

## **Amendment Report**

## **Application for Licence Amendment**

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

| Licence Number    | L8621/2011/1                                                   |
|-------------------|----------------------------------------------------------------|
| Licence Holder    | Roy Hill Iron Ore Pty Ltd                                      |
| ACN               | 123 722 038                                                    |
| File Number       | 2011/009784-1                                                  |
| Premises          | Roy Hill Iron Ore Mine                                         |
|                   | M46/518 and M46/519                                            |
|                   | NEWMAN WA 6753                                                 |
|                   | As defined by the premises map attached to the amended licence |
| Date of Report    | 10 August 2020                                                 |
| Proposed Decision | Revised licence granted                                        |

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## 1. Decision summary

Licence L8621/2011/1 is held by Roy Hill Iron Ore Pty Ltd (RHIO) (Licence Holder) for the Roy Hill Iron Ore Mine (the premises), located at M46/518 and M46/519, Newman.

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 proposed changes the Premises. As a result of this assessment, amended licence L8621/2011/1 has been granted.

## 2. 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 <a href="https://www.der.wa.gov.au">https://www.der.wa.gov.au</a>.

## 3. Scope of assessment

On 10 March 2020, the Licence Holder submitted an application to the department to amend Licence L8621/2011/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments were sought:

- Expansion of the Magnetic Separation Plant (MSP).
- Installation of a Non-Process Plant (NPP) for dry crushing and screening of approximately 9 Mtpa of ore.
- Removal of, and addition of, Managed Aquifer Recharge (MAR) injection bores and groundwater monitoring bores.
- Change to reporting unit for of *E. coli*.
- Change of Process Water Dam unscheduled discharge location.

On 5 June 2020, RHIO notified DWER of a proposed change to the boundary of the Mine Process Plant irrigation spray-field and requested this be included in the amendment application as a minor update as there is no change to risk. The Delegated Officer agreed to include the irrigation sprayfield in the scope of the assessment.

On 1 July 2020, RHIO notified DWER that the NPP is to be withdrawn from the amendment due to a recent change in the mine plan resulting in the crusher no longer being required.

This amendment is limited only to changes relating to categories 5, 6 and 54 of the existing licence, but with no change to design/throughput capacities, and no changes to the aspects of the existing licence relating to Categories 12, 52, 57, 64, 73 or 85B.

## 4. Magnetic separation plant expansion

An MSP has been constructed to capture ultra-fine high grade iron ore material from the final tailings waste stream, prior to tailings deposition at the Tailings Storage Facility (TSF). The MSP was expected to recover approximately 4 Mtpa ultra-fine iron ore. RHIO proposes to expand the MSP with total recovery at the final MSP of up to 9 Mtpa.

The MSP is a wet processing facility with pipelines and pumps to transfer the tailings underflow throughout the plant.

The MSP takes the underflow from an existing process plant thickener and processes it through scrubbers, screens, staged magnetic separation, thickeners and concentration tanks, with recovery incorporated into the existing fines iron ore fines (stream) for export. Excess tails remaining after the completion of the MSP and concentration process is thickened and then transferred to the existing process plant tailings transfer tank before being piped to the TSF.

The Process Water Dam receives any excess water that is returned from the MSP process. The MSP currently consists of:

- Bunded tailings transfer from the process plant.
- Overflow Scrubber.
- Screening.
- Staged Magnetic Separation.
- Thickeners.
- Concentration Tanks.
- Oily water separator, sumps and stormwater diversion infrastructure.

The proposed MSP extension will consist of:

- An additional thickener to thicken the tailings stream to the required density for process separation.
- Three additional processing units, and a further two units if deemed required to recover the targeted high-grade iron that has not been captured in the Initial Stage 1 of the MSP, with the flexibility to switch back to treating the tailings stream.
- A switch room; to cater for the expansion to 10 units.
- A switch room to cater for the expansion to 12 units.
- A spiral building.
- A feed tank; to the MSP.
- A feed tank to the De-sands Buildings for Oversized Screen Feed.
- A feed tank to the Plate and Frame filtration building.
- A plate and frame filtration building to reduce the moisture to the required target.
- Ancillary infrastructure (including but limited to ablutions, offices, crib rooms, process water, power).
- Stormwater diversion so that stormwater is diverted to the main stormwater diversion drains.
- All new infrastructure will be self-contained with spillage redirected back into the MSP tailings tanks and Thickeners.

The boundary of the existing MSP plant and the proposed extension is outlined in Figure 1 below.



Figure 1: MSP boundary

## 5. Process Water Dam creek discharge

The Process Water Dam contains mine dewatering water, tailings return water, and water from the Stage 1 borefield. Mine dewater is used in the process plant if it meets operational water quality requirements.

The existing licence approves unscheduled discharge from the Process Water Dam to No Name Creek, at a location named the 'Zulu Creek Discharge Point' (location shown in Figure 2 below).

