



Application for Licence Amendment

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

Licence Number	L8577/2011/2
Licence Holder	Mincor Operations Pty Ltd
ACN	35 094 977 321
File Number	2012/006881-1
Premises	Miitel & Mariners Mines Norseman-Coolgardie Highway WIDGIEMOOLTHA WA 6443 Legal description – Mining Tenements M15/83, M15/85, M15/91, M15/92, M15/93, M15/543, M15/667, M15/668 and L15/243 As defined by the Premises map attached to the Revised Licence
Date of Report	27 April 2022
Decision	Revised licence granted

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REGULATORY SERVICES

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

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1. Decision summary

L8577/2011/2 is held by Mincor Operations Pty Ltd (Licence Holder) for the Miitel & Mariners Mines (the Premises), located at Mining Tenements M15/83, M15/85, M15/91, M15/92, M15/93, M15/543, M15/667, M15/668 and L15/243 in Widgiemooltha.

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 L8577/2011/2 has been granted.

The Revised Licence issued as a result of this amendment consolidates and supersedes the existing Licence previously granted in relation to the Premises. The Revised Licence has been granted in a new format with existing conditions being transferred, but not reassessed, to the new format.

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 Amendment Summary

On 8 February 2021, the Licence Holder submitted an application to the department to amend Licence L8577/2011/2 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Category 6 - Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.

This amendment is limited only to addition of Category 6 activities to the Existing Licence. No changes to the aspects of the existing Licence relating to Category 85 and 89 have been requested by the Licence Holder.

Table 1 below outlines the proposed changes to the existing Licence

Table 1: Proposed design changes

Category	Current design capacity	Assessed production capacity	Description of proposed amendment
6	N/A addition of a new category	3 million tonnes/year	The proposed initial dewatering amount is 2.1 million tonnes/year and thereafter, approximately 790,000 tonnes annually.

2.3 Proposed Activities

Mincor Operations Pty Ltd is seeking approval to include Category 6 Mine dewatering activities to their existing licence L8577/2011/2 as they are re-establishing production of high-grade nickel at Miitel mine as a part of 5-years Integrated Operating Plan (Kambalda Nickel Operations) identified in a Definitive Feasibility Study (DFS). No mining activities are proposed at the Mariners mining operation. The life of mine is estimated at 2.5 years.

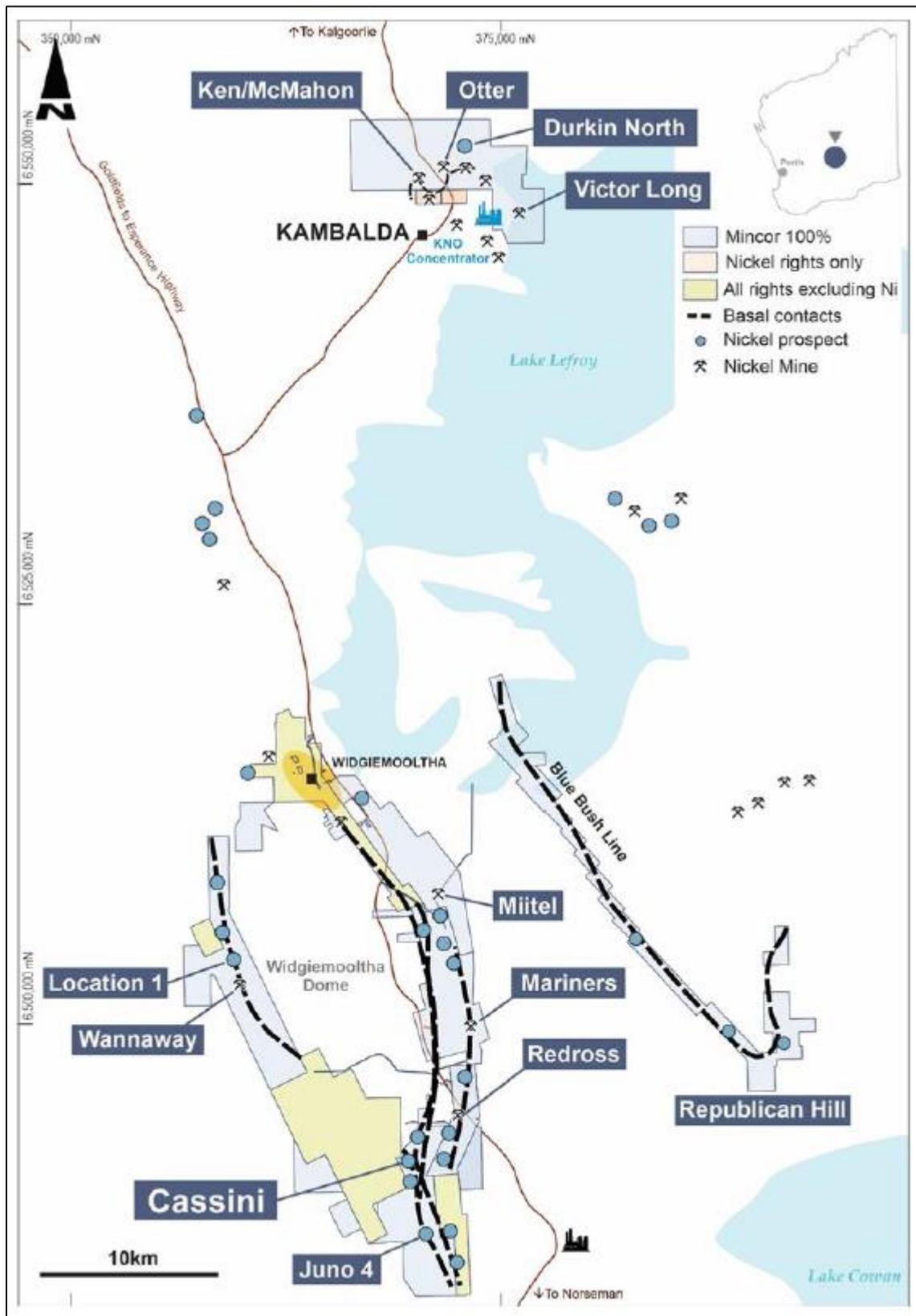


Figure 1: Location of Mines within Kambalda Nickel Operations

Miitel mine was operated until 2016 and then placed on to care and maintenance phase. Most of the underground infrastructure were removed from the mine prior to care and maintenance and allowed to flood. It has taken approximately 34 months to flood to the portal location. The licence holder now plans to dewater and re-enter to the mine to develop and resume production. As the water level decrease, rehabilitation of the existing portal will be occurred and utilised to enter the mine. Any possible remaining infrastructure will be utilised.

