



## Application for Licence Amendment

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

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<b>Licence Number</b>	L8148/2006/4
<b>Licence Holder</b>	Koolan Iron Ore Pty Ltd
<b>ACN</b>	099 455 277
<b>File Number</b>	DER2014/000374-1
<b>Premises</b>	Koolan Iron Ore Mine and Port Facility Mining Tenements M04/416, M04/417, L04/68 and L04/29 Koolan Island (Buccaneer Archipelago) WA 6733  As defined by the map in Schedule 1 of the Revised Licence
<b>Date of Report</b>	26 August 2024
<b>Decision</b>	Revised licence granted

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## 1. Decision summary

Licence L8148/2006/4 is held by Koolan Iron Ore Pty Ltd (Licence Holder) for the Koolan Iron Ore Mine and Port Facility (the Premises), located on Mining Tenements M04/416, M04/417, L04/68 and L04/29, Koolan Island (Buccaneer Archipelago).

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 construction and operation of the Premises. As a result of this assessment, Revised Licence L8148/2006/4 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 Application summary

On 21 December 2023, the Licence Holder submitted an application to the department to amend Licence L8148/2006/4 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are sought:

- Construction and operation of a Tertiary Circuit at the existing Processing Plant area;
- Construction and operation of a new wastewater treatment plant (WWTP) and a new irrigation sprayfield;
- Operation of a mobile crushing and screening (MCS) plant;
- Update the premises map to include Waste Dump 5 (WD5) and tenement L04/68; and
- Removal of three ambient groundwater monitoring bores from figures in Licence.

The proposed amendments are discussed in more details in the following sections. This amendment is limited only to changes to Categories 5, 12 and 54 activities from the Existing Licence. No changes to the aspects of the existing Licence relating to Category 6, 58, and 73 have been requested by the Licence Holder.

Table 1 below outlines the proposed changes to the existing Licence.

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

Category	Current design or throughput capacity	Proposed design or throughput capacity	Description of proposed amendment
Category 5: Processing or beneficiation of metallic or non-metallic ore	5,000,000 tonnes per Annual Period	No change	Installation of a Tertiary Circuit to produce <7.5 mm fines.
Category 6: Mine dewatering	5,000,000 tonnes per Annual Period	No change	N/A
Category 12: Screening etc. of material	2,000,000 tonnes per Annual Period	No change	Additional location for mobile crushing and screening activities to crush existing sub-grade ore stockpiles for use on site.
Category 54: Sewage facility	100 cubic metres per day	130 m <sup>3</sup> per day	Replacement of the exiting WWTP which is reaching end of life and installation of a new irrigation sprayfield.
Category 58: Bulk material loading or unloading	75,000 tonnes per day	No change	N/A
Category 64: Class II or III putrescible landfill site	4,500 tonnes per Annual Period	No change	Rename landfill under WD5 boundary. No change to design or location of landfill.
Category 73: Bulk storage of chemicals	1,200 cubic metres in aggregate	No change	N/A

### 2.2.1 Category 5 - Tertiary Circuit at the existing Processing Plant

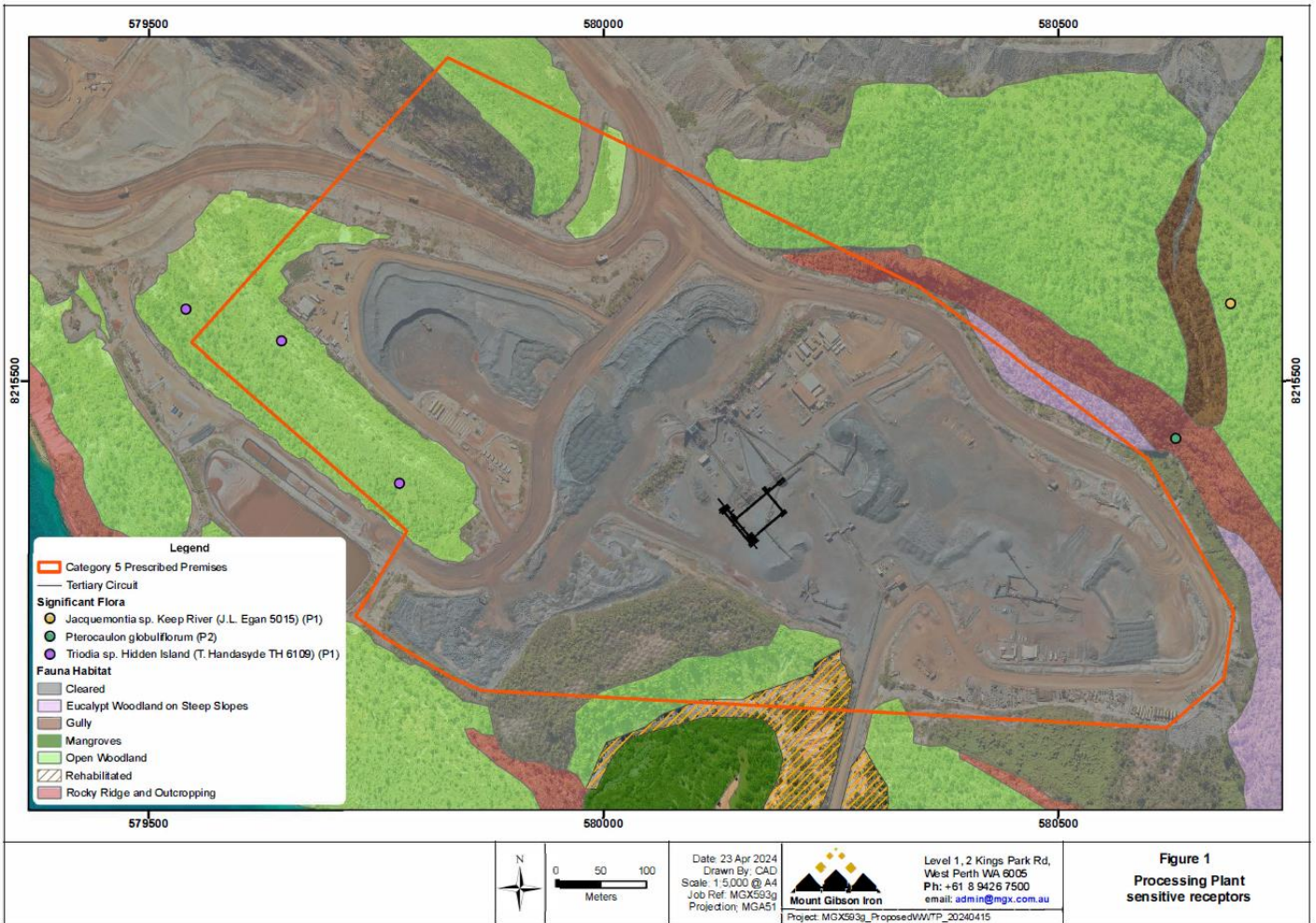
The Licence Holder proposes to construct and operate a Tertiary Circuit at the existing Processing Plant to achieve their target of 100% ≤7.5 mm fines (Figure 1). The Tertiary Circuit will produce an additional 25% of fines by input of their existing ore stream. There will be no change to the proposed production capacity.

Of the dust generated from the operation of the Tertiary Circuit, 87% is expected to be greater than 1 mm in size and the remaining 13% less than 1 mm in size. Dust greater than 1 mm in size has generally been observed by the Licence Holder to stay within the processing plant area and had little to no impact on surrounding vegetation.

The key components of the Tertiary Circuit include:

- Back feed bin and feeder conveyor;
- Tertiary cone crusher;
- Transfer stations;
- Surge bin and feeder; and

- Double deck screen.



**Figure 1 – Proposed Tertiary Circuit at the existing Processing Plant**

The Licence holder was requested to provide further information on stormwater management within the process plant area to ensure current controls are sufficient to manage storm water within the proposed new tertiary circuit.

The Licence holder initially considered the installation of a sump (if necessary) to contain the eastward moving stormwater runoff as there is currently no containment system in place; however, there are constraints on sediment retention sumps on Koolan Island as they need to be extremely large to either contain surface water for disposal via infiltration or otherwise retain surface water for sufficient duration to allow sediment to be removed from suspension.

