal description - Mining tenements M39/342, M39/343, M39/553, M39/424, M39/421 Shire of Leonora and Shire of Laverton
<b>Date of Report</b>	26 July 2021
<b>Decision</b>	Works approval granted

#### **A/MANAGER RESOURCE INDUSTRIES REGULATORY SERVICES**

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

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## 1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the premises. As a result of this assessment, works approval W6526/2021/1 has been granted.

## 2. Scope of assessment

### 2.1 Regulatory framework

In completing the assessment documented in this decision 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 and overview of premises

On 11 March 2021, Murrin Murrin Operations Pty Ltd (applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to category 5, in particular the conversion of open mine pits into in-pit tailing storage facilities (TSFs) at the Murrin Murrin North area of current operations (premises). The premises is approximately 50 km east of Leonora, WA.

The premises relates to the category and assessed production/design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6526/2021/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6526/2021/1.

#### 2.2.1 Category 5

The applicant proposes following works at the premises (Figure 1, Figure 2):

- Conversion of six existing pits (1701, 1702, 1706, 1707, 1708, 1753) into in-pit TSF
- Tailings, decant water pipeline, scour sump, associated infrastructure, and groundwater monitoring bores

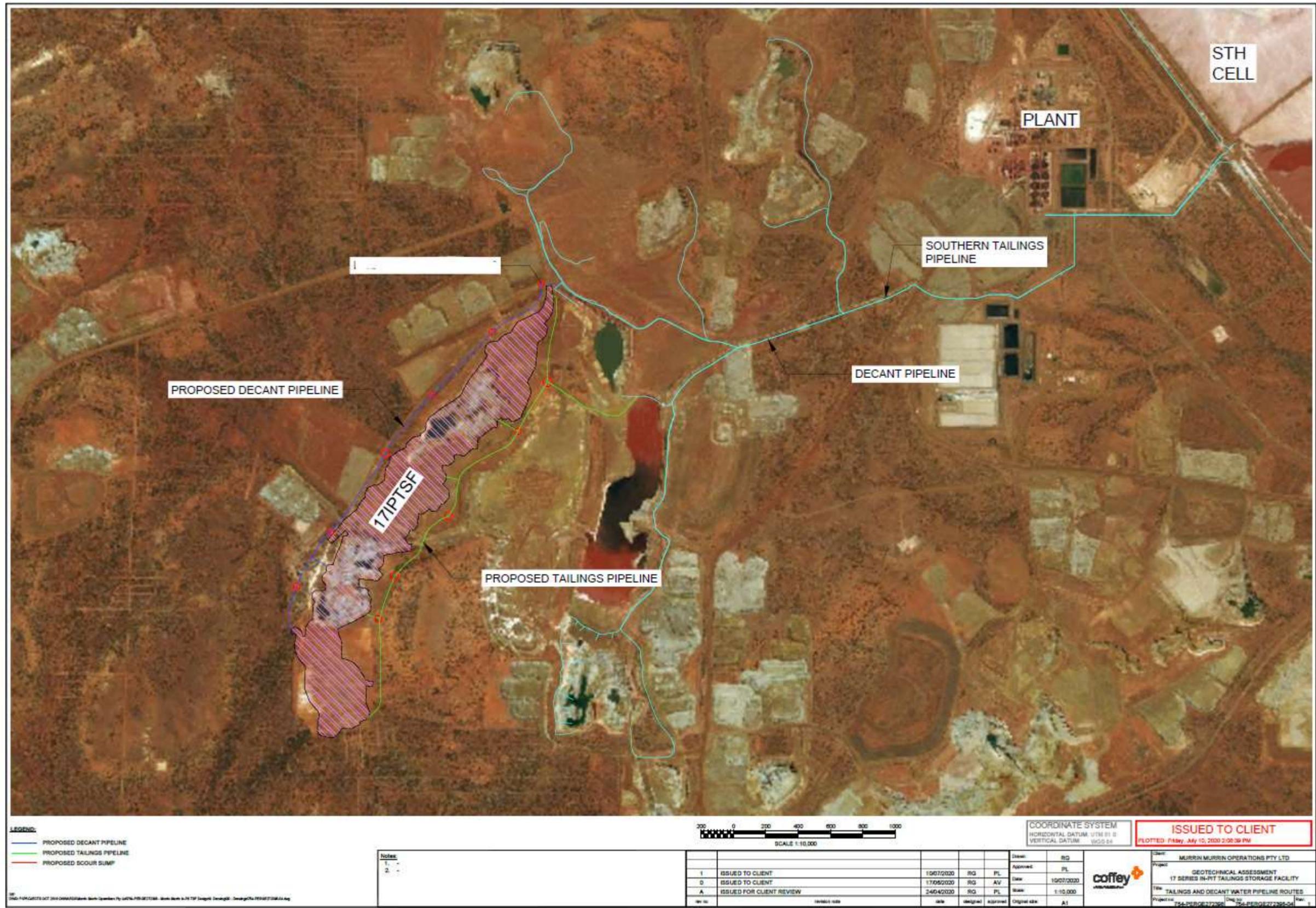


Figure 1 Location of proposed pipelines and related infrastructure

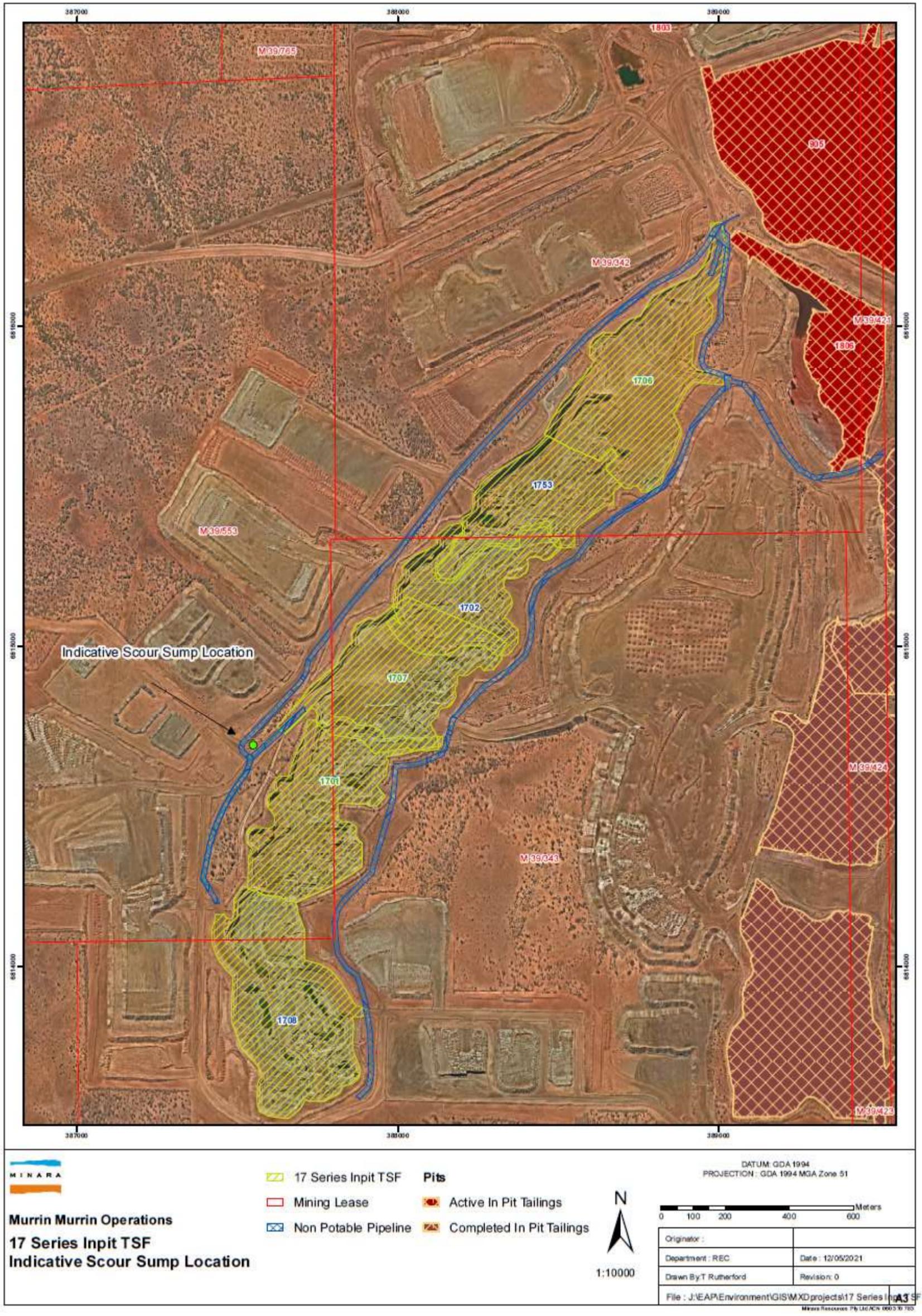


Figure 2 Proposed in-pit TSF and scour sump location

### 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 *Guidance Statement: Risk Assessments* (DER 2017).

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 construction and operation which have been considered in this decision report are detailed in Table 1 below. Table 1 also details the proposed control measures the applicant has proposed to assist in controlling these emissions, where necessary.