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The water table of the area is located above the mining operation, as such an ongoing dewatering will be needed. Miitel and Mariners operation held a Prescribed Premises Licence for mine dewatering into Lake Lefroy and Lake Fore when operational. Mine dewater from Miitel mining operation will be discharged mainly into Lake Lefroy and Lake Fore will be utilised as contingency. Therefore, during this amendment, the applicant is seeking approval to include Category 6 prescribed activities again to the licence L8577/2011/2 to resume the underground mining operation.

2.3.1 Mine dewatering activities

The design capacity of the dewatering infrastructure is 3.16 Million tonnes per year. The Applicant proposes to dewater 2.1 million tonnes initially and approximately 790,000 tonnes annually thereafter. Therefore, allowing any contingency, the assessed production capacity for this application is 3 million tonnes per year. It is proposed that the dewatering of Miitel mine will occur at a rate of 65 L/s where it takes approximately 8-10 months to achieve the target amount. Subsequently, during the development and the mining phases, dewatering will be passive and involve the collection of groundwater inflows into the sumps and is expected to be at 25-26 L/s.

2.3.2 Mine dewatering infrastructure

Pumping Infrastructure

It is proposed that two sets of pumps including a bore hole pump (400mm borehole) and a series of pump sets along the decline will be utilized. The proposed pumping infrastructure during the initial dewatering operations as below.

- Borehole pump - deliver water up to 90l/s to existing settling dams at Miitel (Mariners dams)
- Series of package pump sets – located along the decline and deliver water at up to 80l/s to the borehole pump
- Permanent main pump station (underground) - fed by a series of mono-pump sets through the decline

Once the water recedes, the previously utilized main pump station will be re-established to operate as the main dewatering system during the mining operation.

Storage Dams

Four settling dams are currently existing at the Miitel operation including Mariners east and west settling dams, and Miitel north and south settling dams (Figure 2). These dams were utilised previously when mines were operational, and the applicant intends to refurbish these dams to store mine dewater before discharging them into Lake Lefroy and Lake Fore when use as a contingency. During the dewatering phase, the mine dewater will be pumped into the Mariners settling dams using the borehole pump and then carried out to the discharging lakes via an existing buried pipeline.

These dams have constructed;

- to accommodate 100 L/s peak flow and 45L/s during the operation
- with a flow velocity appropriate for settling silt sized and smaller particles
- to have a 24-hour resident time before discharging mine dewater
- with additional capacity to accommodate during a possible power or pipeline failure
- to hold a combined volume of 16,500 cubic metres (approximately 8,250m³ per dam)
- HDPE lined
- to access bund walls with a crane or with a similar

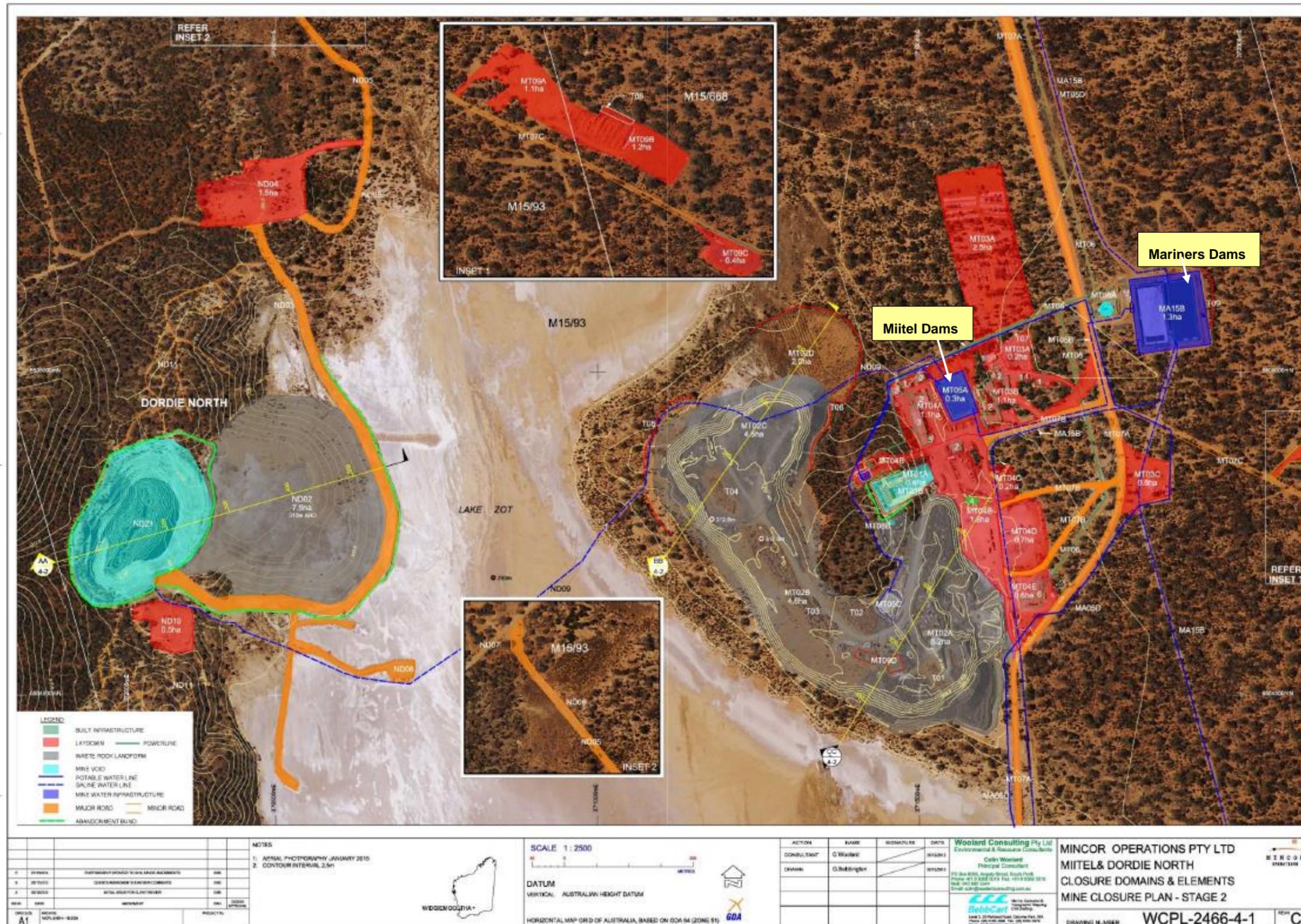


Figure 2: Miitel Operation Site Layout and Dewatering Infrastructure

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In August 2020, the applicant has conducted an inspection and review of the dewatering infrastructure including condition of settling dams liner and walls, suction reservoir, pumps and suction piping, pipeline telemetry, pipelines to discharging lakes, valve pit and breathers.

Based on the recommendations, the applicant will be implementing the following actions before commissioning the dewatering activities.