The Licence holder preferred solution is to reconfigure the existing surface water drain from a simple W-style surface drain to a low-flow filter drain, in the location shown in Figure 2. The filter drain is a sub-surface drainage solution consisting of perforated or slotted pipe within a gravel-filled open trench.

The basic specification for the filter drain is:

- 191m total length
- 1% longitudinal grade
- 3.7m wide x 0.5m deep open channel
- 1 in 1.5 sideslopes
- Perforated/slotted pipe(s) of at least 160mm diameter



The infiltration drain is intended to perform as a 'first-flush' system capturing the initial runoff having higher sediment load from the surrounding area as it is washed into the gravel around the pipe. As the rainfall intensifies, higher flows are conveyed via the open channel that flows to the south of the process plant area and discharges to the ocean.

The Licence holder provided the results of a stormwater model for the 3 ha sub-catchment within the crushing precinct to quantify the volume of surface water runoff to be managed via the filter drain. Different storms events were considered based on an Intensity-Frequency-Duration chart for Koolan Island sourced from the Bureau of Meteorology. The model indicates:

- the flow coming off the sub-catchment peaks at 0.89 m<sup>3</sup>/s in the 1 EY event and 1.56 m<sup>3</sup>/s in the 10% AEP event.
- the channel specification (as described above), modelled at 1% grade and based on actual dimensions would handle the 10% AEP storm event, but would overtop during larger events.

The capacity of the filter drain relates primarily to the volume of voids within the drain. With an estimated 35% void space, a 0.5m depth of gravel will result in up to 175mm of storage capacity for capturing the first flush, which the licence holder indicated to be sufficient. The gravel within the drain does not require a longitudinal grade to promote flow through, it is simply a storage media and the eastern end of the gravel drain would be blocked off to prevent longitudinal flow. As indicated above, the open channel will convey excess rainfall above and beyond the storage capacity of the gravel.

The permeable fabric (e.g., Bidim) serves as a protective layer and would be either installed at the sides and the bottom of the trench or otherwise wrapped around the perforated/slotted pipe to prevent ingress of sediment. The filter pipe provides the means for the gravel to drain down and filters the water to prevent the first flush escaping the gravel. This readies the system for the next event.

It is noted that the area near the tertiary crushing circuit is used to stockpile lump ore (not fines ore) from the fixed crushing plant. Once construction of the tertiary crushing circuit is completed, lump ore will no longer need to be stockpiled.

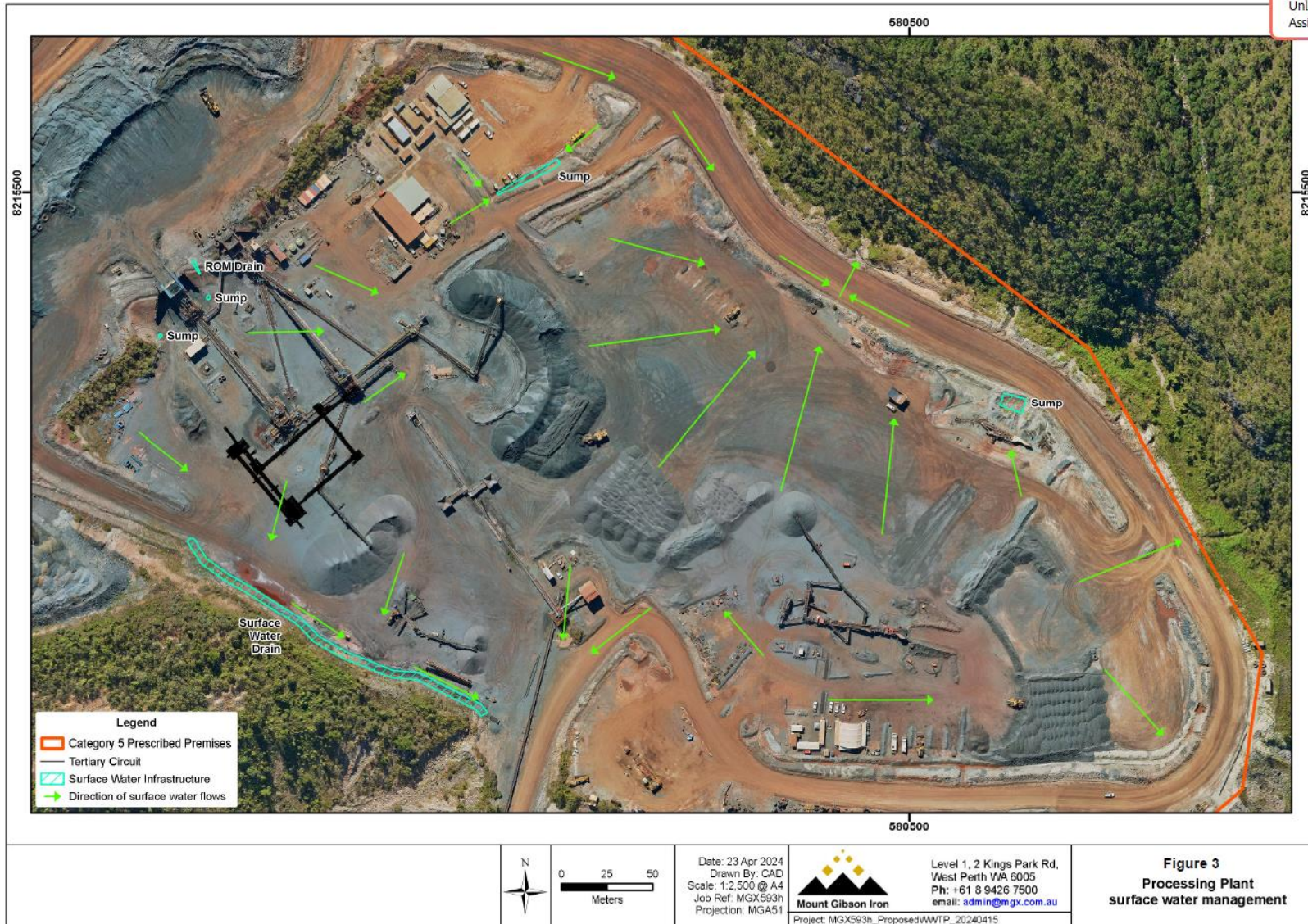


Figure 2 – Existing stormwater infrastructure and proposed low flow surface water drain



## 2.2.2 Category 54 - Construction and operation of a new wastewater treatment plant (WWTP) and new irrigation sprayfield

The Licence Holder proposes to construct and operate a new WWTP to replace the existing WWTP which is reaching its end of life (Figure 3). The new WWTP will be a skid mounted moving bed bio reactor (MBBR), rather than another dual stage WWTP. The MBBR is claimed to be a more efficient, reliable, modern and safe system and is intended to service the mining camp for the remaining lifespan of the project. Select existing infrastructure such as the drying beds will remain in service with the new system.