**Table 1: Proposed applicant controls**

Emission	Sources	Potential pathways	Proposed controls
<b>Construction</b>			
Dust	Construction works of sumps, pipes and other infrastructure, vehicle movement	Air/windborne pathway	<ul style="list-style-type: none"> <li>Dust suppression as required</li> <li>Vehicle speed limits</li> </ul>
Noise			N/A
<b>Operation</b>			
Tailings	Deposition of tailings into in-pit TSFs	Direct infiltration of tailings seepage	<ul style="list-style-type: none"> <li>Low hydraulic conductivity and pits confined within the weathered area with estimated hydraulic conductivity of <math>2 \times 10^{-8}</math> m/s</li> <li>Depressed groundwater levels (from previous dewatering activities) reduce risk of mounding</li> <li>Water recovery managed to prevent impact on vegetation in the event of mounding</li> <li>Groundwater monitoring and standing water levels in proximity of in-pit TSF &gt; 4 m</li> <li>Decant recovery to manage seepage</li> <li>Four sets of multiple spigots at different positions along the pit to assist water recovery</li> <li>Rotational deposition of tailings into in-pit TSFs to allow tailings to desiccate to reduce seepage</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
		Overtopping of in-pit TSFs	<ul style="list-style-type: none"> <li>Minimum operational freeboard of 300 mm (total freeboard of 500 mm) maintained</li> </ul>
	Pipeline breaks or leakages		<ul style="list-style-type: none"> <li>Tailings delivery and decant return pipeline within bunded corridor</li> <li>Flow monitors with telemetry reporting to control room installed for leak detection</li> <li>Scour sump at low point capturing and preventing tailings overflow out of the bund in event of pipe bursting</li> <li>Daily pipeline inspections in accordance with existing licence L7276/1996/12</li> </ul>