- Clean out sediment, clear debris and repair ripped sections of dam liner
- Gouge and repair cracks in concrete wall in clear water sump
- Complete a pump selection review and overhaul or replace existing pumps
- Reinstate power cables on pump panel main breaker box
- Install new scramble mats (egress netting) on sides of dams

Mine operational phase

During this phase, the water will be first pumped into the Miitel storage dams and recycle this water to reuse at the underground. Also, it allows further settlement of excess water before transfer into the Mariners dams and eventually into the Lake Lefroy / Lake Fore via buried pipelines.

Miitel dam has two sections namely dirty water section (approximately 700 m³) and the clean water section (approximately 1300 m³) and are divided by a central compacted embarkment. The two compartments are connected by a spillway. This dam consists of a compacted earth embarkment which is approximately 70m long x 45m wide and 2m high, however the northern wall is constructed with rocks. Dam will be operated at 0.5m freeboard height from the northern embarkment wall and the water sensors will be re-established at this height. Dams were elevated above surface level to prevent any stormwater input. The ponds are lined using HDPE liners to prevent any potential seepage and internal walls erosion.

2.3.3 Pipelines

The applicant intends to utilize the existing pipeline, which has built from Miitel settling dams to Mariners dams and from there to Lake Lefroy which is 10.5 km long and another 3 km pipeline to Lake Fore. These pipelines are buried underground, and they are PE100 HDPE, 200 – 250 mm in diameter, and rated PN10. These pipelines are consisting of breather tubes along the pipeline (Figure 3). Each pipeline comprised of leak detention telemetry system and cumulative flow meters installed upstream.

During the recent inspection carried out by the application, following recommendations are made and are intending to carry out before commissioning the premises.

- Replacement of breathers along the pipelines
- Replacement of any faulty isolation valves
- Install bunding around exposed breathers
- Ensure the flowmeters are operational once the power is restored and telemetry system is running

2.3.4 Lake Lefroy and Lake Fore discharge point

The outfalls of the pipelines at the lakes are located at least 50 m beyond the shore to prevent potential erosion and risk to the shoreline vegetation. Each outfall point is constructed with basalt rock mattress and underlying geofabric mat to prevent erosion of the lake surface.

The proposed minor works do not trigger any new emission sources or any changes to the containment structures/ design and can be considered as general maintenance is required to ensure the efficient use of infrastructure or any pollution control equipment. Therefore, The Delegated Officer determined that the licence holder is exempt from needing an authorisation

under a works approval or a licence under Section 53(1)(g) and 53(2)(d) of the EP Act to undertake those works.

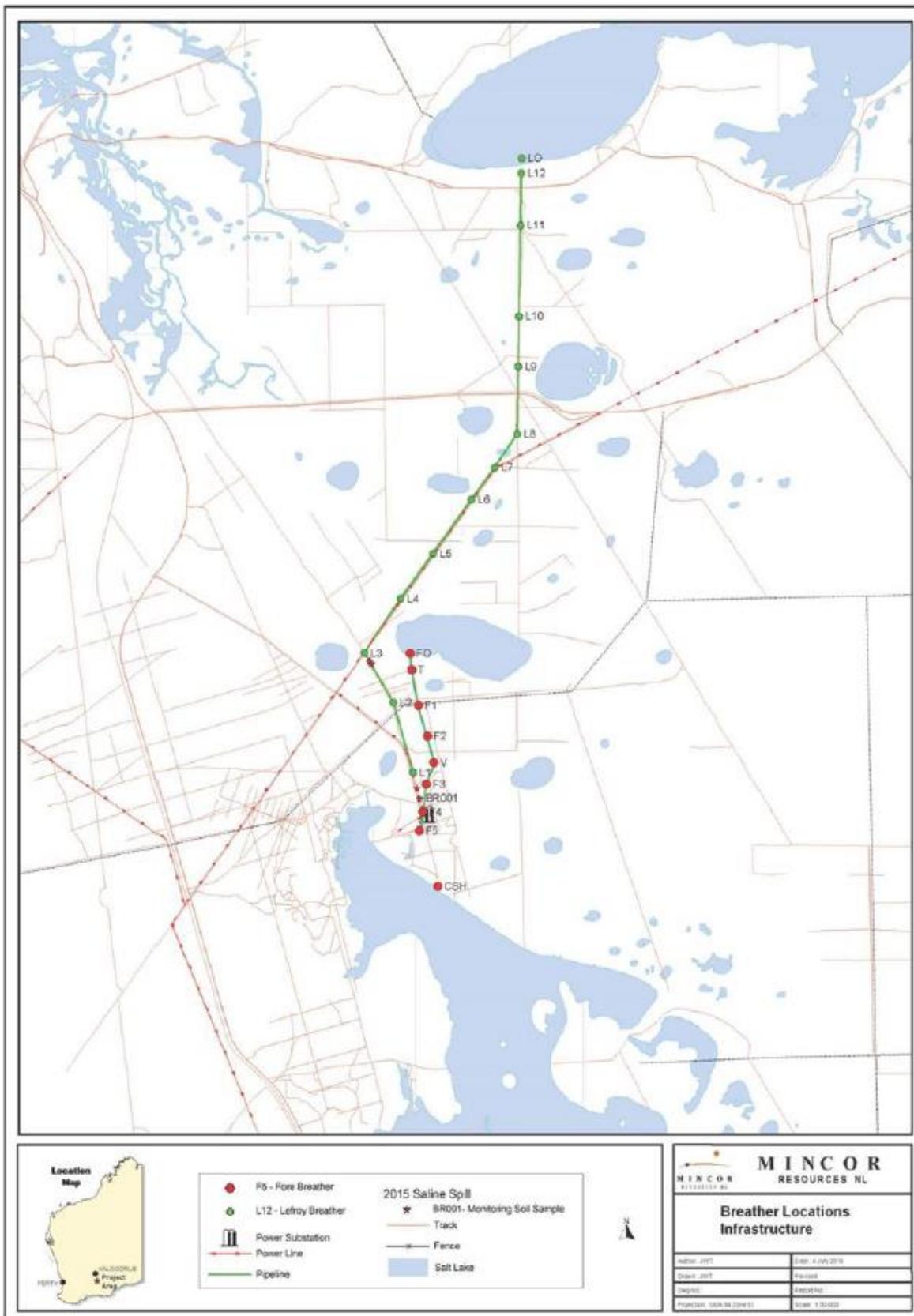


Figure 3: Lake Lefroy and Lake Fore pipelines and breather tubes locations

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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* (DWER 2020(a)).