The 'Zulu', 'Bravo' and 'Delta' dewatering discharge locations were included in the licence by Amendment Notice 4. Disposal of pit dewater to these locations was removed by Amendment Notice 8 because dewater disposal had moved to the MAR system. Unscheduled Process Water Dam discharge to Zulu dewater creek discharge location remained in the licence.

The Applicant has requested that the 'Zulu Creek Discharge Point' for the Process Water Dam discharge be amended as it "*is not accurate as this represents discharge from dewater*". The Application included a map for the discharge route and location (Figure 3).

The discharge point is at a drainage line approximately 1 km upstream of the existing licence Zulu Dewatering Creek Discharge location. There are no changes to process pond water quality or volumes, or sensitive receptors. Flow path remains within No Name Creek (via the drainage line).

A submersible pump will likely be utilised to pump water from the dam into the No Name Creek drainage line as shown in Figure 3.

The Applicant has confirmed the discharge infrastructure at Zulu Dewatering Creek Discharge location (rip rap, spreaders, flow-meter) has been decommissioned.



#### Figure 2: Zulu Creek Discharge Point



#### Figure 3: Process Water Dam discharge location

## 6. MAR

## 6.1 MAR injection bores not required

RHIO has undertaken a review of the injection bores which are currently on the operating licence and has noted that one bore has failed and is no longer required. In addition, part of the initial concept was to convert some production bores in Stage 1 Borefield into injection bores however this is no longer required. As such, RHIO has requested that the following injection bores be removed from the operating licence:

- RHIB0188 and associated groundwater monitoring bore RHPZ0255.
- RHIB0023 (no associated monitoring bore)
- RHIB0024 (no associated monitoring bore)
- RHIB0027 (no associated monitoring bore)
- RHIB0030 (no associated monitoring bore)
- RHIB0036 (no associated monitoring bore)
- RHIB0039 (no associated monitoring bore)

#### Decision

The bores listed above will be removed from the licence.

## 6.2 MAR – proposed new injection bores

RHIO proposes to install six new injection bores and associated groundwater monitoring bores in the South West Injection Borefield (SWIB) and requests that the following bores be added to the operating licence:

- RHIB0431 (associated monitoring bore RHPZ0400)
- RHIB0432 (associated monitoring bore RHPZ0401)
- RHIB0433 (associated monitoring bore RHPZ0402)
- RHIB0434 (associated monitoring bore RHPZ0403)
- RHIB0435 (associated monitoring bore RHPZ0404)
- RHIB0436 (associated monitoring bore RHPZ0405)

#### Decision

The six new SWIB injection bores and groundwater monitoring bores above will be added to the licence.

#### 6.3 Groundwater monitoring bore RHPZ0228S

During a review of the groundwater data, RHIO has noted that groundwater monitoring bore RHPZ0228S, adjacent to bore RHIB0266, has been installed but is not included in the licence. The Application includes the bore log for RHPZ0228S.

RHIO is monitoring a bore next to each injection well and considers that this monitoring bore should be added to the operating licence.

#### Decision

Groundwater monitoring bore RHPZ0228S will be added to the licence.

#### 6.4 MAR – shallow bores

The Applicant requested to add 's' to MAR groundwater monitoring bores to ensure the bores in the licence match the bores in the field. The bores in the MAR borefields sample from the shallow or alluvial aquifer.

#### Decision

Agreed. 's' has been added to bores where indicated appropriate by RHIO.

## 7. E. coli. reporting

The existing licence condition 3.3.1 requires reporting of E.coli. in units of cfu/100mL. Likewise, licence fees for emissions of E.coli are calculated by units of cfu/100mL. RHIO has requested that E. coli. can be reported in *"cfu/100 mL or MPN/100 mL."* 

Table 7 of the *Guidelines for the Non-potable Uses of Recycled Water in Western Australia* produced by the Environmental Health Directorate, Department of Health, Western Australia 2011, implies 1 MPN and 1 cfu/100mL are equivalent values.

#### Determination

The Delegated Officer has determined that reporting for E.coli should remain in units of cfu/100 mL for consistency across reporting periods and years, and for calculation of fees. If the laboratory provides reports to RHIO in units of MPN, RHIO must convert the units prior to

cfu/100mL for reporting to DWER under the licence.

## 8. Mine process plant WWTP spray-field

To enable construction of a new road, changes to the boundaries of the Mine Process Plant Irrigation Field are proposed as shown in Figure 4.

Effluent discharge quality and amount, location of potential receptors (none in the vicinity) and licence holder controls remain the same.



Figure 4: Mine Process Plant Irrigation Area

#### Determination

There is no change to risk. Conditions in the existing licence remain applicable. The map of the Mine Process Plant irrigation spray area in Schedule 1 of the Licence is updated to include the proposed change of boundary.

