Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice 6

Licence Number	L8621/2011/1
Licensee	Roy Hill Iron Ore Pty Ltd
ACN	123 722 038
File Number	2011/009784
Premises	Roy Hill Iron Ore Mine M46/518 and M46/519 NEWMAN WA 6753
Prescribed Premises	Category 5 – Processing or beneficiation of metallic or non-metallic ore Category 6 – Mine dewatering Category 12 – Screening, etc. of material Category 54 – Sewage facility Category 52 - Electric power generation Category 57 – Used tyre storage (general) Category 64 – Class II putrescible landfill site Category 73 – Bulk storage of chemicals, etc.
Date of Amendment	5/10/2018

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act) as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Alana Kidd 2018.10.05 15:50:41 +08'00'

Alana Kidd

Manager, Resource Industries

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

Definitions and interpretation

Definitions

In this Amendment Notice, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Amendment Notice	refers to this document
BIF	Banded Iron Formation
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 33 Cloisters Square PERTH WA 6850 info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act
DWER	Department of Water and Environmental Regulation
EC	Electrical Conductivity
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
GDV	Groundwater Dependent Vegetation
GL/a	gigalitres per annum
kW	kilowatt
Licensee	Roy Hill Iron Ore Pty Ltd

Term	Definition
MAR	Managed Aquifer Recharge
m^3	cubic metres
mbgl	metres below ground level
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
MSP	Magnetic Separation Plant
Mtpa	million tonnes per annum
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act
OWS	oily water separator
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Prescribed Premises	has the same meaning given to that term under the EP Act
RHIO	Roy Hill Iron Ore Pty Ltd
Risk Event	as described in *Guidance Statement: Risk Assessment*
RO	Reverse Osmosis
SCADA	Supervisory Control and Data Acquisition
SIF	Spray Irrigation Field
SWIB	Southwest Injection Borefield
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
WWTP	Wastewater treatment plant
µS/cm	micro Siemens per centimetre

Amendment Notice

This amendment is made pursuant to section 59 of the EP Act to amend the Licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is limited only to an amendment for Categories 5, 6 and 54.

The following guidance statements have informed the decision made on this amendment*:*

- *Guidance Statement: Regulatory Principles (July 2015);*
- *Guidance Statement: Setting Conditions (October 2015);*
- *Guidance Statement: Licence Duration (August 2016);*
- *Guidance Statement: Decision Making (February 2017);*
- *Guidance Statement: Risk Assessment (February 2017);* and
- *Guidance Statement: Environmental Siting (November 2016).*

Amendment description

This amendment notice comprises the assessment of two applications applied for by Roy Hill Iron Ore Pty Ltd (RHIO) (Licensee) for the amendment to the Licensee's current operating licence L8621/2011/1. These applications and associated Licensee changes to the applications are as follows:

- Submitted 13 November 2017, the Licensee applied to increase the category 5 approved premises production to 86 million tonnes per annum (Mtpa) (wet) and add a Magnetic Separation Plant (MSP) to the west of the existing Process Plant. The 10 Mtpa increase in exportable ore product is proposed to be achieved by the Licensee through capitalising on the latent capacity within the existing Process Plant (approximately 6 Mtpa) and recovering ultra-fine high-grade iron ore from the existing tailings through the installation and operation of a MSP (approximately 4 Mtpa).
- Submitted 15 May 2018, the Licensee applied to increase the category 6 dewatering disposal limit to 55 Mtpa (55 gigalitres (GL) per annum (GL/a)) as part of a Managed Aquifer Recharge (MAR) Trial for a duration of less than two years and outlined their proposal to install and operate up to 50 reinjection bores and 2 recharge basins to dispose of the excess dewatering water.
- Submitted 19 July 2018, amendment to the application submitted 13 November 2017. The Licensee requested that a second potential location for the MSP be assessed in this amendment such that the Licensee would have the flexibility to choose the desired MSP construction/operation location, post - amendment grant. The MSP design configuration and throughput was to remain the same as the option applied for in November 2017. The second location was to be immediately to the north of the existing Process (Water) Pond and would require the relocation of the licensed Mine Process Plant Irrigation Area (constructed under W5732/2014/1) immediately north of where it currently exists.
- On 3 August 2018, the Licensee confirmed design and requested that only a single MSP location be assessed. It was confirmed that this location is the location (hereafter named MSP) immediately to the north of the existing Process (Water) Pond. The licensed Mine Process Plant Irrigation Area will require relocation immediately north of where it currently exists. The existing size of the spray field (approximately 15,300 square metres (m^2) area) will be maintained.