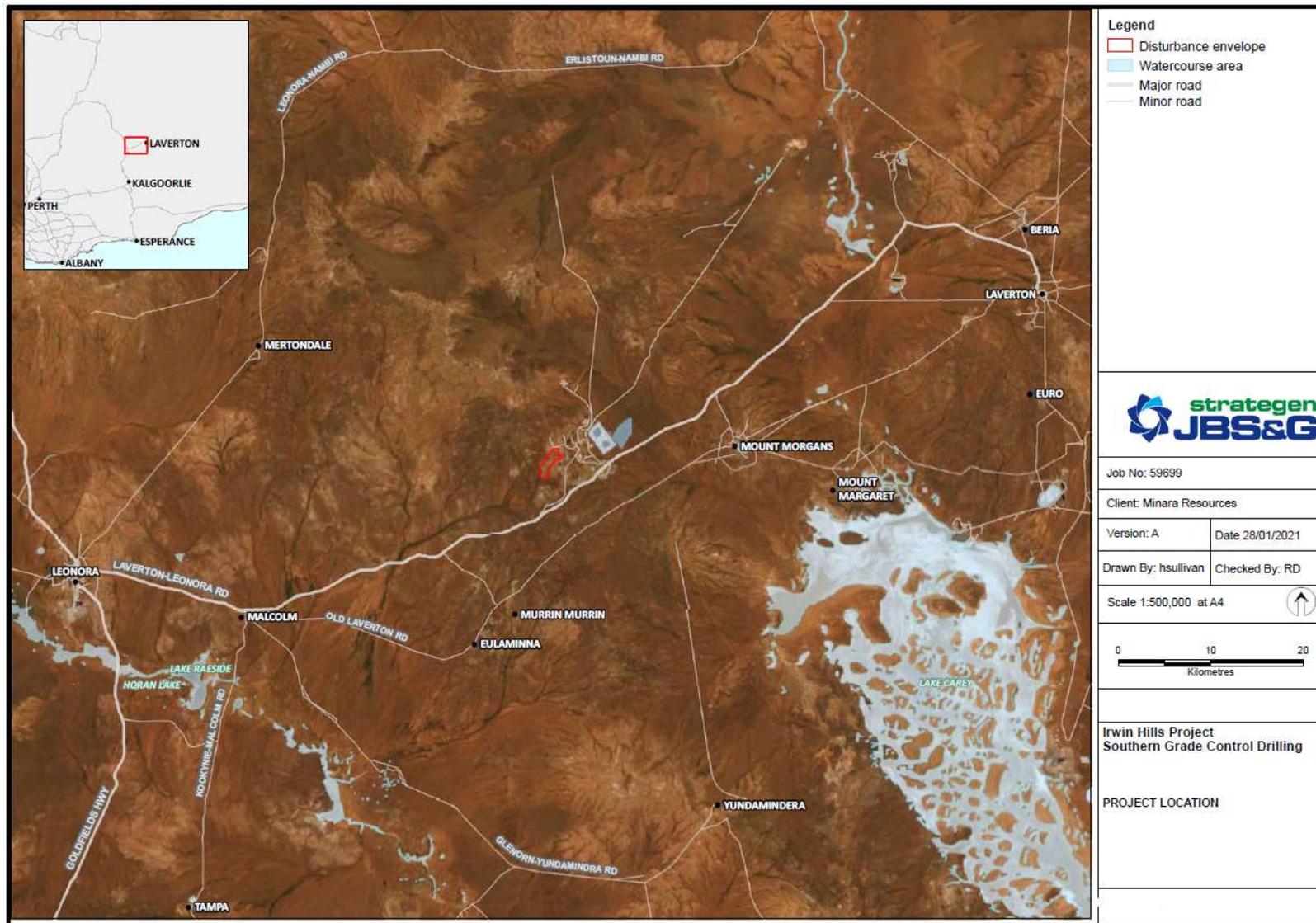
### 3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the applicant's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2 and Figure 3 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 (*Guidance Statement: Environmental Siting* (DER 2016)).

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

Human receptors	Distance from prescribed activity
Town of Leonora	50 km west of premises  The Delegated Officer considers it unlikely a risk event for dust or noise emissions will occur as a source pathway receptor linkage does not exist based on the distance from proposed activities. Therefore, this receptor is not further considered in the risk assessment below.
Environmental receptors	Distance from prescribed activity
Groundwater	RIWI proclaimed groundwater area.  Premises located within Goldfields Groundwater area
Surrounding vegetation	Priority flora within the area of proposed works: <ul style="list-style-type: none"> <li><i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i> (Priority 3)</li> <li><i>Hemigenia exilis</i> (Priority 4)</li> <li><i>Acacia websteri</i> (Priority 1)</li> <li><i>Hibiscus krichauffianus</i> (Priority 3)</li> </ul>



**Figure 3 Distance to sensitive receptors**

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## 3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant 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 applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

Works Approval W6526/2021/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued Works Approval, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. deposition into in-pit TSFs. A risk assessment for the operational phase has been included in this Decision Report, however licence conditions will not be finalised until the department assesses the licence application.

**Table 3: Risk assessment of potential emissions and discharges from the premises during construction and operation**

Risk Event					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<i>Operation (including time-limited-operations operations)</i>								
Deposition of tailings into in-pit TSFs	Tailings and process water	Tailings seepage resulting in direct subsurface infiltration and impacting groundwater quality and resulting in mounding and impacting vegetation	Groundwater, surrounding vegetation	Refer to Section 3.1.1	C = Moderate L = Likely <b>High Risk</b>	N	<b>Condition 15, 16</b> Condition 1, 4, 9	Refer to section 3.3
		Overtopping of in-pit TSFs resulting in direct infiltration of tailings subsurface and impacting groundwater quality and vegetation		Refer to Section 3.1.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Condition 9	N/A
		Pipeline breaks or leakages resulting in tailings infiltrating subsurface impacting groundwater quality and vegetation		Refer to Section 3.1.1	C = Minor L = Unlikely <b>Medium Risk</b>	Y	Condition 1, 4, 9	N/A

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

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

### 3.3 Detailed risk assessment for seepage into groundwater from in-pit TSF

Mining from the existing 17 series pits has been completed and the pits are now proposed to be converted into in-pit TSFs, which will receive approximately 15 Mt of tailings resulting from the extraction of nickel and cobalt from the ore. The pits to be converted are confined within the weathered (saprolite unit) which has an estimated hydraulic conductivity of  $2 \times 10^{-8}$  m/s.