## 9. Zulu5 In Pit TSF

RHIO completed construction of the Zulu5 in-pit TSF (Z5IPTSF) embankments and pipework and provided compliance documents to DWER on 15 April 2020. Decant lines have been constructed to dispose of water to the process pond and the Central Transfer Ponds (currently under construction).

On 7 July 2020 RHIO notified DWER that due to delayed construction of the Central Transfer Ponds an alternative configuration to dispose the decant water to the above ground TSF has been constructed. Construction documentation was submitted for the return line variation with the notification.

## **10.** Other approvals

The licence holder has provided the following information relating to other approvals relevant to the application, as outlined in Table 1.

#### Table 1: Other approvals

| Legislation                                                                            | Reference             | Relevant approvals                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental<br>Protection and<br>Biodiversity<br>Conservation Act 1999<br>(EPBC Act) | EPBC No:<br>2008/4624 | Notification of Referral Decision – Not a Controlled<br>Action                                                                                                                                                                                                                                                                                                                                                                                                   |
| EP Act Part IV                                                                         | MS 824 (stage 1)      | Includes approval for clearing of defined development areas.                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                        | MS 829 (Stage 2)      | MS 824 and MS 829 provide conditions for the<br>management of groundwater drawdown,<br>groundwater dependent vegetation (from<br>groundwater abstraction) and groundwater and<br>surface quality impacts from run-off and seepage<br>from the waste rock dump, waste fines storage<br>facility and evaporation pond.<br>Condition 8 of MS 824 and Condition 10 of MS 829<br>requires monitoring of groundwater quality around<br>waste fines storage facilities. |
| Mining Act 1978                                                                        | Reg. ID 87062         | Mining Proposal yet to be approved for the MSP extension at the time of this assessment.                                                                                                                                                                                                                                                                                                                                                                         |
| Rights in Water and<br>Irrigation Act 1914<br>(RIWI Act)                               | GWL172642(4)          | Groundwater Licence (5C)                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## 11. Risk assessment – Source, pathways and receptors

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

## **11.1 Emissions and controls**

The key emissions and associated actual or likely pathway during construction and 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 – Construction and operation

| Emission                                                        | Sources                                                                | Potential<br>pathways                  | Applicant controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| Magnetic Separatio                                              | Magnetic Separation Plant (MSP)                                        |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |
| Dust                                                            | Dust during<br>construction.<br>MSP is a wet<br>process<br>(operation) | Air/windborne                          | Not provided                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |
| Noise                                                           | Vehicles and plant<br>during construction<br>and operation             | Air/windborne                          | Not provided                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |
| Contaminated<br>stormwater and<br>spills<br>Storage of tailings | Uncontained spills,<br>leaks and<br>sediment                           | Direct discharge<br>and flow path.     | <ul> <li>The entire MSP will be managed in accordance with the:</li> <li>RHIO Surface Water Management Procedure (OP-REP-00034).</li> <li>Hazardous Materials Management Procedure (OP-REP-00289).</li> <li>Bunds, Sumps, Washdowns and Oily Water Separators Management Procedure (OP-PRO-00178).</li> <li>Roy Hill Spill Response Procedure (OP-PRO-00178).</li> <li>Roy Hill Spill Response Procedure (OP-PRO-00275).</li> <li>and include:</li> <li>Surface water will be diverted away from the facility with stormwater.</li> <li>Sump water level monitored following rainfall events and pumped out to prevent overflows.</li> <li>Oily water separator constructed at the existing MSP plant.</li> <li>Spill kits will be provided and accessible.</li> <li>Any soil contaminated by hydrocarbon will be taken to the bioremediation facility for treatment.</li> <li>Environmental inspections as per existing Mine Inspection Schedule.</li> </ul> |  |  |  |  |  |  |
| Storage of tailings                                             |                                                                        | 1                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |
| Tailings and decant<br>– potential change<br>to the %           | MSP tailings<br>stream processed<br>prior to discharge                 | Seepage<br>through base<br>the storage | Applicant has not detailed any changes to the existing controls of tailings distribution or decant pond                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |  |  |

| Emission                                                                                                                | Sources                                                                                           | Potential<br>pathways                                                                                                         | Applicant controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| solids/consolidation<br>of the tailings<br>stored (no<br>information<br>provided by the<br>Applicant).                  | to the TSF or<br>Z5IPTSF; and<br>decant from the<br>Z5IPTSFdisposed<br>to the above<br>ground TSF | facilities with<br>infiltration<br>through ground<br>to groundwater                                                           | management.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Process Water Dam                                                                                                       | 1                                                                                                 |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Process water<br>(containing tailings<br>return water, water<br>from Stage 1<br>borefield and pit<br>dewatering water). | Process Water<br>Dam                                                                              | Discharge at the<br>No Name Creek<br>natural drainage<br>line with flow<br>path<br>approximately 1<br>km to No Name<br>Creek. | A freeboard of 800 mm is maintained,<br>and the process water dam is<br>inspected daily. Unscheduled<br>discharge is required for maintenance<br>purposes only to ensure integrity of<br>the dam liner is maintained.<br>A submersible pump will likely be<br>used to pump water into an internal<br>drain and onto the discharge point<br>(route shown in Figure 3).<br>Existing concrete armour for erosion<br>and sediment control is in place to<br>minimise erosion and movement of<br>sediment at the discharge location. |

### 11.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), employees, visitors and contractors of the Licence Holder are excluded from this assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for by other state legislation.