Table 2 outlines the proposed changes to the Licence and Figure 1 displays an updated infrastructure layout within the Premises boundary.

Table 2: Proposed design and throughput capacity changes

Category	Current throughput capacity	Proposed design/ throughput capacity	Description of proposed amendment
5	65,000,000 (dry) tonnes per annual period (to produce 55,000,000 [wet] tonnes of ore per annual period for export)	86, 000,000 (wet) tonnes per annual period (to produce 65,000,000 [wet] tonnes of ore per annual period for export)	Increase of 21 Mtpa and the addition of a MSP to the existing processing stream to achieve 4 Mtpa recovery. 6 production of ore product will be achieved from existing Processing Facilities
6	843,000 tonnes per annum (with an approved 100,000 tonnes per annum once every 5 years, over a period of 4 days to a max 6,000 mg/L Total Dissolved Solids (TDS), 25,000 tonnes maximum per day)	55,000,000 tonnes per annum	Approval to discharge up to 55 Mtpa for a period of up to two years, following submission of the construction compliance report. Thereafter, the discharge throughput will revert to 843,000 tonnes per annum
54	593 cubic metres (m^3) per day (m^3/day)	nil	Movement of existing Mine Process Plant Irrigation Area to nearby location within the Premises boundary replicating same irrigation area (sizing) of 1.53 hectares (ha).