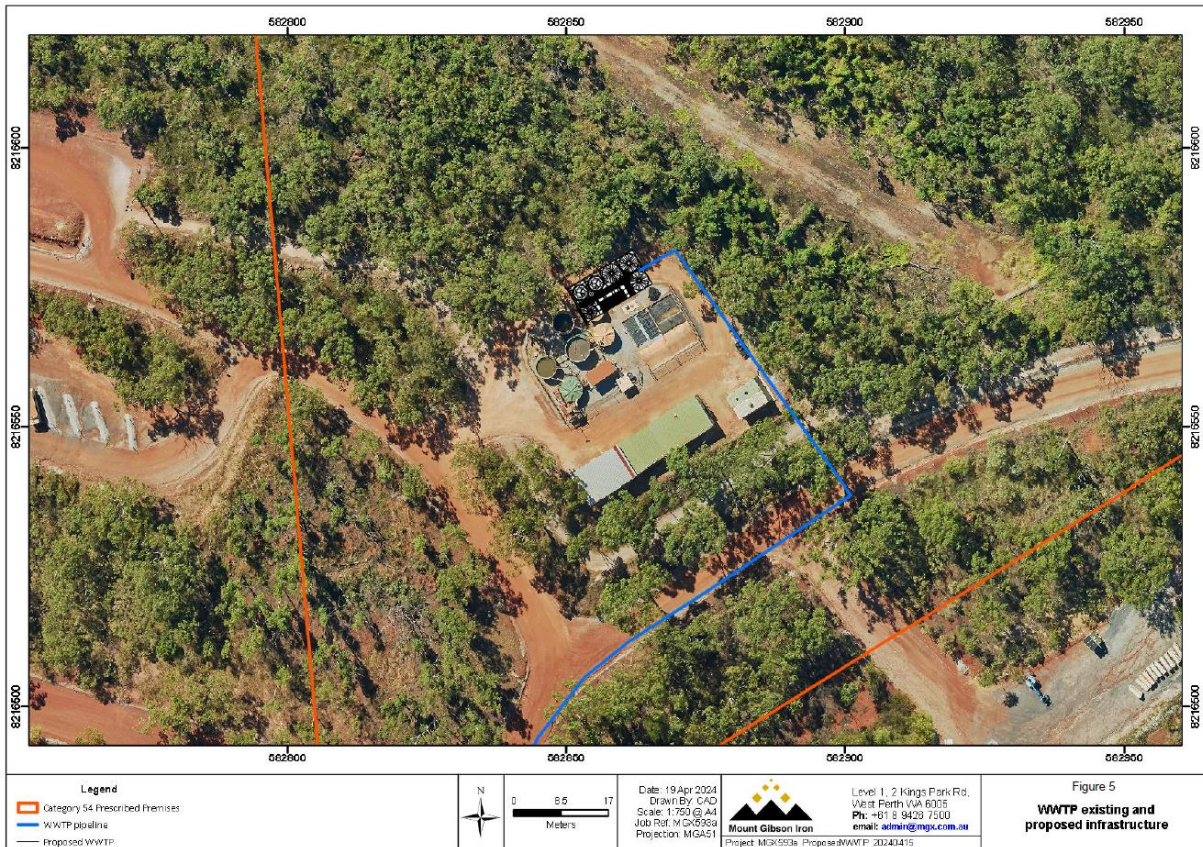
The MBBR will be located adjacent to the existing WWTP to allow for the ease in transition from one system to the other; as well as remaining within existing category 54 Prescribed Premises, Mining Proposal and Ministerial Statement 715 boundaries, and in a cleared area.

The MBBR will have a design capacity of 130 cubic metres (m<sup>3</sup>) per day, therefore the Licence Holder requests to have the assessed design capacity limit on the licence increased to 130 cubic metres per day. However, the Licence Holder expects the MBBR will process the current assessed throughput of about 100 m<sup>3</sup>/day.

The key components for the MBBR include:

- Primary Settling Tank (32 kL);
- Secondary Settling Tank (32 kL);
- Balance Tank (50 kL);
- Anoxic Tank (27 kL);
- Aeration Tank 1 (27 kL);
- Aeration Tank 2 (27 kL);
- Clarifier Tank 1 (15 kL); and
- Clarifier Tank 2 (15 kL).

There are four key stages of the treatment process: pre-treatment (anaerobic), treatment (fixed film Moving Bed Bio-media), post treatment (tertiary filtration) and effluent disposal (irrigation). The treatment process is completely enclosed to minimise odours (excluding the periodic transfer of sludge to the drying beds).



**Figure 3 – Existing WWTP and proposed infrastructure.**

The treated effluent from the MBBR will be directed to a new 3.3 ha irrigation sprayfield to be constructed and operated within Waste Rock Dump 5. This location is within the boundaries of the Mining Proposal, Ministerial Statement 715 and Prescribed Premises boundary. The hydraulic application rate will be less than 4 mm/day and proposed irrigation field is 3.3 ha.

In accordance with the information provided by the applicant, the WD5 waste rock dump contains waste material characterised as alkaline (pH 8 to 9 typically) and very geochemically benign. It comprises of mostly weathered sandstone/iron rich sandstone, siltstone, footwall schist and quartzite. The material typically contains a moderate amount of fines (estimated 20 to 30%) in the form of fine sands and silt from the breakdown of the parent sandstones and siltstones. Despite being sodic, the material is not erosive on slopes due to the lack of clays and presence of significant cobbles and larger rocks. The dump has a significant height/thickness in the area of 50 to 100 m and the WD5 irrigation field is also underlain by a backfilled waste rock bowl in the form of Barramundi pit. Per application supporting documents, groundwater depth is expected to exceed 150m below the surface in this location. The WD5 irrigation area does not contain vegetation or soil as such and would be levelled and intended to be covered with a fines rich growth medium at closure (thus not the final surface).

Effluent is proposed to be treated by the WWTP to the following effluent quality:

**Table 2: Effluent specification**

Parameter	Effluent specification
Biological Oxygen demand (BOD)	<20mg/L
Total nitrogen	<30mg/L
Total Suspended Solids	<30mg/L
Total Phosphorus	<8mg/L
Coliforms	<1,000 cfu/100mL
Residual chlorine	≥0.5mg/L, ≤2.0mg/L
pH	≥6.5 ≤8.5

During assessment the licence holder informed that the discharge of reject water (saline water) from an existing potable water treatment plant is also planned to be discharged into the new 3.3 ha irrigation field (L4) and existing irrigation field L2 (used as a backup only). The Village reverse osmosis plant will produce approximately 100 kL of reject water per day. The activity (water desalination plant) does not trigger the threshold under Category 85B, and the applicant has confirmed it will not be mixed with WWTP effluent, however, will be co-disposed. The reject water to be discharge was considered in this assessment, to ensure the proposed irrigation field capacity is sufficient to manage the proposed effluent discharge. However, the construction and operation of the water desalination plant is not assessed and managed through this licence amendment. General provisions of the EP Act still apply.

The licence holder confirmed the reject water volume was considered in sizing of the proposed and existing irrigation fields. The sizing was based on the Department of Health guidelines as well based on recent modelling undertaken.

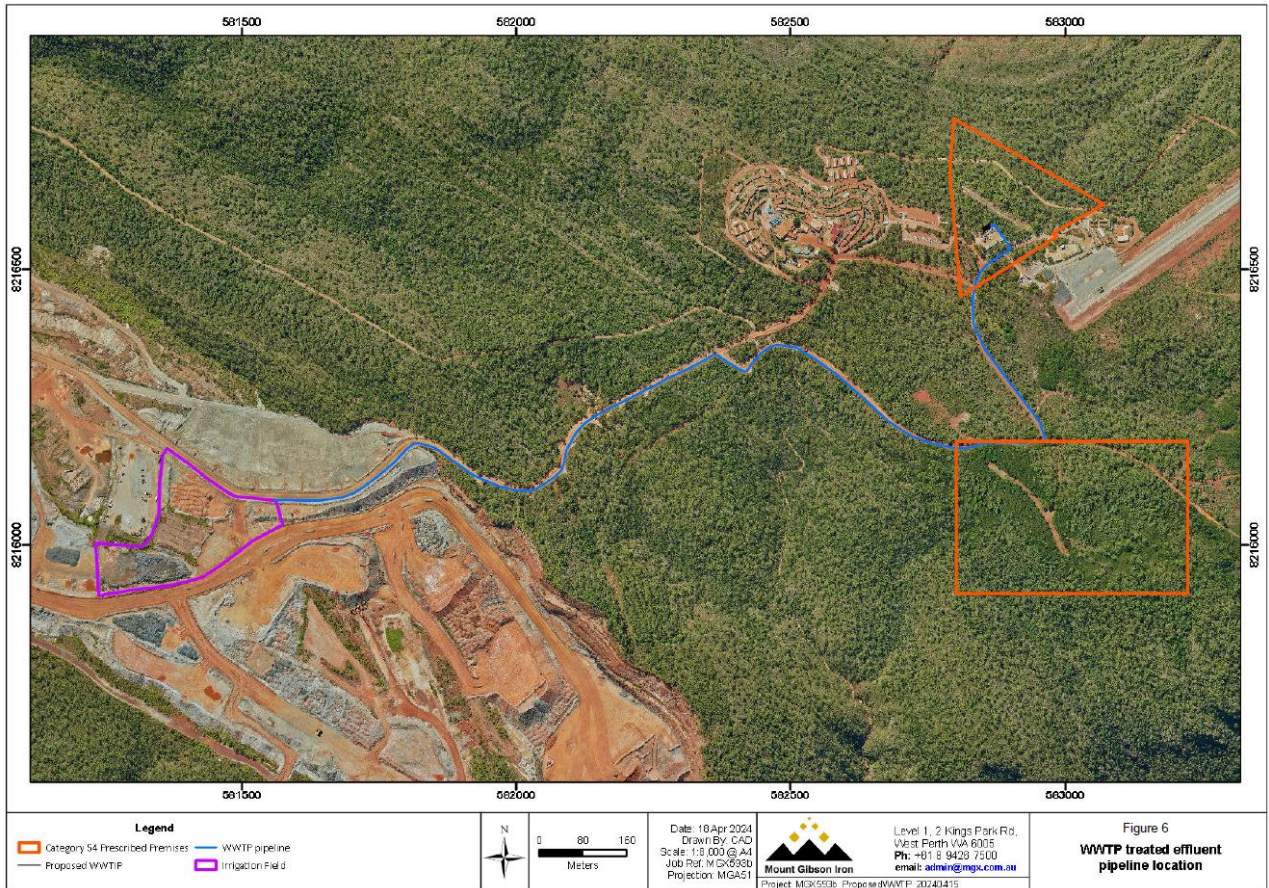
The following was also provided by the applicant:

- A calculation based on DWER's Water Quality Protection Note-22 and the Department of Health guidelines has been performed for the irrigation area based on maximum potential irrigation (including reject water from desalination). The nutrient retention capacity of the irrigation area is not exceeded (high iron soil type D for a sandy loam) overall and the water will infiltrate into the benign waste profile during the period of operation.
- The TDS concentrations range of expected co-discharge ranges from 869 mg/L TDS (61% WWTP, current use) to 973 mg/L TDS (57% WWTP, maximum design). While the waters will be discharged at varying times, levels of overall salinity are not high and will also be flushed by seasonal rains.
- Irrigation will be completed by pivot sprinklers in which the irrigation water will be most exposed to evaporation. The SAR of the blended water is 10.5 with 1.45 dS/m EC. If clays were present, this may indicate on standard scales a potential for 'slight to moderate' reduction in infiltration (due to sodic clay dispersion). This is not considered relevant for the waste rock on WD5 as it has a lack of clay as also seen by the very low CEC of 0.5 to 2 cmol(+)/kg (i.e., the lack of clay and exchangeable capacity means alteration of the 'soil' structure is very unlikely). High infiltration rates and a lack of surface water ponding is therefore expected to be maintained as per calculations for infiltration combined with evaporation rates.
- Potential salt accumulation on the surface of the WD5 irrigation area (from RO reject) will be later flushed by WWTP water and seasonally flushed by higher rainfall events into the waste rock dump each year due to the high seasonal rainfall between December and March.
- Additionally, the high iron (and manganese) content in the waste rock material will readily adsorb phosphate in the irrigation water as it infiltrates into the waste rock dump. High rain events also come with significant dilution.
- Levelling and placement of growth media (additional fines medium on the upper flat) at closure will mean vegetation at closure (and given flushing rains) will not be exposed to saline or nutrient rich 'soils'.

The existing L1 and L2 irrigation field will continue to operate for rotation of treated wastewater from the WWTP if required, based on inspections on the new field. The capacity of the L1 and L2 irrigation area has been re-assessed by the Licence Holder and determined to have a maximum capacity of 23KL/day (each) during the dry season.

This rotation of treated wastewater from the WWTP would only be required in times of very high rainfall, due to the oversized design of the proposed irrigation field on WD5.





**Figure 4 – Proposed new irrigation field (in pink) and associated pipeline. Orange boundaries include existing/proposed WWTP and existing irrigation fields.**

The Licence holder proposes to monitor effluent quality in line with the current monitoring program implemented for the existing WWTP and irrigation fields.

### WWTP Pipelines

Treated effluent for irrigation is transported via high density polyethylene (HDPE) pipeline (the same type of pipe is used to transport raw water to the potable water treatment plant). The pipelines are an acu-black pressure rated HDPE pipeline (PN 16/SDR11) 125mm pipe. Additional valves are proposed to be installed every 700m (about 2.6 km total length) to enable isolation of the pipeline for maintenance periods.

### 2.2.3 Mobile crushing and screening

The Licence Holder proposes an additional location for mobile crushing and screening activities to operate a mobile crushing and screening plant (MCS) to crush subgrade ore for the purposes of generating material for blast hole stemming, general sheeting (primarily for the Run of Mine), rehabilitation media for waste rock dumps and backfill for mine pit voids. The subgrade ore is stockpiled near Acacia Pit and on WD5 and WD2. The MCS plant is proposed to be operated at the area shown in Figure 5.



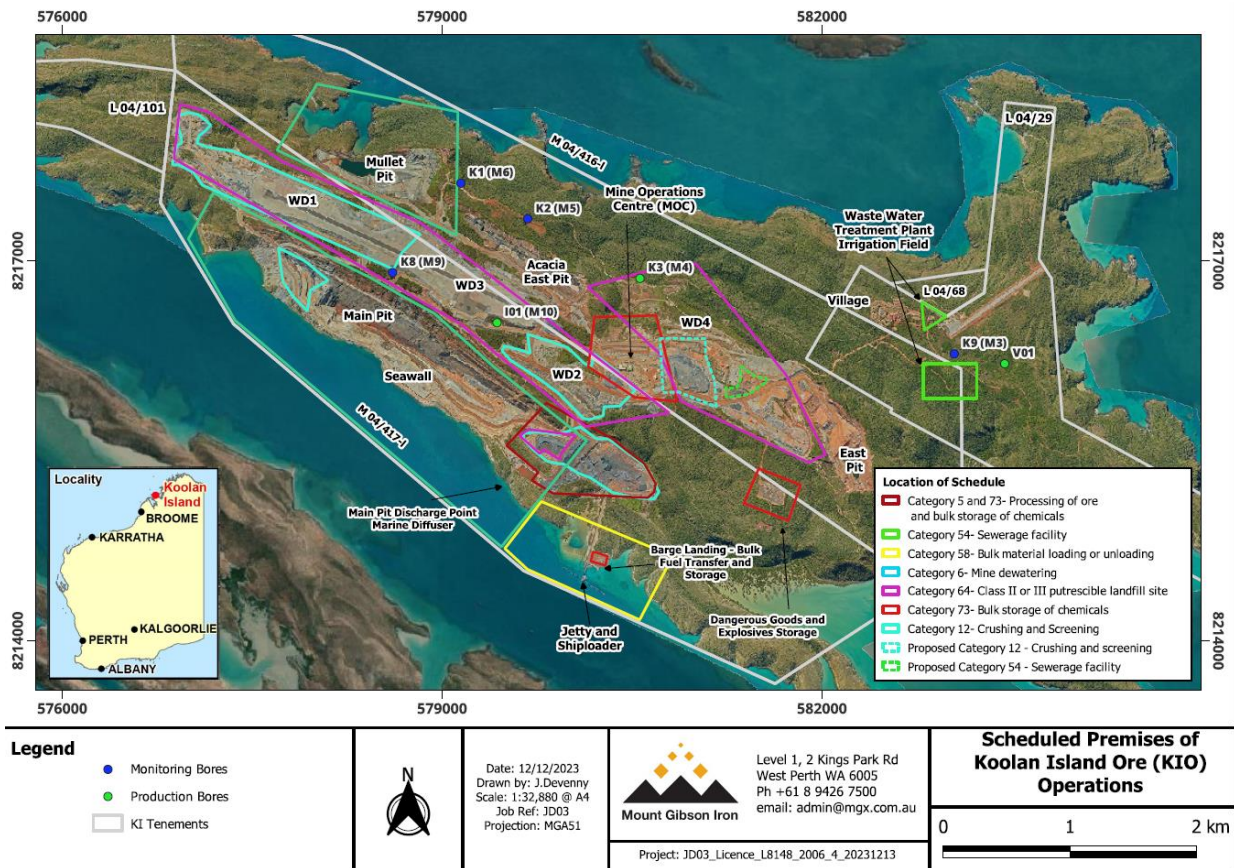


Figure 5 – New proposed Category 12 location shown in hatched blue.

### 2.2.4 Waste rock dump 5

Putrescible waste has previously been buried in dedicated landfill trenches within Waste Rock Dumps at the mine site. However, waste rock dumps within the project area have been re-designed due to operational requirements. The licence holder advises the existing landfill located within WD4 will now be located under the WD5 boundary (Figure 6), which has been revised. The Licence holder has confirmed there is no change to design, risk, or controls in place.