Table 3 below provides a summary of the closest human and environmental receptors to the proposed activities, and whether they may be impacted as a result of emissions and discharges from the proposed activities (*Guidance Statement: Environmental Siting* (DER 2016).

| Closest human receptors                                                                                                            | Approximate distance from the prescribed activity/emission | Potential impact      |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------|
| Roy Hill Homestead                                                                                                                 | 20 km from the MSP.                                        | No - due to distance. |
| Closest environmental receptors                                                                                                    | Distance from prescribed activity                          |                       |
| Five priority flora species have<br>been recorded on the premises.<br>Native vegetation and riparian<br>vegetation on the premises | The MSP is located within a larger cleared area.           | No - due to distance  |
| Fortescue River and Marsh -<br>Priority 1 Ecological Community                                                                     | 12 km from the MSP                                         | No - due to distance  |

#### Table 3: Closest receptors

| (PEC)                                                                                                                                                                                                                             | 12 km from Process Water Dam discharge location                                                                                                                                    |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Surface water bodies<br>Ephemeral creeks including<br>groundwater dependent and                                                                                                                                                   | MSP (stormwater) - No Name Creek is approximately 150 m to the west of the MSP                                                                                                     | Yes |
| surface water vegetation<br>communities<br>The premises is drained by<br>several ephemeral creeks,<br>including No Name Creek, which<br>generally flow in a south westerly<br>direction towards the Fortescue<br>River and Marsh. | Process Water Dam directly discharges<br>into a natural drainage line of No Name<br>Creek.                                                                                         | Yes |
| <u>Groundwater</u><br>Salinity of groundwater beneath<br>the project site ranges from 600 to<br>100,000 mg/L Total Dissolved<br>Solids (TDS).                                                                                     | TSF (tailings from the MSP) - depth to<br>groundwater at TSF is 13 to 20 mbgl<br>(from AER for 2018).<br>Monitoring bores established around the<br>ZIPTSF recorded 16 to 40 mbgl. | Yes |
| There are no Public Drinking<br>Water Supply Areas within or<br>adjacent to the RHIO prescribed<br>premises.                                                                                                                      |                                                                                                                                                                                    |     |
| Under natural conditions, depth to<br>groundwater at the premises<br>decreases towards the south in<br>the direction of the Fortescue<br>Marsh.                                                                                   |                                                                                                                                                                                    |     |

## **11.3 Surface water runoff**

Local data indicates that surface flows within drainage lines only occurs during, and for relatively short periods after, significant rainfall. Under these conditions flow response and subsequent recession is typically rapid (Application, 2019).

## 11.4 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 11.2. 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 11.1. 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 4.

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 proposed activities during construction, and operation

| Risk Event                                                                                           |                                                                                                                                          |                           |                                                                                                                  |                                           | Risk rating <sup>1</sup>               |                                                                                                                                                                                                                           |                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source/Activities                                                                                    | Potential<br>emission and<br>pathway                                                                                                     | Potential<br>receptors    | Potential impact                                                                                                 | Licence holder<br>controls<br>sufficient? | C = consequence<br>L = likelihood      | Conditions <sup>2</sup> of licence                                                                                                                                                                                        | Reasoning                                                                                                                                                     |
| MSP - Construction                                                                                   | n                                                                                                                                        |                           |                                                                                                                  |                                           |                                        |                                                                                                                                                                                                                           |                                                                                                                                                               |
| Construction of<br>the MSP<br>extension,<br>including<br>earthworks and<br>movement of<br>machinery. | Sediment and/or<br>hydrocarbons by<br>direct discharge or<br>spills, and path of<br>stormwater flow<br>(drainage lines or<br>sheet flow) | No Name<br>Creek.         | Contamination of<br>soils and impact to<br>riparian vegetation<br>along creek lines.                             | Y                                         | C = Slight<br>L = Unlikely<br>Low Risk | Not subject to controls                                                                                                                                                                                                   | Construction activities will be of<br>relatively short duration.<br>The Environmental Protection<br>(Unauthorised Discharges)<br>Regulations 2004 will apply. |
| MSP - Operation                                                                                      |                                                                                                                                          | ·                         |                                                                                                                  |                                           |                                        |                                                                                                                                                                                                                           |                                                                                                                                                               |
| Operation of the<br>final MSP with<br>extension                                                      | Sediment and/or<br>hydrocarbons by<br>direct discharge or<br>spills, and path of<br>stormwater flow                                      | Soils<br>No Name<br>Creek | Potential for<br>contamination of<br>soils, ephemeral<br>creeks and<br>degradation of<br>riparian<br>vegetation. | Y                                         | C = Slight<br>L = Unlikely<br>Low Risk | Condition 1.2.14 Table 1.2.6 -<br>addition of MSP extension<br>infrastructure and applicant<br>control for diversion of surface<br>water away from the facility.<br>Schedule 1 Map of the<br>location of the proposed MSP | The Environmental Protection<br>(Unauthorised Discharges)<br>Regulations 2004 will apply.                                                                     |