Current operations involve deposition of tailings into an above ground TSF as well as several in-pit TSFs (MM8/5-9/4; MM8/4 and MM18/6) which are located immediately east of the proposed new in-pit TSFs.

#### 3.3.1 Tailings seepage characterisation

The tailings are of clayey silt nature and are described as hypersaline (TDS approximately 180,000 mg/L), with a pH of 2.3 and elevated concentrations of Fe, Mg, Mn and Ni. No sulphide material is present in the tailings, reducing the risk of acidic drainage from the tailings.

According to the Hydrogeological Assessment provided in support of the application, the bases of the pits are predominantly bound by saprolite which is high in magnesium (12- 13%) and silica (20 %).

#### 3.3.2 Potential impacts on groundwater and vegetation

The bases of the proposed in-pit TSFs consist of the following layers:

- saprolite
- clay rich ore zone
- ferruginous zone
- plastic clays with reduced iron content

It is suggested that mining in the in-pit TSFs does not extend below the saprolite unit, which has an estimated hydraulic conductivity of  $2 \times 10^{-8}$  m/s. A major structural feature in the form of a striking fault zone is identified in the proposed in-pit TSF 1702, which is proposed to be a likely pathway for seepage migration.

Monitoring bores in proximity of the existing in-pit TSFs (MM8/5-9/4; MM8/4 and MM18/6), indicate low to moderate hydraulic conductivities at most locations, with some indication of anisotropic groundwater movement through the heterogeneous weathering profile. Groundwater shows increased salinity, likely the result of seepage migration through pathways of higher hydraulic conductivity. Monitoring from existing groundwater bores at the premises, indicates pH between 6 and 8.5 (more acidic on the eastern side of existing in-pit TSFs), with high dissolved magnesium. The current operating licence L7276/1996/12 for the premises sets out standing water level limits of  $> 4$  mbgl for existing in-pit TSFs. The most recent Annual Environmental Report (Minara Resources, 2020) indicates no exceedances of this limit during the reporting period.

Deposition of tailings into the 6 in-pit TSFs is expected to result in some seepage and groundwater mounding. Monitoring bores in the proximity of the new in-pit TSFs are constructed to track potential impacts.

#### 3.3.3 Applicant controls

According to hydrogeological investigations provided in supporting documents, the premises area shows relatively low hydraulic conductivity and movement of seepage to be restricted to discrete hydraulic pathways within the footprint of the premises. Multiple groundwater monitoring bores have been installed in the proximity of the proposed in-pit TSFs (Figure 4) in

order to track potential seepage impacts. As a contingency plan, the applicant proposes the conversion of groundwater monitoring bores into seepage recovery bores, if seepage occurs and the standing water level limit is exceeded.

Additionally, groundwater levels are currently somewhat depressed, due to mining and water harvesting activities, and groundwater mounding is not expected to occur until groundwater reaches pre-mining levels. Deposition of tailings is proposed to be rotational, to allow extended periods of desiccation in order to reduce seepage.

### 3.3.4 Rating of this risk event

The Delegated Officer considers the consequence of seepage occurring, resulting in groundwater mounding and impacting priority flora within the area of proposed works, as **Moderate**.

Considering that ongoing tailings deposition into currently operating in-pit TSFs at the site has resulted in groundwater mounding, and it also is proposed to occur from the 17 series in-pit TSFs, the likelihood is **Likely**.

The Delegated Officer has compared the consequence and likelihood of this risk event and determined the overall rating is **High**. Based on this rating, the risk event is subject to multiple regulatory controls.

### 3.3.5 Regulatory controls

The suggested low hydraulic conductivity in the relevant area and containment of seepage within prescribed premises boundary requires confirmation via groundwater monitoring. Baseline monitoring of groundwater conditions is required to be undertaken prior deposition of tailings, to get an understanding of current groundwater quality, standing water levels and to allow future detection of potential impacts.

Standing water level limits are required to be complied with, to ensure no adverse impacts on surrounding vegetation. Standing water level limits of > 4 mbgl and monitoring of relevant parameters will be conditioned on the instrument.

The risk will be further assessed and additional controls considered as part of the licence amendment following this works approval. This could include the construction of seepage recovery bores to manage the occurring groundwater mounding.