### 2.2.1 Removal of ambient groundwater monitoring bores

The Licence Holder proposes to remove the three out of service ambient groundwater monitoring bores from a figure on the Licence. The bores being removed are M2 (VO2), M7 (K15) and M8 (K12). These are not listed as monitoring points under Table 3.4.1 or require reporting under the licence. The bores are part of ongoing network of bores that provide a solid understanding of the water chemistry and levels time from ongoing groundwater abstraction and recharge processes. The reason for the removal is due to decommissioning of one bore in 2014, the lack of data from one bore (dry since 2014) and the other is now covered by a waste dump (airstrip).



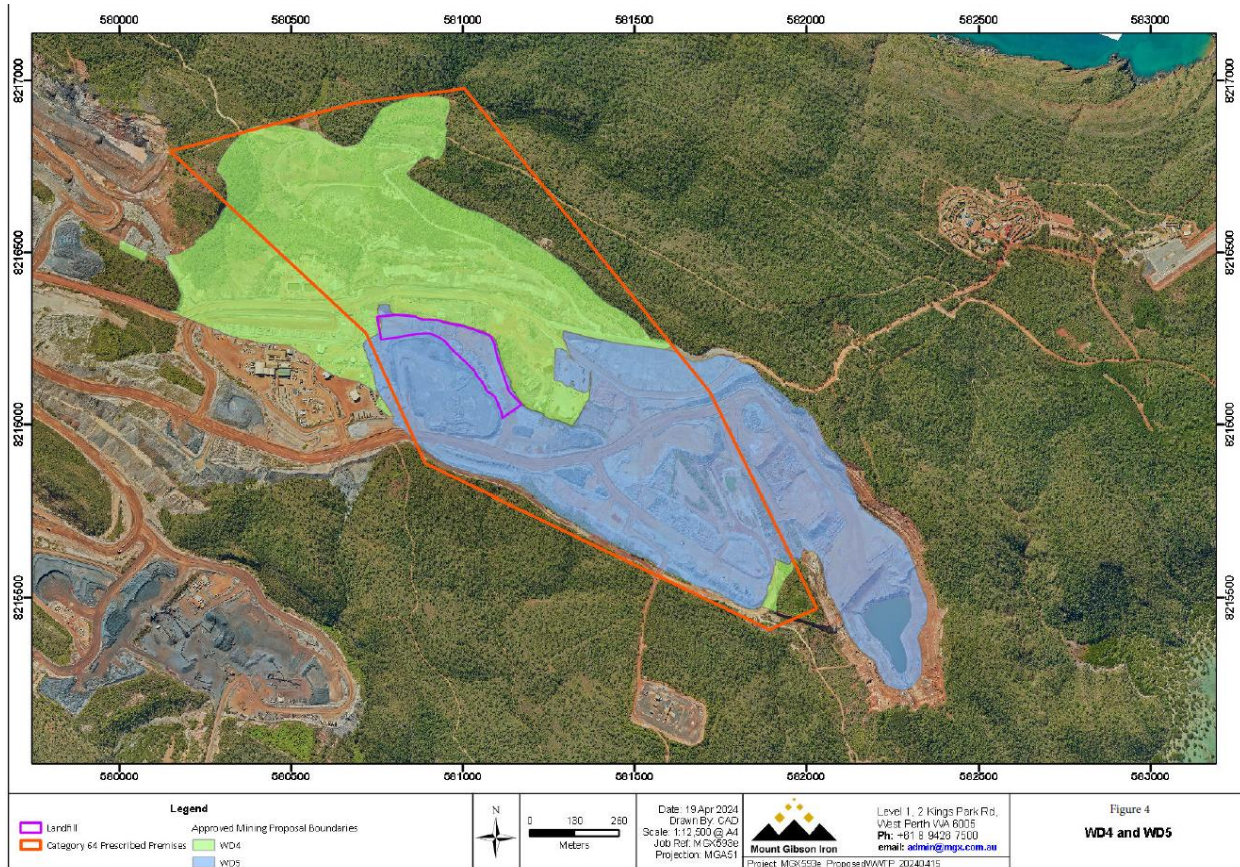


Figure 6 – Existing landfill location, now within the WD5 boundary.

## 2.3 Part IV of the EP Act

The Koolan Iron Ore Mine and Port Facility was assessed under Part IV of the EP Act under EPA Bulletin 1203 and approved under Ministerial Statement (MS) 715 in February 2006. MS 715 covers monitoring and protection of environmental receptors which could potentially be impacted by increased emissions and discharges from the proposed amendment. These receptors are listed in Table 4. This decision report only assesses emissions and discharges from the proposed activities and does not re-consider the management procedures outlined in MS 715. The requirements of MS 715 are not re-assessed in this decision report and are not duplicated as conditions in the Licence.

## 2.4 Other Approvals

### 2.4.1 Mining Proposal

*Addendum to Koolan Island Iron Ore Mining Proposal REG ID 5601* approved in September 2016, includes existing facilities such as the processing plant, crushing and screening facilities and an accommodation village. The MP does not specify the number of crushing circuits at the processing plant or further detail the crushing and screening facilities. The WWTP and irrigation field are considered a component of the accommodation village.

### 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 construction and operation which have been considered in this Amendment Report are detailed in Table 3 below. Table 3 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

**Table 3: Licence Holder controls**

Emission	Sources	Potential pathways	Proposed controls
Dust	Construction/installation of new WWTP and associated pipelines	Air/windborne pathway	Dust suppression using water carts. Temporary activity.
	Operation of the Tertiary Circuit at the Processing Plant		The new Tertiary Circuit has an inbuilt dust suppression system such as water outlets and sprays at each of the transfer points.  Water carts are utilised as required on ore stockpiles to reduce dust generation.  Visual monitoring of dust deposition on vegetation is undertaken opportunistically by environmental personnel as part of daily movements around site.  Applicant indicated no adverse effects on vegetation in these locations have been observed in relation to dust.
	Mobilisation of MCS plant to crush existing sub-grade ore stockpiles		Mobile crusher has an inbuilt dust suppression system including water outlets and sprays.  Water carts are utilised as required on ore stockpiles to reduce dust generation.  The new fixed crushing circuit does not increase the volume of fines produced, therefore there will not be a corresponding increase in dust emissions from this source.
Noise	Operation of the Tertiary Circuit at the Processing Plant and MCS plant.	Air/windborne pathway	Noise managed as per <i>Health &amp; Safety Management plan</i> .
Potentially	Operation of the Tertiary	Overland runoff	Stormwater is generally drained to sumps in

Emission	Sources	Potential pathways	Proposed controls
contaminated stormwater	Circuit at the Processing Plant and MCS plant.	potentially causing ecosystem disturbance or impacting groundwater quality	<p>low points within process plant operating area.</p> <p>The Licence holder proposes to reconfigure the existing surface water drain from a simple W-style surface drain to a low-flow filter drain, in the location shown in Figure 2. The filter drain is a sub-surface drainage solution consisting of perforated or slotted pipe within a gravel-filled open trench, designed to contain sediment in a 'first flush'.</p> <p>General controls are in place for hydrocarbon spill within the plant area, with spills contained and managed with absorbent material and removal of contaminated soil to the bioremediation farm on site.</p>
Odour	Operation of the new WWTP / MBBR	Air/windborne pathway	<p>Enclosed system.</p> <p>Regular inspections and maintenance of WWTP to ensure it is operating within specification.</p>
	Operation of the irrigation field		New irrigation field located about 1 km to any sensitive receptors.
Untreated or partially treated effluent	Operation of the WWTP	Direct discharge to land and overland runoff causing nutrient overloading.	<p>Enclosed system.</p> <p>Separation distance to groundwater &gt;2 m.</p> <p>Use of spill containment materials and collection of contaminated soils.</p>
Treated/blended effluent			<p>Regular inspections and maintenance of WWTP.</p> <p>The WWTP tanks are set on skids which provides for a compact design and allows the new plant to fit entirely within existing disturbed areas.</p> <p>No new hardstand areas are required for the site and existing infrastructure is suitable for management of stormwater.</p>
Untreated or partially treated and blended effluent	Operation of the irrigation field and associated pipelines	Direct discharge to land and overland runoff causing nutrient overloading/soil sodicity.	<p>Pipelines:</p> <p>Treated effluent for irrigation is currently transported via high density polyethylene (HDPE) pipeline (the same type of pipe is used to transport raw water to the potable water treatment plant). The pipe is placed on the windrow on the side of the main camp road.</p>