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

Table 2: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Saline/Hypersaline mine dewater	Mine dewatering	Direct discharge to environment due to pipeline leak / rupture	<ul style="list-style-type: none"> • Pipelines remain buried • All breathers to be banded • Leak detection telemetry and pressure sensors installed • Automatically shut down pumping systems • Daily inspection of dewatering infrastructure • Dewatering will cease in the event of pipeline failure • Water Discharge Management Plan to be implemented
		Direct discharge to Lake Lefroy and Lake Fore (discharge outlets)	<ul style="list-style-type: none"> • Energy dissipation infrastructure (rock mattress) at discharge sites to minimise impact to lakebed • Discharge outlets to be inspected daily • A cumulative flowmeter will be installed at lake outfall • Settlement ponds utilised prior to discharge to reduce sedimentation • Discharge dewaterers and lake sediments monitored regularly to assess potential impacts • Water Discharge Management Plan to be implemented • Regular monitoring of water levels • Monthly photographic monitoring of

Emission	Sources	Potential pathways	Proposed controls
			<p>the discharge points</p> <ul style="list-style-type: none"> • Low discharge volumes to Lake Fore (contingency Lake) • Discharge points at least 50m away from lake fringing vegetation • Regular measurement of salt crust thickness • Regular monitoring of vegetation health
	Storage of mine dewater in the settlement ponds	Seepage through settlement ponds	<ul style="list-style-type: none"> • Pond to be lined with HDPE liners • 0.5m freeboard to be maintained at all times • Daily inspection of dewatering infrastructure • Water Discharge Management Plan to be implemented
		Overtopping of settlement ponds or embankment failure	<ul style="list-style-type: none"> • Water level sensors to be installed • A cumulative flowmeter will be installed at dam discharge point • Daily inspection of dewatering infrastructure • Water Discharge Management Plan to be implemented
		Direct ingestion by fauna	<ul style="list-style-type: none"> • Egress netting to be constructed

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DWER 2020(a)), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 3 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DWER 2020(b))).

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

Human receptors	Distance from prescribed activity
Residential Premises	<p>The prescribed premises is located in a remote area. No residences recorded within >10km from the prescribed premises boundary.</p> <p>The nearest town of Widgiemooltha, which is approximately 12 km north-west of the Premises.</p>

2 x Aboriginal sites Dordie Rockhole and Mt Morgan - Historical, Camp and Water Source	Dordie Rockhole – approximately 2km to the west of the premises Mt Morgan – dewatering pipeline to Lake Lefroy intersect this site
Environmental receptors	Distance from prescribed activity
Threatened and/or priority flora	No threatened flora presents. 1 x Priority flora species within the prescribed premises
Threatened and/or priority fauna	<i>Leipoa ocellate</i> (Malleefowl) has been recorded within 1km of the prescribed premises (Threatened – Vulnerable)
Surface Water bodies	Parts of Lake Lefroy and Lake Fore are within the prescribed premises
Surface Water lines	1 x ephemeral minor creek is within the prescribed premises
<i>Rights in Water and Irrigation Act 1914</i> (RIWI Act) Groundwater areas	Prescribed premises is located within the Goldfields Groundwater Area Groundwater quality in the local vicinity of Lake Lefroy ranges between 274,000 and 423,000 mg/L TDS.
Interim Biogeographic Regionalisation of Australia (IBRA) Regions	Within Coolgardie region

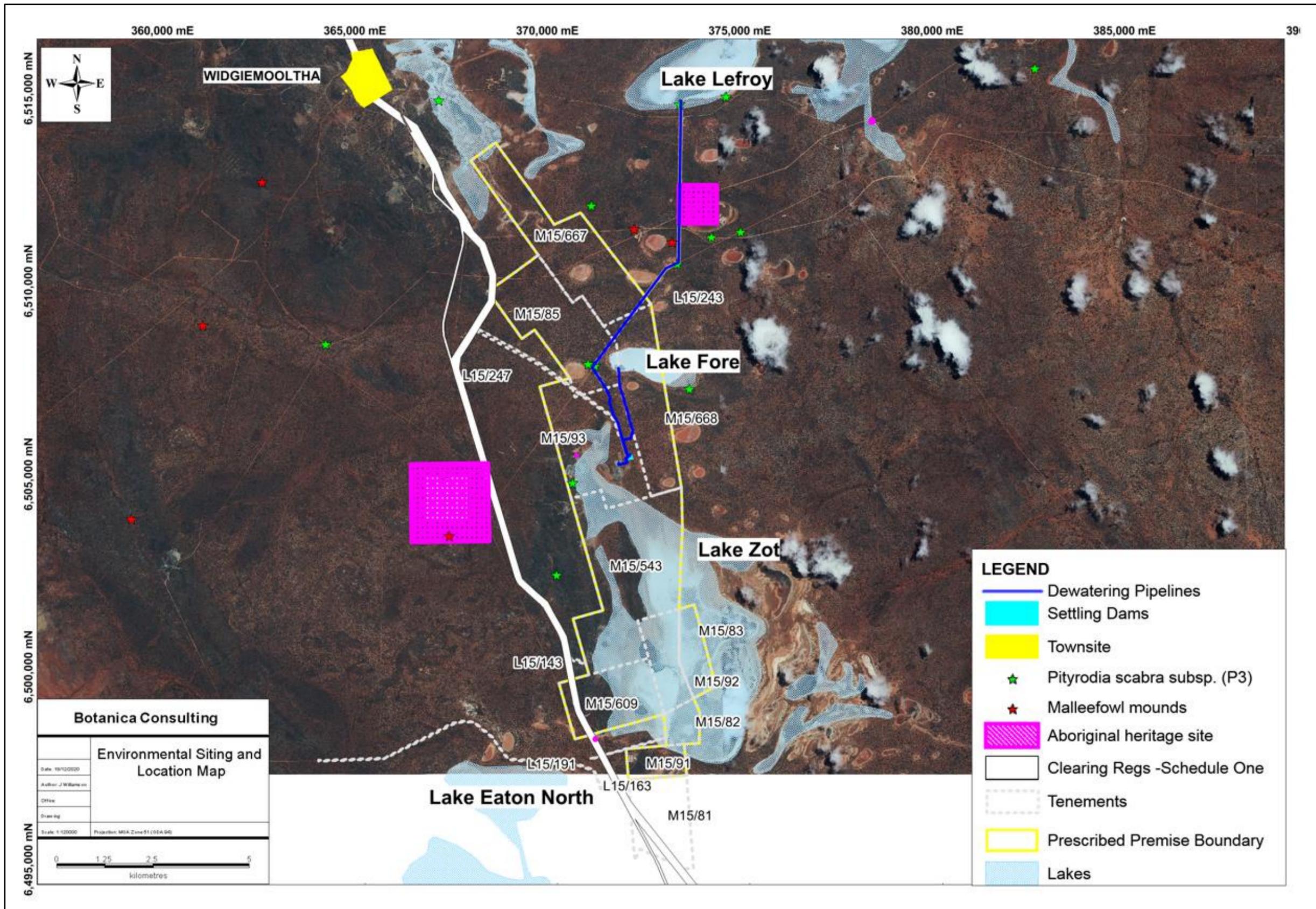


Figure 4: Distance to sensitive receptors

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3.2 Risk ratings

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

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence's regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

The Revised Licence L8577/2011/2 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Category 6 Mine dewatering activities.