| Risk Event                                                                                                                                  |                                                                                                                                                    |                                                                               |                                                                                               |                                           | Risk rating <sup>1</sup>                    |                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source/Activities                                                                                                                           | Potential<br>emission and<br>pathway                                                                                                               | Potential<br>receptors                                                        | Potential impact                                                                              | Licence holder<br>controls<br>sufficient? | C = consequence<br>L = likelihood           | Conditions <sup>2</sup> of licence                                                                                                            | Reasoning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                             |                                                                                                                                                    |                                                                               |                                                                                               |                                           |                                             | extension.                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| MSP operation and                                                                                                                           | Z5IPTSF decant to t                                                                                                                                | he above ground                                                               | ITSF                                                                                          |                                           |                                             |                                                                                                                                               | •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| MSP tailings<br>stream processed<br>prior to discharge<br>to a TSF; and<br>decant from the<br>Z5IPTSFdisposed<br>to the above<br>ground TSF | Potentially altered<br>tailings stream<br>properties -<br>seepage through<br>the base of a TSF<br>and infiltrating to<br>groundwater,<br>mounding. | Groundwater<br>dependent<br>vegetation<br>Groundwater<br>of beneficial<br>use | Adverse impacts<br>to the health and<br>survival of<br>groundwater<br>dependent<br>vegetation | Y                                         | C = Moderate<br>L = Unlikely<br>Medium Risk | Condition 3.6.1 requires<br>monitoring of standing water<br>levels in m (AHD) <u>and</u> mbgl.<br>No other changes to existing<br>conditions. | Clarification of condition 3.6.1.<br>Existing condition 3.6.1 requires<br>monitoring and reporting of standing<br>water levels.<br>Existing condition 3.5.2 requires the<br>Licence Holder to undertake an<br>annual water balance for the TSF<br>and Z5TSF with calculation of<br>seepage losses.<br>Condition 8 of MS 824 and Condition<br>10 of MS 829 require monitoring of<br>groundwater quality around waste<br>fines storage facilities.<br>Groundwater levels at TSF recorded<br>13 to 20 mbgl (AER for 2018).<br>Groundwater levels at the Z5IPTSF<br>recorded 40 to 16 mbgl.<br>GHD (2019) modelling for deposition<br>of tailings into Z5IPTSF predicts that<br>groundwater mounding will be small<br>and limited to the immediate vicinity<br>of the Z5 IPTSF footprint due to the<br>dewatering at an adjacent pit for the<br>duration of tailings deposition.<br>There may be interaction with other<br>hydrogeological processes occurring<br>on site, also may be long term. |
|                                                                                                                                             | Potentially altered<br>tailings stream<br>properties - TSF                                                                                         | N/A                                                                           | N/A                                                                                           | N/A                                       | N/A                                         | N/A                                                                                                                                           | Not within the scope of this assessment. Embankment stability managed under the <i>Mining Act</i> 1978                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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| Risk Event                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |                                                                                                                                                                                        |                                                                                                                                 |                                           | Risk rating <sup>1</sup>                    |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source/Activities                                                                                                                                                                                                       | Potential<br>emission and<br>pathway                                                                                                                                                                                                 | Potential<br>receptors                                                                                                                                                                 | Potential impact                                                                                                                | Licence holder<br>controls<br>sufficient? | C = consequence<br>L = likelihood           | C = consequence Conditions <sup>2</sup> of licence                                                                                                                                                               | Reasoning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                         | embankment<br>failure/instability.                                                                                                                                                                                                   |                                                                                                                                                                                        |                                                                                                                                 |                                           |                                             |                                                                                                                                                                                                                  | by DMIRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Process Water Dar                                                                                                                                                                                                       | n discharge – operat                                                                                                                                                                                                                 | ion                                                                                                                                                                                    |                                                                                                                                 |                                           |                                             |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Unscheduled<br>discharge from the<br>Process Water<br>Dam (no more<br>than once every 5<br>years) to a<br>drainage line 150<br>m upstream from<br>the previous Zulu<br>Creek discharge<br>location at No<br>Name Creek. | Process water<br>containing mine<br>dewatering water,<br>TSF return water,<br>and water from the<br>Stage 1 borefield<br>discharging 150 m<br>upstream of the<br>existing approved<br>discharge location,<br>via a drainage<br>line. | Soils and<br>vegetation of<br>the discharge<br>path of the<br>drainage line.<br>No essential<br>change to<br>receptors to<br>that previously<br>assessed for<br>Amendment<br>Notice 4. | Impact to soils and<br>vegetation from<br>scouring and<br>erosion, and<br>sediment load by<br>discharge at the<br>new location. | Y                                         | No change to that<br>previously<br>assessed | Conditions 2.5.1, 2.5.2, 3.6.2<br>and 3.7.1 amended to replace<br>'Zulu Creek Discharge point'<br>with 'No Name Creek<br>discharge point', and Schedule<br>1 map amended for location of<br>the discharge point. | Zulu Creek discharge location is<br>decommissioned.<br>Concrete armour for erosion and<br>sediment control is in place at the<br>new location.<br>There is no change to the existing<br>licence limits to volume, water<br>quality or frequency of discharge<br>from the Process Water Dam,<br>wetting flow monitoring and<br>monitoring of vegetation health at No<br>Name Creek.<br>Existing condition 5.2.2 requires<br>records of daily discharge volumes,<br>duration of the discharge, and<br>reasons for the discharge. |