Emission	Sources	Potential pathways	Proposed controls																
Treated and blended effluent		Spray drift, pipeline leaks, overland runoff, pooling, soaking through the soil.	<p>This pipe has shown to be very durable over time with no history of large leaks or failure. The pipelines are an acu-black pressure rated HDPE pipeline (PN 16/SDR11) 125mm pipe.</p> <p>Irrigation Field:</p> <p>The proposed irrigation field is 3.3 hectares (ha) in size to ensure &lt;4 mm per day hydraulic application rate.</p> <p>Slope 1:20 to reduce runoff potential and pooling.</p> <p>6 metre (m) buffer around the perimeter equating to a total area of 3.5 ha.</p> <p>Vertical separation distance to groundwater &gt;2 m (applicant indicates the depth to groundwater across the island varies from 9 mBGL to 135 mBGL).</p> <p>The automated irrigation system will be installed at an adequate height and number of sprinklers to ensure even coverage of the field.</p> <p>Windrows 1.8 m high will also be established on the external boundary to prevent any potential surface water run-off from the area and to meet requirements for heavy vehicles. Internal windrows (the boundary of the irrigation field) will be 0.5 m high.</p> <p>Regular inspection of irrigation fields to ensure no pooling or surface water runoff is occurring.</p> <p>Effluent to be treated to the following effluent quality:</p> <table border="1" data-bbox="970 1503 1485 1697"> <thead> <tr> <th>Parameter</th> <th>Effluent specification</th> </tr> </thead> <tbody> <tr> <td>Biological Oxygen demand (BOD)</td> <td>&lt;20mg/L</td> </tr> <tr> <td>Total nitrogen</td> <td>&lt;30mg/L</td> </tr> <tr> <td>Total Suspended Solids</td> <td>&lt;30mg/L</td> </tr> <tr> <td>Total Phosphorus</td> <td>&lt;8mg/L</td> </tr> <tr> <td>Coliforms</td> <td>&lt;1,000 cfu/100mL</td> </tr> <tr> <td>Residual chlorine</td> <td>≥0.5mg/L, ≤2.0mg/L</td> </tr> <tr> <td>pH</td> <td>≥6.5 ≤8.5</td> </tr> </tbody> </table>	Parameter	Effluent specification	Biological Oxygen demand (BOD)	<20mg/L	Total nitrogen	<30mg/L	Total Suspended Solids	<30mg/L	Total Phosphorus	<8mg/L	Coliforms	<1,000 cfu/100mL	Residual chlorine	≥0.5mg/L, ≤2.0mg/L	pH	≥6.5 ≤8.5
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Residual chlorine	≥0.5mg/L, ≤2.0mg/L																		
pH	≥6.5 ≤8.5																		

### 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 4 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed

premises (*Guideline: Environmental siting (DWER 2020)*).

**Table 4: Sensitive human and environmental receptors and distance from prescribed activity**

Human receptors	Distance from prescribed activity
Cultural Centre	<p>Located 4kms east of proposed CAT 12 new area of activity.</p> <p>Located 4.7kms from proposed new Tertiary circuit.</p> <p>The topography between mining operations and the Cultural Centre is hilly with multiple ridges and gullies and is vegetated.</p> <p>The Cultural Centre is not a residence and only used approximately 20 days of the year. During this time short-term visitors such as Traditional Owners are present.</p> <p>Ruled out as a sensitive receptor due to separation distance.</p>
Heritage receptors	<b>Distance from prescribed activity</b>
Aboriginal Site	<p>K04-01 Aboriginal Heritage site located 1.8km from crushing screening, infrastructure, proposed irrigation field and existing landfill. Approximately 1.2km from proposed WWTP.</p> <p>Ruled out as a sensitive receptor due to separation distance.</p>
Environmental receptors	<b>Distance from prescribed activity</b>
Native vegetation	<p>Immediately surrounding the entire mining envelope.</p> <p>Mangrove vegetation/habitat exists approximately 220 m south of the existing tertiary unit and crushing circuit.</p> <p>Native vegetation is considered under this assessment.</p> <p><b>Introduced flora is managed by a Quarantine Management Plan which is required and implemented under condition 11 of Ministerial Statement 715.</b></p>
Priority flora	<p>Immediately surrounding the entire mining envelope.</p> <p>Conservation significant flora species within 500m from amendment locations (WWTP irrigation field and crusher unit).</p> <ul style="list-style-type: none"> <li>• <i>Jacquemontia</i> sp Keep River (J.L. Egan 5051) (approximately 500 m from new works of crusher unit and 360 m from the WWTP proposed irrigation area). Licence holder states that based on slopes and intervening features there is negligible risk of impact on these locations;</li> <li>• <i>Pterocaulon globuliflorum</i> (P2) is located approximately 440 m from the new crusher unit; and</li> <li>• <i>Triodia</i> sp Hidden Island (P1) is located approximately 350 m from the new crusher unit.</li> </ul> <p><b>Impacts of ground clearing upon conservation significant flora are managed by condition 9 of Ministerial Statement 715.</b></p>
Fauna	<p>Immediately surrounding the entire mining envelope.</p> <p><b>A Significant Fauna Species Management Plan is implemented to manage impacts of ground clearing upon conservation significant fauna as required by condition 9 of Ministerial Statement 715.</b></p> <p><b>A Northern Quoll Management Plan is implemented requiring the trapping</b></p>

	<b>of Northern Quolls to be undertaken prior to ground disturbing activities under EPBC 2006/2522.</b>
Marine environment	Immediately surrounding Koolan Island. <b>Impacts to the marine environment are managed by a Marine Management Plan which is required and implemented under condition 7 of Ministerial Statement 715.</b>
Groundwater	<p>The depth to groundwater across the island varies from 9 mBGL to 135 mBGL</p> <p>Koolan Island has three broad hydrogeological provinces that correspond with three main geological structures: Southern Syncline, Central Anticline and Northern Syncline (EPBC, 2022).</p> <p>The Southern Syncline is divided into two zones – an inland zone, which is used as a water supply area, and the orebody zone (i.e. Main Pit and Mangrove Pit). The two zones within the Southern Syncline are hydraulically isolated by an impermeable siltstone formation (Elgee siltstone) (EPBC, 2022).</p> <p>Water within Main Pit originates from the Yampi member orebody aquifer and seawater via the hanging wall at the southern end of the pit and varies between low and moderate salinities (EPBC, 2022).</p> <p>Groundwater resources are highly localised within fractured rock aquifers. Large yielding (&gt;20 L/s) bores are rare, owing to the tightness of the geological structure and lack of significant fracture development (EPBC, 2022).</p> <p>Potable water supply comes from two aquifers: the Northern Syncline aquifer (abstracted via bores V01 and K3 for village water supply) and the Southern Syncline aquifer (abstracted via bore I01 for industrial purposes, although it also supplies potable water to the Mine Operation Centre) (EPBC, 2022).</p> <p><b>Groundwater quality is managed by a Groundwater Management Plan which is required and implemented under condition 8 of Ministerial Statement 715.</b></p>
Surface Water	Minor drainage lines located surrounding existing disturbed areas of the project.

### 3.2 Risk ratings

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

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

Additional regulatory controls may be imposed where the Licence Holder’s controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

The Revised Licence L8148/2006/4 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Category 5, 12 and 64 activities.