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

Table 4. Risk assessment of potential emissions and discharges from the Premises during 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								
Mine Dewatering	Saline/Hypersaline mine dewater	Direct discharge to environment due to pipeline leak / rupture	Native vegetation Soil Groundwater	Refer to Section 3.1.1	C = Moderate L = Unlikely Medium Risk	Y	Infrastructure and equipment requirement: Condition 1 Inspection of Infrastructure: Condition 3	Refer to Section 3.3. detailed risk assessment of mine dewatering into Lake Lefroy and Lake Fore
		Direct discharge to Lake Lefroy and Lake Fore – Erosion at the discharge outlet Decline/death of vegetation from salt spray/salt inundation Decline/death of vegetation from change to surface water hydrology	Surface of the Lake Lefroy and Lake Fore Shoreline Vegetation	Refer to Section 3.1.1	C = Moderate L = Possible Medium Risk	Y	Infrastructure and equipment requirement: Condition 1 Inspection of Infrastructure: Condition 3 Vegetation Health monitoring: Condition 4 Energy dissipation infrastructure: Condition 13 Emission and discharge monitoring: Condition 19	Refer to Section 3.3. detailed risk assessment of mine dewatering into Lake Lefroy and Lake Fore
		Direct discharge to Lake Lefroy and Lake Fore - Reduction in species abundance and diversity	Aquatic biota (algae and invertebrate fauna species)	Refer to Section 3.1.1	C = Moderate L = Unlikely Medium Risk	N	Settlement of water before discharge: Condition 12 Emission and discharge monitoring: Condition 19 Sediment monitoring: Condition 20 Management measures: Condition 21 Non-annual reporting requirement: Condition 29	Refer to Section 3.3. detailed risk assessment of mine dewatering into Lake Lefroy and Lake Fore
		Direct discharge to Lake Lefroy and Lake Fore - Reduced quality of surface waters	Aquatic biota (algae and invertebrate fauna species)	Refer to Section 3.1.1	C = Moderate L = Possible	N	Settlement of water before discharge: Condition 12	Refer to Section 3.3. detailed risk assessment of mine dewatering into Lake Lefroy and Lake Fore

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				
		Increased sedimentation Increase in salt crust			Medium Risk		Monitoring of Salt crust thickness: Condition 18 <u>Emission and discharge monitoring: Condition 19</u> <u>Non-annual reporting requirement: Condition 29</u>	
		Direct ingestion of metals and metalloids via invertebrates living within the lake which can be biomagnified	Fauna including water bird species	Refer to Section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	<u>Emission and discharge monitoring: Condition 19</u> <u>Sediment monitoring: Condition 20</u> <u>Non-annual reporting requirement: Condition 29</u>	Refer to Section 3.3. detailed risk assessment of mine dewatering into Lake Lefroy and Lake Fore
Storage of mine dewater in the settlement ponds	Saline/Hypersaline mine dewater	Seepage through evaporation ponds	Native vegetation	Refer to Section 3.1.1	C = Moderate L = Unlikely Medium Risk	Y	Infrastructure and equipment requirement: Condition 1 Inspection of Infrastructure: Condition 3	The Delegated officer has determined that the proposed applicant controls are sufficient to manage the risk event and additional regulatory controls are not required. Applicant controls have been conditioned in accordance with <i>DWER Guideline: Risk Assessments (2017)</i> .
		Overtopping of evaporation ponds or embankment failure	Soil					
		Direct ingestion	Groundwater	Native fauna	Refer to Section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments (DWER 2020(a))*.

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 of mine dewatering into Lake Lefroy and Lake Fore

3.3.1 Characteristics of mine dewater

Miitel underground mine was dewatered previously, and the water quality was monitored on a quarterly basis from late 2003 until dewatering ceased in late 2015, as required by the operating licence. Based on those monitoring results, discharged water considered to be ranging from saline to hypersaline and pH generally neutral averaging at 7.3. A suite of heavy metals were also regularly measured during this water quality monitoring and elevated levels of chromium, zinc, nickel, and lead were detected in the discharge water with compared to ANZG (2020) default guideline values (DGV) for 80% protection of species in marine water.

A grab sample of the Miitel portal water in 2020 was collected to identify the characteristics of the proposed discharging water. Confirming the historic results, it was identified high levels of chromium, zinc, and nickel in the Miitel portal water. In addition to that, elevated levels of manganese found in that water sample. The pH of the water was identified as generally at 7.5.

Further water quality testing carried out in July 2021 showed that all results were relatively similar to the historic testing and indicated several exceedances in some metal concentrations including zinc, nickel, manganese, copper, cadmium and cobalt, when comparing to the Fresh and Marine Water Quality guideline levels (ANZG 2020) (Table 5). Furthermore, pH of the portal water indicated as neutral-alkaline (7.51-7.6), which is fairly similar to the historic analysis and the Total Dissolved Solids (TDS) recorded lower than that of the Lakes (Table 5). It was detected that the selenium levels in the portal water is below the recommended levels (27µg/L) from the literature that protect bird populations from harmful effects.

3.3.2 Characteristics of the receiving environment

Lake Lefroy

Lake Lefroy is one of the ephemeral saline playa lakes of inland Australia and covers an area of approximately 554km². The lake appears to be in transition between an ephemeral lake and a salt pan. Lake Lefroy is a highly altered salt-lake system due to the effects of long-term mining on and adjacent to the lake. A permanent salt crust has occurred throughout an extensive area on the surface of the lake of which the thickness is generally ranging from 10cm to 30cm. Salt accumulation is occurring via natural processes as well as Mine dewatering discharge. It is estimated that approximately 2.4 million tonnes of salt is added to Lake Lefroy annually, as a result of mine discharges to the lake.

An opportunistic sampling was carried out in 2020 during the hydroperiod of the Lake. The results indicated that the water quality of Lake Lefroy is hypersaline with elevated levels of sodium chloride as common in Goldfields (Table 5). pH of the lake considered to be neutral as it ranges from 6.3 to 6.8. Few metals were recorded elevated concentrations compared to ANZG (2020) default guideline values for marine water. However, these guidelines do not provide default trigger values to protect aquatic organisms under hypersaline conditions.