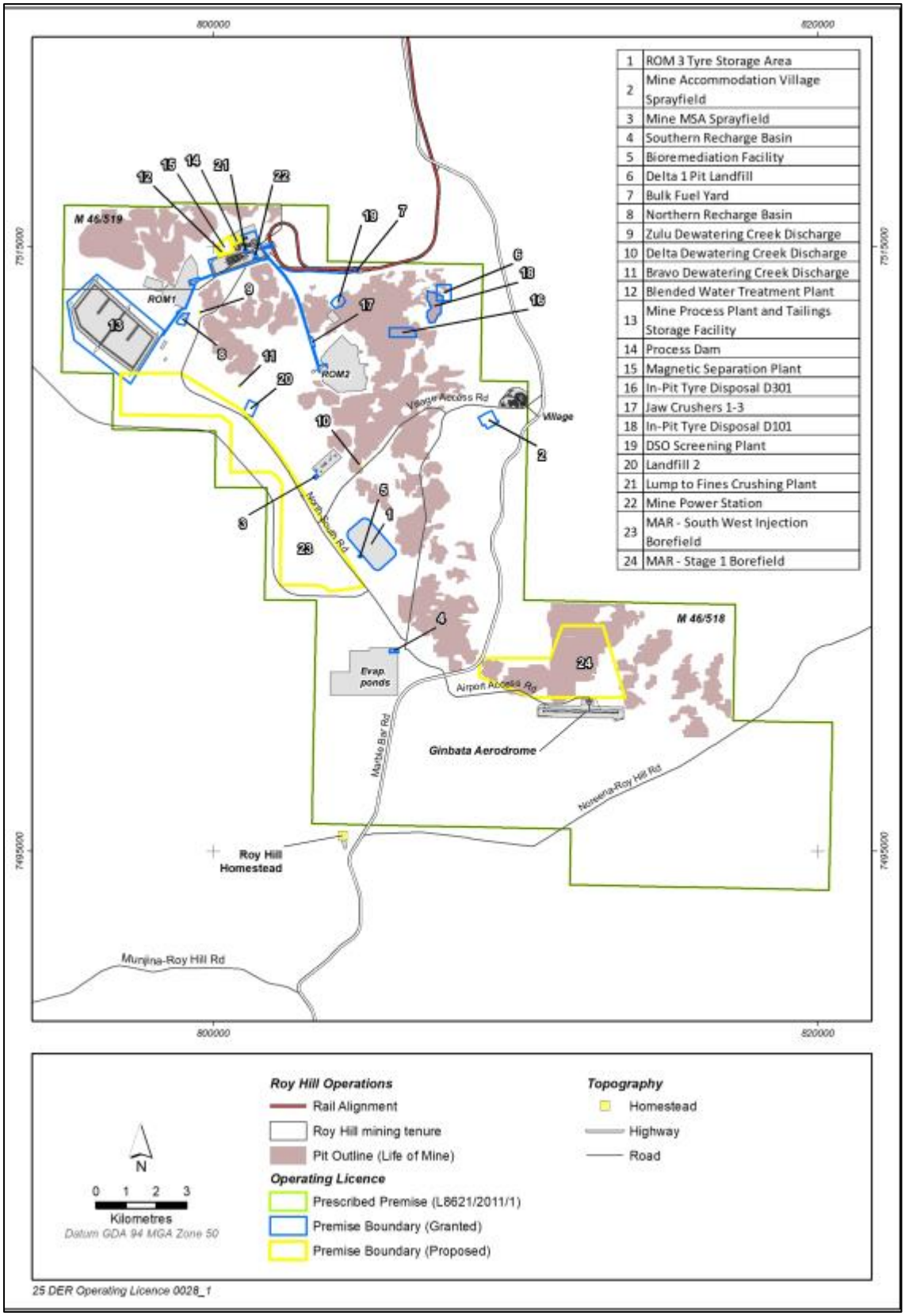


Figure 1: L8621/2011/1 Operating Facilities

INCREASED PRODUCTION CAPACITY

The Licensee plans to utilise the latent capacity currently within the existing Process Plant to generate an additional 6 Mtpa of product for export. No physical modifications to the Process Plant are required and generation of the additional 6 Mtpa of product will be achieved by:

- Increasing efficiencies, productivity and utilisation of the existing processing assets;
- Reducing the original conservative engineering design factors;
- Improving maintenance cycles and reducing maintenance requirements; and
- More effective use of the ore body and maximising the overall resource.

The Licensee has advised that the emissions to air, water and land and associated operational controls (for these emissions) have been previously assessed in the (November 2016) Operating Licence amendment application for the Process Plant and Tailings Storage Facility (TSF) (Licensee document OP-APP-00018). The emissions from the increase in production capacity is not considered by the Licensee to significantly differ to the emissions as previously assessed. As such, no additional operational controls have been proposed to manage the emissions.

MAGNETIC SEPARATION PLANT

The Licensee wishes to remove/ recover ultra-fine high-grade iron ore material that is currently being deposited within the tailings at the TSF. To recover the ultra-fine tailings prior to TSF deposition, a MSP will be constructed and operated to capture the product, with the final waste stream from the MSP being directed to the TSF. The MSP is expected to recover approximately 4 Mtpa of ultra-fines high grade iron ore material from the tailings. The MSP is a wet processing facility with pipelines and pumps to transfer the tailings underflow material throughout the plant. The MSP process will comprise transfer of the thickened waste through the following infrastructure:

- Overflow scrubber;
- Screening;
- Staged Magnetic Separation (wet high intensity magnetic separator (WHIMS));
- Thickeners; and
- Concentration Tanks.

The MSP will take the underflow from an existing Process Plant thickener and process it through the scrubbers, screens, staged magnetic separation, thickeners and concentration tanks, which will finally be incorporated into the existing fines iron ore fines (stream) for export. Excess tails remaining after the completion of the MSP and concentration process will be thickened and then transferred to the existing Process Plant tailings transfer tank before being piped to the TSF. The indicative process flow for the MSP activity is presented in Figure 2. The existing Process Water Dam will receive any excess water that is returned from the process.

Construction of the MSP will comprise localised earthworks, installation of an earthen bund around the infrastructure, installation of tailings and water delivery/return pipework and installation and commissioning of the abovementioned infrastructure.

The location of the MSP is presented in Table 3 and Figure 3.