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

**Table 5. Risk assessment of potential emissions and discharges from the Premises during construction, commissioning and 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
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
<b>Construction</b>								
Tertiary Circuit at the Processing Plant Mobile Crushing & Screening Plant WWTP	Dust	Air/windborne pathway causing impacts to health and amenity	Native vegetation Priority flora Fauna	Refer to Section 3.1	C = Slight L = Rare <b>Low Risk</b>	Y	N/A	N/A
<b>Operation</b>								
Tertiary circuit processing of ore at the Processing Plant. Mobile crushing and screening, loading, and unloading of materials at new Cat 12 area.	Dust and Noise	Air/windborne pathway causing impacts to health and amenity	Surrounding Native vegetation including Mangroves Priority flora Fauna	Refer to Section 3.1.1	C = Slight L = Possible <b>Low Risk</b>	Y	1,2,3,4,5,11	Infrastructure design and dust management commitments made by the Licence holder are added to condition 3 and 11 of the licence. Standard dust conditions added. General provisions under <i>Environmental Protection (Noise) Regulations 1997</i> apply.
	Potentially sediment-laden or contaminated stormwater	Overland runoff potentially causing ecosystem disturbance or impacting water quality	Surrounding Native vegetation, including rehabilitated area and mangroves Marine Environment	Refer to Section 3.1.1	C = Major L = Unlikely <b>Medium Risk</b>	Y	1,2,3,5,11, 28	Regarding potential for contamination of stormwater, the potential sources of hydrocarbons are transient, mainly from vehicles and heavy machinery (e.g., loaders, water carts). The Delegated Officer notes that hydrocarbons and chemicals are not stored within the tertiary crushing precinct and therefore considers the risk of stormwater contamination in the area to be low. The Delegated Officer considers that these sources can be adequately regulated under the <i>Unauthorised Discharge Regulations 2004</i> .  Stormwater should also be managed to ensure that all potential sources of sediment runoff do not adversely impact surrounding vegetation including mangroves, which are considered to have significant environmental value (EPA report 1203). The Delegated Officer notes that the remote sensing analysis of mangrove canopy cover and vegetation quality downgradient to the tertiary crushing precinct (Hydrobiology 2020) from 2009 to 2020 found that there was no significant change in mangrove cover and health within Mangrove Inlet (i.e., the tidal inlet between the tertiary crushing precinct and the ship loader jetty).  Condition 3 and 11 have been added to the licence to address the risk, which includes installation of the proposed subsurface drain to capture first-flush sediment in a 1 in 10-year (10% AER) rainfall event. It is acknowledged that spatial constraints mean stormwater generated in the tertiary crushing circuit, particularly during heavy rainfall events, cannot be fully contained on-site. The Delegated Officer considers the likelihood of impact to be 'unlikely' with the proposed applicant controls in place to capture the 'first flush' sediment loading (particularly finer-fraction loose material), no adverse impacts were reported in the mangrove inlet from 2009 to 2020 and ore will not be stockpiled in the area once construction of the tertiary crushing circuit is completed.  Reporting requirements have been added to the Annual Environmental Report relating to the performance of stormwater infrastructure within the operational areas and vegetation health monitoring downstream of processing/crushing and screening areas, including conditions of mangroves within Mangrove Inlet. This requirements is captured by condition 28 of the Licence.  Risks to the marine environment due to stormwater runoff is regulated under MS715.



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
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
Operation of wastewater treatment plant (leaks or overtopping of tanks)	Untreated, partially treated or treated effluent	Direct discharge to land and overland runoff, resulting in direct contact with native vegetation and adverse impacts from nutrient and salinity loading	Native vegetation Groundwater	Refer to Section 3.1.1	C = Slight L = Rare <b>Low Risk</b>	Y	1,2,3,11,28	WWTP design and management commitments made by the Licence holder are added to condition 3 and 11 of the licence.
Irrigation at the new 3.3 ha sprayfield	Untreated or partially treated effluent from the WWTP and RO unit  Treated effluent	Direct discharge to land from irrigation, with overland runoff and infiltration of treated wastewater with elevated nutrient and salt content.  Spray drift, overland runoff, pooling, soaking through the soil.	Native vegetation Priority flora Groundwater	Refer to Section 3.1.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	1,2,3,11,16,28	The irrigation field design and location have been added to the licence.

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.

## 4. Consultation

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

**Table 6: Consultation**

Consultation method	Comments received	Department response
The Shire of Derby-West Kimberly advised of proposal (9 February 2024)	No comments received.	N/A
Department of Health (DoH) advised of proposal (9 February 2024)	<p>Department of Health highlighted that the Koolan Island Workers Village, is approximately 1.4km from the proposed crushing and screening area and greater than 2km from metallic ore processing area. Department of Health recommended that the applicant is requested to provide further information on how air emissions from CAT 12 and 5 are managed.</p> <p>The proponent is to comply with the conditions of DoH approval to construct or install an apparatus for the treatment of sewage No 267.23 as issued on 31 January 2024.</p>	<p>The Workers accommodation village and the health and safety of visitors are managed under the <i>Work Health and Safety Act 2020</i>.</p> <p>Infrastructure design and commitments made related to dust management have been added to the Licence.</p>
Wanjina-Wungurr (Native Title) Aboriginal Corporation RNTBC advised of proposal (9 February 2024)	No comments received.	N/A
Licence Holder was provided with draft amendment on 5 August 2024 and 12 August 2024.	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
-	Revised to current licensing format template, grammatical changes, and wording.
Contents page	Removal of contents page.
Conditions renumbering	Renumbering of conditions undertaken as per current format template.
Tables and references to table	All tables number and references were updated accordingly.
Licence history	Licence history table has been amended by removing references to works approvals.
Introduction	Removal of the introductory explanation – DWER's industry licensing role, licence requirements, licence fees, ministerial conditions, premises description and licence summary.
Interpretation including definitions	Removal of the previous 'interpretation' section, with the definitions moved to Table 15 after the licence conditions. Amended existing definitions, inclusion of new definitions and removal or redundant definitions.
Licence conditions	Heading added
Infrastructure and equipment	Heading added
Conditions grammatical change	<i>Shall</i> replaced by <i>must</i> as per current licence format.
Table 1	Updated to include proposed activities and move crushing and screening plant requirements to operational requirements.
Condition 5	Certification requirements added as per current licence template.
Condition 11	Condition added to address operation requirements for relevant infrastructure assessed under this report.
Table 8	Added L4 emission point.
Table 11	Total dissolved solids replaced by total suspended solids as per applicant request.
Table 13	Table numbers updated. Requirement to report on stormwater management infrastructure and vegetation condition added to the licence.
Figure 1 and 2	Figures replaced.
Figure 3 to 6	Figures added to the licence.



## References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. Environmental Protection Authority (EPA) 2006, *Ministerial Statement 715*, Environmental Protection Authority, Perth, WA.
5. Hydrobiology 2020, *Mangrove Canopy Cover And Vegetation Quality At Koolan Island (2009 – 2020)*, Version 1.0 13<sup>th</sup> July 2020.
6. Mount Gibson Iron Limited 2016, *Addendum to Koolan Island Iron Ore Mining Proposal Reg Id 5601*, West Perth, Western Australia.

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

Condition	Summary of Licence Holder’s comment	Department’s response
<b>Comments received on 1 August 2024</b>		
<p>Table 1: Design and construction/installation requirements</p>	<p>Hydrocarbons and chemicals are not stored within the tertiary crushing precinct, therefore there is a low risk of surface water runoff from this area containing significant contamination of this type. The potential sources of hydrocarbons in this area are transient, mainly from vehicles and heavy machinery (e.g., loaders, water carts). Although hydrocarbon spills from these sources can occur from time to time they are readily managed on site in accordance with the relevant procedures and do not present a significant risk to either land or water at Koolan Island.</p> <p>In terms of residual sedimentation, as stated previously, the subsurface drain is intended to perform as ‘first-flush’ system capturing initial runoff having higher sediment load from the tertiary crusher precinct as it is washed into the gravel around the pipe. This ‘first-flush’ contains a higher sediment load as stormwater initially mobilises the finer-fraction of loose material. This finer-fraction material is primarily a result of the movement of vehicles and machinery (rather than from ore stockpiles).</p> <p>KIO also advises that the area near the tertiary crushing circuit is used to stockpile lump ore (not fines ore) from the fixed crushing plant. This lump ore is then re-processed via a mobile crushing and screening plant at the eastern end of the stockyard to produce fines ore for export. In other words, fines ore is not stockpiled in the proposed tertiary crushing precinct.</p> <p>Furthermore, once construction of the tertiary crushing circuit is completed, lump ore will no longer need to be stockpiled. The lump ore will be processed via the tertiary circuit to produce fines ore that will be stockpiled on the northern side of the stockyard. Stormwater runoff in this area of the stockyard flows north to the drainage line (on the northern side of the stockyard) then east to its terminus in a fully contained basin (on the eastern side of the stockyard).</p> <p>As stated previously, the difficulty with secondary containment of stormwater on Koolan Island is that such containment systems need to be extremely large to either contain surface water for disposal via infiltration or otherwise retain surface water for sufficient duration to allow sediment to be removed from suspension. Rainfall at Koolan Island averages approximately 800 mm per year. Nearly all of this rainfall</p>	<p>This additional information has been considered in the risk assessment with the decision report updated accordingly where relevant.</p> <p>A requirement to report on the performance of stormwater infrastructure within the tertiary crushing precinct and monitor vegetation condition downstream, including mangroves within Mangrove Inlet, has been added to annual reporting (condition 28).</p>