Table 5: Mine portal water and receptor water against guideline values

Parameter	Unit	Miitel portal water (2021) Average	Lake Lefroy surface water (2020)	Lake Fore surface water (2020)	ANZG (2020) DGV 80% (marine)	
pH	pH units	7.55	6.31	6.52	NG	
EC	µs/cm	203,500	-	-	NG	
TDS	mg/L	174,500	322,000	315,000	NG	
SS		6.5	24	25	NG	
CaCO ₃		95	-	-	NG	
HCO ₃		95	12	11	NG	
SiO ₂		13.6	-	-	NG	
Si		6.35	-	-	NG	
SO ₄		8,155	7,020	2,490	NG	
Cl		79,600	144,000	136,000	NG	
Ca		1,005	846	477	NG	
Mg		5,790	3,440	1,060	NG	
Na		56,750	108,000	121,000	NG	
K		1,410	509	221	NG	
Hg		<0.0005	<0.0005	<0.0005	0.0014	
Al		µg/L	<25	<500	<500	0.5 ²
Sb			<2.5	-	-	270 ²
As	7.1		<50	<50	4.5 ²	
Ba	156		-	-	NG	
Be	<0.5		-	-	NG	
B	1,695		<2500	<2500	NG	
Cd	1.2		<5	<5	36	
Cr	3.0		<50	<50	85	
Co	2.9		<50	<50	150	
Cu	8.3		<50	<50	68 ²	
Fe	<25		<2500	<2500	NG	

Pb		<1.0	<50	<50	12
Mn		758	70	249	80 ²
Mo		17.7	-	-	23 ²
Ni		209	<50	<127	560
Se		<10	<500	<500	27 ¹
Th		<0.5	-	-	17 ²
U		1.6	-	-	NG
V		7.9	<500	<500	280
Zn		465	<250	<250	80 ¹

NG – Not Given

Note 1: Recommended in literature for hypersaline conditions

Note 2: marine low reliability trigger value

Sediments Quality

Sediment testing carried out in 2000 revealed that the sediments were extremely saline at the surface and less saline sediments can be found at the sites where previously not impacted by the dewatering discharges (analogue sites). Generally, pH of the sediments was neutral to slightly alkaline. Metals and metalloid concentrations in the sediments were compared against the ANZG (2020) default guideline trigger values for sediment quality. Nickel has identified as the highest varied element in the Lake Lefroy sediments where extremely higher concentrations can be found closer to the discharge point. It is therefore suggested that the impacts may be confined to a very small area. Additionally, chromium levels in the sediments were detected slightly higher concentrations in majority analogue sites confirms that chromium are naturally occurring in the sediments.

Further sediment sampling analysis was carried out in 2021 with more sample sites located approximately 10m, 30m, 70m, 150m, 310m and 630m from each discharge point. The results illustrated that the sediments closer to the discharge points are extremely saline compared to the samples away from the discharge impacted areas, which are less saline. This recent analysis also confirmed the outcomes of the previous assessment and has resulted elevated concentrations of Nickel and Chromium. Additionally, elevated levels of copper and arsenic were detected in few sediment samples within 30m of the discharge point.

Based on the sediment testing results, it has been determined that impacts from the mine dewatering have localised around the dewatering discharge points and the metals and metalloids concentrations are decreasing with increasing distance from the discharge points.

Riparian vegetation

A flora and vegetation survey around the perimeter of Lake Lefroy and Lake Fore and the dewatering pipelines was conducted in June 2020. Based on the supporting documents provided with the application, the field assessment has not identified any Threatened Flora or threatened ecological communities (TEC) pursuant to Commonwealth or State legislation, priority ecological communities (PEC) listed by the Department of Biodiversity, Conservation and Attractions (DBCAs) were identified within the survey area. Also, there are no Environmentally Sensitive Areas (ESA) or Nationally Important or RAMSAR wetlands located within the survey area. A total of five vegetation communities were identified during the survey and rated as “good” in condition. However, an area of shoreline vegetation to the south of Lake Lefroy has impacted due to a fire occurred in 2020.

Mine dewatering together with the surface water flow into the lakes after a significant rainfall has a potential to inundate the shoreline vegetation with hypersaline water causing deterioration in health and/or death of the riparian vegetation. Licence holder has conducted a photographic monitoring of riparian vegetation at both Lake Lefroy and Lake Fore since 2006 to 2016 as to fulfill the requirement by the operating licence. These vegetation photo monitoring has illustrated that there has been no impact to the riparian vegetation pre- and post-dewatering.

The recommencement of mine dewatering will discharge approximately 2.2 GL into Lake Lefroy, which is much less in comparison with the previous dewatering which discharged approximately 8 GL. Therefore, the potential impacts to the riparian vegetation expected to be low.

Aquatic biota

Due to construction of infrastructure and alterations happened to the system, water inflows after a heavy rainfall have restricted. Therefore, significant changes in the salinity of the water cannot be observed after a rainfall and has led to low diversity of the aquatic invertebrate species in the lake. Also, no conservation significant aquatic invertebrates have been recorded within the Lake Lefroy. Based on the supporting information provided with the application, a total of 13 taxa, predominately crustaceans and insects, have recorded in the Lake Lefroy.

Crustaceans are the prevailing invertebrates identified in the lake, of which *Parartemia* sp (brine shrimp) considered to be the most common species. *Parartemia* eggs can lie dormant in dry salt crust for years between flood events and rapidly hatch following rewetting of the lake sediment. It is suggested that the wading birds will be visited the lakes as which would use invertebrates as a food source and considered to be the most sensitive environmental receptors in the system, due to the potential for some metals and metalloids to be biomagnified in local food webs. However, due to the hypersaline nature in the Lake water, it expected that the wading birds only occurred infrequently and in small numbers.

Lake Fore

Lake Fore is a medium sized (approx. 1.5km²), isolated claypan located 8km north of the Miitel mining operations. There is no permanent outflow in the lake where the water loss only happens via evaporation and percolation. Prior to dewatering, the surface of Lake Fore was generally dry, salt free and water inflow was from various small ephemeral creek lines. Massive amount of sediments has accumulated into the Lake during the dewatering period (approximately 20 tonnes per month). Storage and assimilative capacity is limited in the Lake Fore and therefore will be used as a contingency.

According to the sediment sample results only 2 samples out of 30 samples recorded elevated nickel levels compared to ANZG (2000) guideline values. These samples were located more than 300m away from the discharge point. Additionally, nickel was also elevated in the analogue sites tested in 2020 analysis, which demonstrates that nickel may be naturally occurring in the sediments. The Lake Fore sediment results differ to the Lake Lefroy results in that there is no apparent decrease in concentration of analytes as moving further away from the discharge point. This result supports the fact that Lake Fore is considered a closed system compared to the open system of Lake Lefroy and therefore whole lake might have impacted by the previous dewatering discharge.