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

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

## 12. Consultation

Table 5 provides a summary of the consultation undertaken by the department.

#### Table 5: Consultation

| Consultation method                                                                              | Comments received                                                                                                |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Department of Mines, Industry<br>Regulation and Safety (DMIRS)<br>advised of proposal 6 May 2020 | DMIRS replied on 26 May 2020 advising that a Mining Proposal had been lodged and was currently under assessment. |
| Works Approval/Licence Holder<br>was provided with draft<br>amendment on 30 July 2020.           | Comments received on 6 August as summarised in Appendix 1.                                                       |

## 13. 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.

## **13.1 Summary of amendments**

Table 6 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 6: Summary of licence amendments

| Condition no. or Table no.                          | Proposed amendments                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Category 6 production or design<br>capacity         | Reworded for clarification.                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| Table 1.2.6 - Works Specifications                  | Removal of the first stage of the MSP as this has now been constructed and commissioned (compliance documents submitted).                                                                                                                                                                                                                                                                                                     |  |
|                                                     | Removal of Z5IPTSF, tailings delivery system tailings deposition ring main and spigots, return water system and Z5IPTSF groundwater monitoring bores (compliance documents submitted).                                                                                                                                                                                                                                        |  |
|                                                     | Removal of Water Blending Plant (WBP) and WBP reject water pipelines (compliance documents submitted).                                                                                                                                                                                                                                                                                                                        |  |
|                                                     | Addition of infrastructure for the MSP extension and applicant control for diversion of surface water away from the facility.                                                                                                                                                                                                                                                                                                 |  |
| Table 1.2.7 Category 6 production and design limits | Reworded for clarification.<br>The Southern and Northern Recharge Basins were approved prior to<br>MAR being approved and are not limited to the MAR two-year approval.<br>The permitted discharge for the Southern and Northern Recharge Basins<br>is the 843,000 tonnes per annual period to which the licence will revert if<br>MAR is not approved for life of Mine. RHIO requested to make this<br>clearer in the Table. |  |
| Table 2.2.1 - Emission points to groundwater        | Addition of six proposed injection bores in the SWIB: RHIB0431,<br>RHIB0432, RHIB0433, RHIB0434, RHIB0435 and RHIB0436.<br>Removal of 7 injection bores from the Stage 1 Borefield: installed                                                                                                                                                                                                                                 |  |