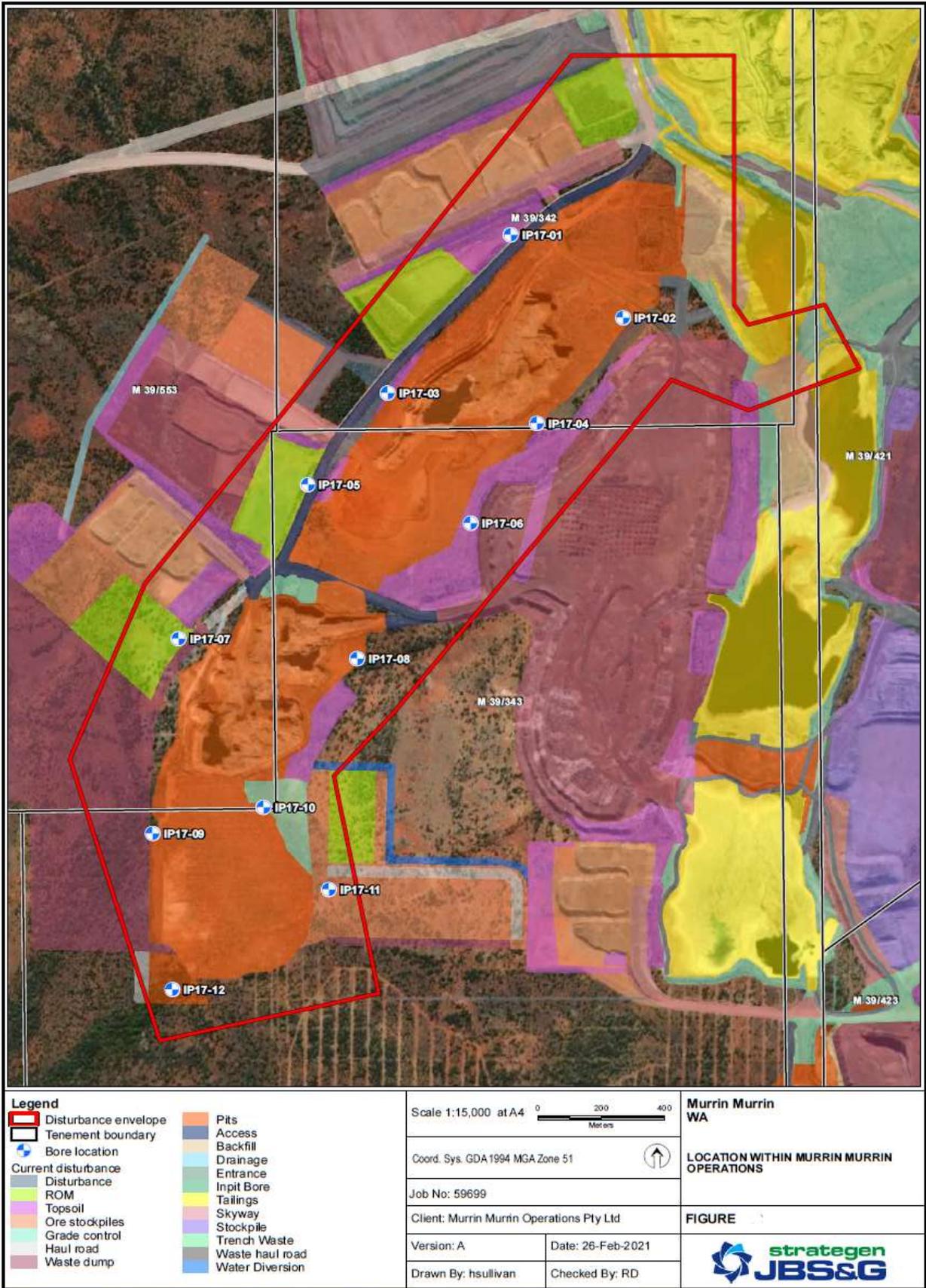


Figure 4 Groundwater monitoring bore locations

## 4. Consultation

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

**Table 4: Consultation**

Consultation method	Comments received	Department response
Application advertised on the department's website (5/05/2021)	None received	N/A
Shire of Leonora advised of proposal (5/05/2021)	None received	N/A
Shire of Laverton advised of proposal (5/05/2021)	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal (5/05/2021)	None received	N/A
Department of Planning, Lands and Heritage advised of proposal (5/05/2021)	None received	N/A
Applicant was provided with draft documents on (25/06/21)	Refer to Appendix 1	Refer to Appendix 1