3.3.3 Impacts from the dewatering discharge

In the absence of suitable water quality trigger values, toxicity values from the literature can be used to determine the triggers values of metals and metalloids to the aquatic organisms in hypersaline condition. Based on the published literature, it was identified that the brine shrimp species are extremely resistant to high metal concentrations, and commonly do not show adverse impacts from metal concentrations of less than about 5 mg/L (Brix *et al.*, 2003; Sarabina *et al.*, 2008). Yet, the hatching success of these species appears to be greatly reduced when the concentration of zinc in solution is greater than about 80 µg/L (Sarabina *et al.*, 2008), and when the concentration of copper in solution is about 68 µg/L (Brix *et al.*, 2006). According to

the recent water quality testing of the Miitel portal water resulted that zinc concentrations are several folds higher than that of safe value. Thus, to ensure no adverse impacts from the mine dewater discharge, regular monitoring of these concentrations is crucial. Therefore, a licence condition has been imposed and is required to report to DWER with the results of the monitoring event with the required timeframe.

Hatching success of brine shrimp species to other metals including mercury, lead, cadmium, cobalt, nickel, chromium, iron, and manganese appears to be relatively unaffected at concentrations less than about 10 mg/L (Liu and Chen, 1987), and therefore their effects can be disregarded in Lake Lefroy. But the low toxicity of metals to aquatic organisms in salt lakes only applies to systems where there is excess alkalinity in the water. Thus, the acidity and alkalinity of the discharge water should be frequently monitored. In the event where acidity exceeds alkalinity in the discharge water, the discharge water should be treated with powdered calcium carbonate to increase its alkalinity, and this has been added as a requirement in a condition of the operating licence L8577/2011/2.

Bioaccumulation and biomagnification of Selenium in wading bird species considered to be another impact from the mine dewatering operations. Even though Selenium levels are below the recommended level, regular monitoring of selenium concentrations in the mine dewater is required to ensure that the concentrations are not exceeding the recommended level and to determine whether management measures would be required to protect bird populations in the discharge area in Lake Lefroy.

Additionally, elevated concentrations of metals and metalloids in sediments have the potential to cause adverse impacts on macroinvertebrates in wetlands and waterways. Therefore, to ensure no adverse impacts on biota in Lake Lefroy, sediments should then be resampled in the dewater discharge area for metals and metalloids including the key parameters Selenium, zinc, and copper, after the proposed dewatering program has finished. In the event of significant increases identified, measures should be implemented to lower the concentrations of metals and metalloids in the discharge area. A condition has been included in the licence and required to be fulfilled once proposed mine dewatering ceased.

The licence holder proposed controls including photographic monitoring of vegetation, measurement of salt crust thickness, utilising sedimentation ponds before discharging water into the lake, and energy dissipation infrastructure at discharge sites have also been conditioned to monitor and manage any potential impacts from the proposed activities.

3.3.4 Risk rating

Taking into consideration that dewater discharge indicates elevated metal concentrations (Zinc and Copper) exceeding the recommended values, the Delegated Officer has considered the consequence to be **Moderate**.

The Delegated Officer also considers it is possible that mine dewatering discharge with elevated metal and metalloid concentrations during long term operation but **Unlikely** in the proposed short-term operations phase together with the applicant proposed and additional regulatory conditions. The final risk rating for this event is therefore **Medium**. Based on this rating, the risk event is subject to regulatory controls.

4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
<i>Local Government Authority (Shire of Coolgardie) advised</i>	None received	N/A

<i>of proposal 14/04/2021</i>		
<i>Other Stakeholders Ngadju Native Title Aboriginal Corporation RNTBC advised of proposal On 14/04/2021</i>	None received	N/A
<i>Licence Holder was provided with draft amendment on 18 March 2022</i>	Refer to Appendix 1	Refer to Appendix 1

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 7 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 7: Summary of licence amendments

Condition no.	Proposed amendments
N/A Cover Page	Prescribed premises category description table updated to include Category 6 mine dewater and its authorised production capacity limit
Contents and Introduction	Deleted from the licence. Revised to current licensing format.
Existing conditions 1.1.1 and 1.1.2 -	Interpretation and definitions Redundant condition. Revised to current licensing format.
Existing condition 1.1.3 - Australian or other standards	Redundant condition. Revised to current licensing format.
Existing condition 1.1.4 - Reference to code of practice	Redundant condition. Revised to current licensing format.
N/A	The phrase "Licensee shall" has replaced with the phrase to "licence holder must" to meet the current licensing format.
All	All the condition numbers and table numbers were replaced with a new numbering system to meet the current licensing format.
Revised Condition 1	New condition - Infrastructure and equipment requirements of settlement ponds and dewatering pipeline outfalls during operation were added

Existing condition 1.2.1 – premises operation	Dewatering pipeline infrastructure requirements were combined with into the Revised Condition 1 Table 1
Revised Condition 3 Table 2	New condition - Inspection requirements for settlement ponds and dewatering pipeline outfalls were added
Existing Condition 2.1.1	Redundant condition. Adequately covered by alternative existing conditions. Deleted from licence.
Revised Condition 11	New condition added into the licence to authorise discharge points at Lake Lefroy and Lake Fore
Revised Condition 12	New condition added to include settling of mine dewater at the settlement ponds before discharge into lakes
Revised Condition 13	New condition added to include the requirement of energy dissipation infrastructure at the discharge points
Revised Condition 19	New condition added to include the requirement of monitoring mine dewater quality before discharging into lakes
Revised Condition 20	New condition added to include the requirement of monitoring lake sediment quality post mine dewatering
Revised Condition 21	New condition added to include the requirement to undertake management measures for sediments in the event of impacted by elevated concentrations of metals and metalloids
Revised Condition 29	New condition added to include the requirement of non-annual reporting of emission and discharges – quality of mine dewater
Existing Condition 4.3.1	Redundant condition. N1 form is now redundant and has been removed from the licence.
N/A Definition Table	A Definitions table was added at the end of the conditions as per the new licensing format
Schedule 1: Premises map	An updated premises map included
Schedule 1: Maps of monitoring locations	New map to show vegetation and water level monitoring locations added – Figure 2 New maps were added to show sediments monitoring points – Figure 4 & 5
Schedule 2: Reporting & notifications	Annual Audit Compliance Report and Form N1 Notification Redundant attachment. Deleted from Licence Forms accessed at www.dwer.wa.gov.au