| Condition no. or Table no.                                               | Proposed amendments                                                                                                                                                                           |  |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                          | RHIB0188; and proposed bores RHIB0023; RHIB0024; RHIB0027;<br>RHIB0030; RHIB0036 and RHIB0039.                                                                                                |  |
| Table 2.2.2 - Point source emission limits to groundwater                | Addition of six proposed injection bores in the SWIB: RHIB0431,<br>RHIB0432, RHIB0433, RHIB0434, RHIB0435 and RHIB0436.                                                                       |  |
|                                                                          | Removal of 7 injection bores from the Stage 1 Borefield: installed<br>RHIB0188 and proposed bores RHIB0023; RHIB0024; RHIB0027;<br>RHIB0030; RHIB0036 and RHIB0039.                           |  |
| Table 2.5.1 - Point source<br>emissions to surface water                 | Emission Point changed from Zulu Dewatering Creek Discharge location to No Name Creek Discharge location                                                                                      |  |
| Table 2.5.2 - Point source<br>emissions limit to surface water           | Emission point reference changed from Zulu Dewatering Creek<br>Discharge location to No Name Creek Discharge location                                                                         |  |
| Condition 3.2.2 - Scope of work                                          | Removal of condition 3.2.2 as the scope of work has been submitted.                                                                                                                           |  |
| Table 3.2.1 - Monitoring of point source emissions to groundwater –      | Addition of six proposed injection bores in the SWIB: RHIB0431, RHIB0432, RHIB0433, RHIB0434, RHIB0435 and RHIB0436.                                                                          |  |
| Stage 1 injection bores                                                  | Removal of 7 injection bores from the Stage 1 Borefield: installed_<br>RHIB0188 and <u>proposed</u> RHIB0023; RHIB0024; RHIB0027; RHIB0030;<br>RHIB0036 and RHIB0039.                         |  |
| Table 3.2.2 - Management actions<br>(SWIB injection bores)               | Addition of six proposed injection bores in the SWIB: RHIB0431, RHIB0432, RHIB0433, RHIB0434, RHIB0435 and RHIB0436.                                                                          |  |
| Table 3.6.1 - Monitoring of ambient groundwater quality                  | The requirement for 12 months of monthly MAR monitoring removed as<br>the 12 months monitoring has been completed. Quarterly monitoring of<br>the MAR monitoring remains.                     |  |
| Table 3.6.1 - Monitoring of ambient groundwater quality- injection field | MAR groundwater monitoring bores identified with addition of 's' for<br>'shallow'.                                                                                                            |  |
|                                                                          | Groundwater monitoring bore adjacent to the injection bores RHPZ0228s added <u>(installed)</u> and RHPZ0255 (installed) removed.                                                              |  |
|                                                                          | Addition of six proposed groundwater monitoring bores in the Groundwater monitoring bores adjacent to the injection bores:<br>RHPZ0400; RHPZ0401; RHPZ0402; RHPZ0403; RHPZ0404; and RHPZ0405. |  |
| Table 3.6.1 - Monitoring of ambient groundwater quality TSFs             | Reworded for clarity for reporting TSF and Z5IPTSF standing water levels both in mbgl and m (AHD).                                                                                            |  |
| Table 3.6.1- Monitoring of ambient groundwater quality Z5IPTSF           | Z5IPTSF monitoring bores identified (construction compliance report submitted) to measure groundwater levels adjacent to and hydraulically downgradient of Zulu 5 IPTSF.                      |  |
| Table 3.6.2 - Monitoring of receiving environment                        | Emission point reference changed from Zulu Dewatering Creek<br>Discharge location to No Name Creek Discharge location                                                                         |  |
| Table 3.7.1 - Monitoring of Point<br>Source emissions to surface water   | Emission point reference changed from Zulu Dewatering Creek<br>Discharge location to No Name Creek Discharge location                                                                         |  |
| Table 4.2.1 - Annual Environment                                         | Reporting on condition 2.5.3 removed (typo error)                                                                                                                                             |  |
|                                                                          | Table 3.3.1 Emissions to land amended to require reporting of "specified monitoring" to simplify and remove redundant replication of parameters.                                              |  |

| Condition no. or Table no. | Proposed amendments                                                                                                                                                  |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | Table 3.6.1 Ambient groundwater quality amended to require reporting of<br>"specified monitoring" to simplify and remove redundant replication of<br>parameters.     |
| Table 4.3.1 - Notification | Line for Table 3.6.1 submission of monthly monitoring results for groundwater monitoring bores adjacent to the injection bores (submitted).                          |
|                            | Line for condition 3.6.2 emission point reference changed from Zulu<br>Dewatering Creek Discharge location to No Name Creek Discharge<br>location.                   |
| Schedule 1: Maps           | Premises map updated for clarity.                                                                                                                                    |
|                            | Addition of map of Z5IPTSF groundwater monitoring bores.                                                                                                             |
|                            | Addition of map of the location of the proposed MSP extension.                                                                                                       |
|                            | Amended map of Mine Process Plant Spray-field to show change of boundary.                                                                                            |
|                            | New map of emission points to surface water added for location of the 'No Name Creek discharge point', (previous dewater and process pond discharge map removed).    |
| Appendix 1                 | Addition of six proposed injection bores in the SWIB: RHIB0431,<br>RHIB0432, RHIB0433, RHIB0434, RHIB0435 and RHIB0436.                                              |
|                            | Removal of 7 injection bores from the Stage 1 Borefield: installed<br>RHIB0188; and proposed bores RHIB0023; RHIB0024; RHIB0027;<br>RHIB0030; RHIB0036 and RHIB0039. |
|                            | Addition of six proposed groundwater monitoring bores adjacent to injection bores: RHPZ0400; RHPZ0401; RHPZ0402; RHPZ0403; RHPZ0404; and RHPZ0405.                   |
|                            | Removal of installed groundwater monitoring bore adjacent to the injection bores - RHPZ0255                                                                          |
|                            | Addition of installed groundwater monitoring bore adjacent to injection bores - RHPZ0228S                                                                            |
|                            | Addition of "s' to denote shallow groundwater monitoring bores                                                                                                       |
| Appendix 2                 | Addition of 's' to denote shallow bores                                                                                                                              |