Condition	Summary of Licence Holder's comment	Department's response
<b>Comments received on 1 August 2024</b>		
	<p>occurs within the summer months (Dec-Feb/Mar) as moderate-high intensity events generating large volumes of surface water runoff.</p> <p>The stormwater model developed for the sub-surface drainage application enables storage volumes to be calculated for various rainfall events. The table shown in Schedule 1 provides the storage capacity of the sub-surface drain for the 1-hour storm duration in relation to several drain specifications (0.5m versus 1.0m depth; 100mm versus 300mm pipe diameter) and several rainfall events (1EY, 5EY and 10EY).</p> <p>The stormwater model shows that a sub-surface drain measuring 191m L x 0.5m D x 3.7m W provides 98 m<sup>3</sup> of secondary storage capacity (within the gravel void space) and would need to be approximately 10x larger (998 m<sup>3</sup>) to accommodate the 63 (or 1EY) rainfall event of 60 min duration (45.5mm of rainfall). If a 300mm diameter pipe were used instead of a 100mm pipe, the drain would need to be 6x larger. KIO concludes that even if the drain could be constructed to provide secondary containment for the 63 (1EY) event, which is practically difficult given operational constraints, it would still overtop during every larger rainfall event (i.e., if the site receives more than 45.5mm of rainfall in 1 hr). In the absence of an outlet to allow surface water to drain away from the tertiary crushing precinct, even moderate rainfall presents a risk of flooding of infrastructure due to the relatively flat topography of the processing area.</p> <p>In terms of risk to downstream environmental receptors such as mangroves, it has been established above that there is negligible risk of significant hydrocarbon contamination in relation to surface water discharge from the tertiary crushing precinct.</p> <p>In terms of sedimentation, KIO advises that mining operations since 2006 have not had a significant adverse effect on the mangroves within Mangrove Inlet (i.e., the tidal inlet between the tertiary crushing precinct and the shiploader jetty). A remote sensing analysis of mangrove canopy cover and vegetation quality for the period 2009- 2020 found that:</p> <ul style="list-style-type: none"> <li>• vegetation cover at Mangrove inlet increased from 1.4 ha in October 2009 to 2.7 ha in April 2020, an increase of 84%;</li> <li>• there was very similar trend in vegetation quality between Mangrove Inlet and Barramundi Bay (reference site), fluctuating between an NDVI score of 0.3 and 0.5;</li> <li>• a decline in mangrove canopy cover at Mangrove Inlet was measured in 2019; however, this trajectory was observed to be more substantial at Barramundi Bay - this infers that had there been a true decline in mangrove vegetation, it was unlikely to be associated with mining operations and more symptomatic of seasonal and/or interannual variation in mangrove health as expected in this part of the Kimberley;</li> <li>• mangrove canopy cover appeared to have recovered to 2.45 ha in 2020, along</li> </ul>	



Condition	Summary of Licence Holder's comment	Department's response
<b>Comments received on 1 August 2024</b>		
	<p>with an increase in vegetation quality at both Mangrove Inlet and Barramundi Bay for the same year (Hydrobiology, 2020) (Schedule 2).</p> <p>KIO submits that the risk rating for potentially sediment-laden or contaminated stormwater affecting mangroves within Mangrove Inlet could reasonably be downgraded to 'Low Risk', based on the managed absence of hydrocarbons within the tertiary crushing precinct together with the documented net increase in mangrove canopy cover and maintenance of vegetation condition over the period 2009-2020.</p> <p>KIO acknowledges the requirement to report on the performance of new stormwater infrastructure within operational areas. Reporting on vegetation condition of Mangrove Inlet downstream of the processing area can be undertaken as part of the AER.</p>	
Condition 6 (	<p>KIO advises that WD5 is being constructed over previously disturbed areas of the mine site, including a portion of what was formerly known as WD4. The construction of WD5 also involves the complete backfill of Barramundi Pit and the partial backfill of East Pit. The boundary of WD4 has therefore been redrawn and its extent reduced (not removed), based on the approved design of WD5.</p> <p>The current landfill location is on the boundary of WD4 and WD5 and the removal of WD4 from the Licence therefore presents a risk of future non-compliance. Importantly, KIO is not seeking additional area for burial of waste, compared to what is already approved (based on the superseded boundary of WD4). WD5 has been constructed over the top of the relevant part of WD4 i.e., it is not in addition to WD4.</p> <p>For the reasons outlined above, KIO requests that WD4 be retained as a location for burial of waste.</p>	The Delegated Officer has retained WD4 on Figure 1.
Table 5: Site infrastructure and operation requirement	<p>This item relates to the additional/expanded mobile crushing and screening locations. KIO requests that Item 1(c) be removed as sumps are not proposed to be constructed in the additional/expanded Category 12 locations. Storage of processed material in these locations will be short-term in nature, for use in either mining applications (e.g., stemming and/or road base/sheeting) or otherwise rehabilitation activities.</p>	An outcome-based condition (Table 5, requirement c) has been added to replace the existing condition to ensure risk of impacts to surrounding vegetation due to overland runoff is minimised at the new crushing and screening location near WD4.
Table 5: Site infrastructure and operation requirement	<p>KIO requests that the L1 irrigation field be retained in addition to the L2 irrigation area, mainly for operational flexibility if needed. It was initially thought that the L1 could be decommissioned; however, with the reduced maximum irrigation rate for</p>	L1 retained with a maximum irrigation rate of 23 m <sup>3</sup> /day.

Condition	Summary of Licence Holder's comment	Department's response
<b>Comments received on 1 August 2024</b>		
	<p>L2 of 23m<sup>3</sup>/day it is prudent to retain L1. Both L1 and L2 would function as standby irrigation areas, for use during maintenance of the L4 irrigation area or otherwise as needed (e.g., during the wet season to avoid ponding and/or surface water runoff) depending on the actual performance of the L4 irrigation area.</p> <p>As for the L2 irrigation area, the maximum irrigation rate for L1 would also be 23 m<sup>3</sup>/day, based on an approximate irrigation area of 0.3 ha, providing a combined total standby irrigation area of 46m<sup>3</sup>/day across both the L1 and L2 irrigation areas.</p>	
Table 4 of Decision Report (p14)	KIO advises that hydrocarbon-contaminated soil is removed and treated at the bioremediation farm on site – it is not sent to an off-site licenced facility.	Information corrected in decision report.
Table 5 of Decision Report (p16)	KIO advises that the Cultural Centre is not located within the Village. It is located at the end of the track leading to the eastern-most portion of L04/29.	Cultural Centre location corrected.
<b>Comments received on 13 August 2024</b>		
Licence expiry	Request that the licence be extended beyond current expiry of 17 June 2025.	The Delegated Officer advises that the department is planning to undertake a review of all licence conditions as part of the next renewal process. Given there is sufficient time to commence that process, the department will retain the original expiry date under this amendment.
(Old) Figure 2	Request Figure 2 be removed as it refers to proposed category 12 and does not include pipeline alignment from the WWTP nor reference to WD5. Suggest cross reference Table 5 to refer to Figure 1 instead.	Removed Figure 2 and corrected cross-reference.
Figure 2	Correct figure caption as it should be "Figure 2: Emission point locations"	Updated to Figure 2 and subsequent figure numbering.
Figure 3	Replace Figure 3 with revised map without monitoring point M17, given this monitoring point is not referenced elsewhere	Replaced with updated map
Condition 23	Missing table reference	Corrected.
Ambient environmental quality monitoring	Correct condition numbering	Corrected.
Table 5 (Item 2b)	Lists residual free chlorine but this parameter is not included in Table 11.	Included in table 11.