References

1. Email titled “L8577 - Application form - Amendment to Prescribed Premise Licence - Mariners and Miitel Mining Operations” and supporting documents dated 08/02/2021 authored by Jessica Williamson, available at DWER records (DWERDT410448).
2. Email titled “L8577/2011/1 - Mincor Operation Pty Ltd - Miitel and Mariners Mines - providing further information” dated 28/10/2021, authored by Rob Hartley, available at DWER records (DWERDT520783).
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2019, *Guideline: Decision Making*, Joondalup, Western Australia.
5. DWER 2020(a), *Guideline: Risk assessments*, Joondalup, Western Australia.
6. DWER 2020(b), *Guideline: Environmental siting*, Joondalup, Western Australia.
7. Brix, K.V., Cardwell, R.D. and Adams, W.J., 2003. Chronic toxicity of arsenic to the Great Salt Lake brine shrimp, *Artemia franciscana*. *Ecotoxicology and Environmental Safety*, **54**, 169-175. The paper is available from web site https://www.researchgate.net/profile/Rick-Cardwell/publication/10931845_Chronic_toxicity_of_arsenic_to_the_Great_Salt_Lake_brine_shrimp_Artemia_franciscana/links/5c0098e392851c63cab0528c/Chronic-toxicity-of-arsenic-to-the-Great-Salt-Lake-brine-shrimp-Artemia-franciscana.pdf
8. Sarabina, R., Del Ramo, J., Varó, I., Díaz-Mayans, J., and Torreblanca, A., 2008. Sublethal zinc exposure has a detrimental effect on reproductive performance but not on the cyst hatching success of *Artemia parthenogenetica*. *Science of the Total Environment*, 398, 48-52.
9. Chen, P-C. and Chen, J-C., 1987. Effects of heavy metals on the hatching rates of brine shrimp *Artemia salina* cysts. *Journal of the World Aquaculture Society*, 18, 78-83.

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

Condition	Summary of Licence Holder's comment	Department's response
Condition 18 Table 10	<p>The monitoring sites are incorrect and should be changed to read the following:</p> <p>Lake Lefroy monitoring site LTG1; and Lake Fore monitoring sites FTG1 and FTG2</p> <p>Lake Lefroy tide gauge location LTG1; and Lake Fore tide gauge location FTG1 (this was following a review of monitoring data – the incorrect monitoring point name was entered into the old licence).</p>	DWER noted the request and updated the condition accordingly.
Figure 3	Licence Holder requested that Figure 3 is removed from the draft Licence as this is incorrect. The correct locations of the monitoring sites are shown in Figure 2.	DWER noted the request and updated the condition accordingly.
Condition 20 Table 12	Condition 20, Table 12 has an annual monitoring of the sediment. Mincor is requesting for Condition 20, Table 12 please be changed to be the same as Condition 29, Table 15 to a one-off sample being required for sediment monitoring within 60 days after ceasing dewatering discharge.	The Delegated Officer considered the Licence holder's request and determined that the annual monitoring of sediment is still required given the amount of mine dewater being discharged to the environment, 2.1 million tonnes, discharged into the lake initially (first 8-10months of operation). Noting the elevated concentrations of Arsenic, Aluminium, Manganese and Zinc in Miitel portal water, annual monitoring will assist in the identification of contamination of sediments in advance and allows for implementation of remedial measures, if required.
Condition 29 Table 15	Miitel licence draft amendment report states on page 20 (paragraph 4) that "sediments should be resampled in the dewater discharge area after the proposed dewatering program has	One off sediment sampling is required in addition to the annual sediment monitoring required by the Condition

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Condition	Summary of Licence Holder's comment	Department's response
	<p>finished".</p> <p>Condition 29, Table 15 has the requirement of a one-off sample for sediment monitoring within 60 days after ceasing dewatering discharge and is agreed to by Mincor.</p>	<p>20, Table 12. The results of this sampling will indicate the cumulative impacts from the dewatering discharge. Any management action as required by Condition 21 can be implemented to ensure that there are no adverse impacts on biota in Lake Lefroy.</p> <p>Sediment monitoring requirement in Table 15 has been reworded to read the requirement clearer.</p>
Condition 21	Licence Holder requested that the wording of the condition 21 to be changed from "identified in the lake sediments during post mine dewatering" to "identified in the lake sediments post mine dewatering."	DWER noted the typographical error and updated the condition as requested.
Figure 6	New map was provided to show the irrigation field location as requested by DWER	Figure 6 of the licence replaced using new map

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)				
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 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:	L8577/2011/2	
		Relevant works approval number:		N/A <input type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:		None <input type="checkbox"/>
Date application received	08 February 2021			
Applicant and Premises details				
Applicant name/s (full legal name/s)	Mincor Operations Pty Ltd			
Premises name	Miitel & Mariners Mines			
Premises location	Mining Tenements M15/82, M15/83, M15/85, M15/91, M15/92, M15/93, M15/543, M15/609, M15/667, M15/668 and L15/243, Widgiemooltha WA 6443			
Local Government Authority	Shire of Coolgardie			
Application documents				
HPCM file reference number:	2012/006881-1			
Key application documents (additional to application form):	Attachment 1A Proof of occupier status Attachment 2 Map A - Discharge points and PP Boundary Attachment 2 Map B - Lake Lefroy Monitoring sites Attachment 2 Map C - Lake Fore Monitoring sites Attachment 2 Map D - Dewatering Infrastructure Attachment 3B - Dewatering Infrastructure Information FINAL Attachment 5 - SKO Nickel Project - Mine Closure Plan FINAL 30_04_2020 w appendices Attachment 7 - Environmental Siting Attachment 8A - Lake Lefroy and Lake Fore Environmental Impact			

		Assessment FINAL w appendices
Scope of application/assessment		
Summary of proposed activities or changes to existing operations.	Licence amendment Addition of Category 6 - Mine dewatering; to the Licence	
Category number/s (activities that cause the premises to become prescribed premises)		
Table 1: Prescribed premises categories		
Prescribed premises category and description	Assessed production capacity	Proposed changes to the production or design capacity (amendments only)
Category 6: Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore	3,000,000 tonnes per year (2,100,000 tonnes per year - proposed maximum dewatering volume)	N/A
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 type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
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: M15/82, M15/83, M15/85 - 21/10/2026 M15/91 – 30/05/2026 M15/92, M15/93 – 05/08/2026 M15/543 – 14/01/2033 M15/609– 11/11/2033 M15/667, M15/668 – 19/10/2035 Other Licence <input checked="" type="checkbox"/> L15/243 – 15/10/2024
Has the applicant obtained all relevant planning approvals?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Approval: Mine Closure Plans - South Kambalda Operations Mine Closure Plan 2017. Recent version is currently assessing by DMIRS

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"/>	Licence/permit No: GWL204037(1)
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Name: Goldfields Groundwater Area Type: Proclaimed Groundwater Area Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Regional office: Goldfields
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 WQPN 25)? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
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

<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Classification: Awaiting Classification – CSS ID 26885</p> <p>Possibly contaminated - investigation required – CSS ID 26882 (Jun 9, 2015)</p> <p>Possibly contaminated - investigation required – CSS ID 26884 (Jun 9, 2015)</p> <p>Possibly contaminated - investigation required – CSS ID 26883 (Jun 9, 2015)</p>
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