## References

- 1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
- 2. Department of Water and Environmental Regulation, (DWER) 2019, *Industry Regulation Guide to Licensing*, Perth, Western Australia
- 3. DER 2017, Guidance Statement: Risk Assessments, Perth, Western Australia.
- 4. DER 2015, Guidance Statement: Setting Conditions, Perth, Western Australia.
- 5. GHD 2019, Zulu 5 In-Pit TSF Detailed Design Groundwater Change Assessment
- 6. Environmental Health Directorate, Department of Health, Western Australia 2011, *Guidelines for the Non-potable Uses of Recycled Water in Western Australia*
- 7. Ministerial Statement 824, Published on 23 December 2009
- 8. Ministerial Statement 829, Published on: 31 March 2010
- Roy Hill Iron Ore Pty Ltd, Application Form signed 10/03/2020, and supporting document Roy Hill 10/03/2020, Mine Operating Licence Amendment Application (L8621/2011/1) WHIMS 1.5 and Non-Process Plant, OP-APP-00063
- 10. Roy Hill Iron Ore Pty Ltd, email from Vlad Rios Vera, 5 June 2020, Subject: *Mine Process Plant Spray-field layout change*
- 11. Roy Hill Iron Ore Pty Ltd, email from Vlad Rios Vera, 1 July 2020, Subject: FW: L8621 amendment Clarifying information and maps.
- 12. Roy Hill Iron Ore Pty Ltd, email from Vlad Rios Vera, 1 July 2020, Subject *RE: Process* pond discharge point follow up email.

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

| Condition      | Summary of Licence Holder's comment                                                                                                                                                                          | Department's response                                                                                                                                                                                                                               |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Instrument Log | Roy Hill proposes the following wording for this amendment:<br>Amendment to <u>expand the MSP with total recovery of up to 9 Mpta</u> ,<br>relocate the Process Water Dam discharge location, change of Mine | Agreed, edited as proposed.                                                                                                                                                                                                                         |
|                | Process Plant irrigation spray field boundary, removal of construction<br>works where compliance documents submitted, and update MAR<br>injection groundwater monitoring bores.                              |                                                                                                                                                                                                                                                     |
| 1.2.14         | Requested to add <i>a spiral building</i> to the list of components for the MSP extension in column 2 of Table 1.2.6.                                                                                        | Amendment report and licence edited as requested                                                                                                                                                                                                    |
| 2.2.1          | RHIO advised names for the proposed reinjection bores have been                                                                                                                                              | Amendment Report and Amendment edited as requested -                                                                                                                                                                                                |
| 3.2.1          | RHRIB0280 RHIB0431 (associated monitoring bore RHPZ0400)                                                                                                                                                     | 1.                                                                                                                                                                                                                                                  |
| 3.2.3          | RHRIB0281 RHIB0432 (associated monitoring bore RHPZ0401)                                                                                                                                                     | Some information is still to be provided by RHIO for Appendix                                                                                                                                                                                       |
|                | RHRIB0282 RHIB0433 (associated monitoring bore RHPZ0402)                                                                                                                                                     | email received 6 August, the information would be available by<br>end of 2020, and hence is included as a requirement in<br>Appendix 1.                                                                                                             |
|                | RHRIB0283 RHIB0434 (associated monitoring bore RHPZ0403)                                                                                                                                                     |                                                                                                                                                                                                                                                     |
|                | RHRIB0284 RHIB0435 (associated monitoring bore RHPZ0404)                                                                                                                                                     |                                                                                                                                                                                                                                                     |
|                | RHRIB0285 RHIB0436 (associated monitoring bore RHPZ0405)                                                                                                                                                     |                                                                                                                                                                                                                                                     |
| 3.6.1          | RHIO requests the removal of monitoring bores RHPZ086, RHPZ0125,<br>RHPZ0398 and RHPZ0107 from Table 3.6.1, and provided a<br>memorandum from the Roy Hill Superintendent Hydrogeology providing             | Construction compliance documents were submitted for the ZIPTSF monitoring bores on 17 April 2020.                                                                                                                                                  |
|                | justification for the removal of the bores.                                                                                                                                                                  | submitted on 15 April 2020 reported that decant lines from                                                                                                                                                                                          |
|                | RHIO requested that if the proposed change would result in delays<br>issuing the amendment, the assessment of this change be postponed and<br>assessed as part of the amendment application submitted on     | Z5IPTSF have been constructed to dispose of water to the<br>process pond and the Central Transfer Ponds (currently under<br>construction). On 7 July 2020 DWER was notified that a<br>diversion of the decant line for disposal to the above ground |

| Condition | Summary of Licence Holder's comment | Department's response                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | 29 May 2020.                        | TSF had been installed, as the Transfer Pond was still under<br>construction. A final construction date for the Transfer Ponds<br>has not yet been provided but will be requested by<br>construction compliance review currently in progress.<br>Additional information and internal consultation may be<br>required, and therefore the monitoring bores will remain as<br>proposed by the compliance document to ensure the progress<br>of this amendment is not delayed. |