## 5. Conclusion

Based on the assessment in this decision report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

## References

1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Murrin Murrin Operations Pty Ltd, Works approval application (2021)

## Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Condition 1	Condition does not read correctly, MMO suggest the following wording: 'The works approval holder must construct and/or install the infrastructure and/or equipment in accordance with the corresponding design and construction/installation requirements and at the corresponding infrastructure location as set out in Table 1.'	Condition 1 is a standard condition used by the department across all instruments, and wording can therefore not be altered.
Decision report, section 2.2.1 and 3.3	Clarification that the 17 series pits are converted into one in-pit TSF.	Noted and clarified in text.
Decision report, section 3.1.1 (Table 1)	Correction and confirmation that standing water levels are greater than (>) 4 m below ground level, rather than <i>less than</i> (<) 4 m below ground level.	Corrected to > 4 m in Table 1.
Decision report, 3.1.1 (Table 1)	Correction that the licence is now L7276/1996/12.	Corrected throughout document to reflect correct licence number L7276/1996/44412

## Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY		
<b>Application type</b>		
Works approval	<input checked="" type="checkbox"/>	Current instruments: L7276/1996/12; W6365
Date application received	11/3/21	
<b>Applicant and Premises details</b>		
Applicant name/s (full legal name/s)	Murrin Murrin Operations Pty Ltd	
Premises name	Murrin Murrin North	
Premises location	Mining tenements: M39/342, M39/343, M39/553, M39/424, M39/421	
Local Government Authority	Shire of Leonora and Shire of Laverton	
<b>Application documents</b>		
HPCM file reference number:	DER2021/000132	
Key application documents (additional to application form):	<ul style="list-style-type: none"> <li>• Application form</li> <li>• Geotechnical assessment</li> <li>• Hydrogeological assessment &amp; figures</li> <li>• TSF Capping modelling</li> <li>• Supporting document</li> </ul>	
<b>Scope of application/assessment</b>		
Summary of proposed activities or changes to existing operations.	<p><b>Works approval</b></p> <ul style="list-style-type: none"> <li>• Conversion of existing open pits into in-pit TSFs (pits: 1701, 1702, 1706, 1707, 1708, 1753)</li> <li>• Construction of bunded tailings and decant water pipelines                             <ul style="list-style-type: none"> <li>○ Extension of existing tailings delivery (4.47 km) and decant water return (3.2 km) pipeline</li> <li>○ Pipeline corridor approx. 6 m wide</li> </ul> </li> <li>• Construction of associated infrastructure: bunding, scour sump)                             <ul style="list-style-type: none"> <li>○ Scour sump approx. 290 m<sup>3</sup></li> </ul> </li> </ul>	
<b>Category number/s (activities that cause the premises to become prescribed premises)</b>		
<b>Table 1: Prescribed premises categories</b>		
<b>Prescribed premises category and description</b>	<b>Proposed production or design capacity</b>	
<i>Category 5: Processing or beneficiation of metallic or non-metallic ore</i>	Maximum 5 Mtpa Actual proposed 4.5 Mtpa	
<b>Legislative context and other approvals</b>		
Has the applicant referred, or do they intend to refer, their proposal to the	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

EPA under Part IV of the EP Act as a significant 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: 418, 444, 445, 506
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Mining lease / tenement <input checked="" type="checkbox"/> Expiry: M39/342- 9/6/2039 M39/343- 9/6/2039 M39/421- 25/7/2038 M39/424- 6/9/2041 M39/553- 16/9/2041
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date: If N/A explain why?
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"/>	Clearing proposed: 0.6 ha Undertaken under exemption of clause 2(2) of Schedule 1 allowing up to 10 ha per financial year ( <i>Mining Act 1978</i> )
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"/>	N/A
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
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"/>	N/A

<p>Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>N/A</p>
<p>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 Agreement Act xxxx</i>)</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p><i>Aboriginal Heritage Act 1972</i>- approvals for relevant sites from current operations obtained</p> <p>Native Title Act 1993- Murrin Murrin Aboriginal and Environmental Liaison Committee (MMAELC) meets regularly and applicant will engage community regarding this proposal</p>
<p>Is the Premises within an Environmental Protection Policy (EPP) Area?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises subject to any EPP requirements?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>N/A</p>