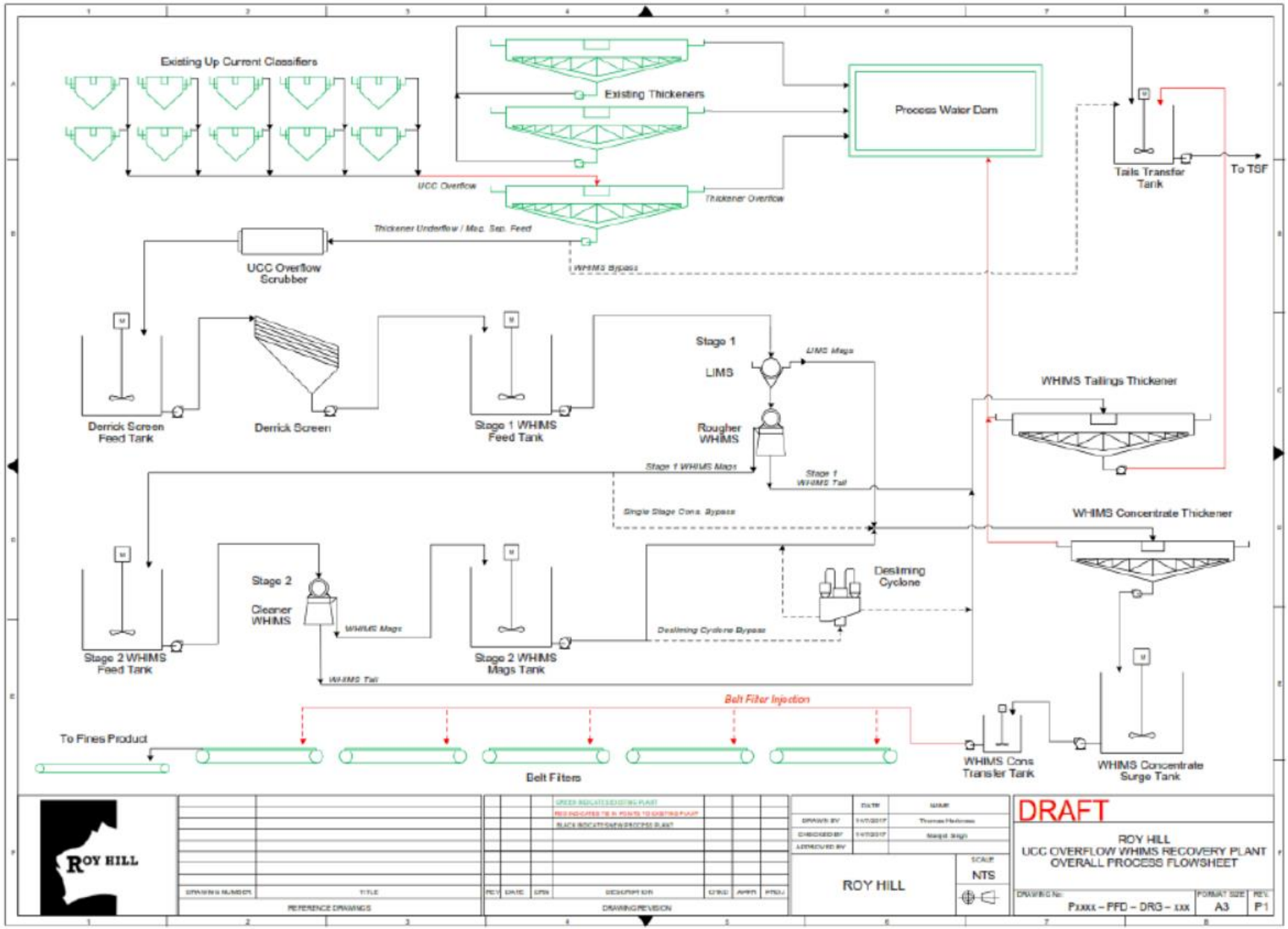


Figure 2: MSP Indicative Process Flow

Table 3: Proposed MSP location coordinates

Description	Location	Easting	Northing
MSP	North of the Process Plant area	800548.8	7515256.4
		800845.1	7515362.7
		800911.5	7515177.0
		800614.2	7515070.0

To enable construction of the MSP, the Mine Process Plant Irrigation Area (also known as SIF [spray irrigation field] in Figure 3) will be moved from the current location (eastings/ northings coordinates) to the 'new' location as displayed in Table 4 and Figure 3. No information has been provided by the Licensee with regards to soil or contamination testing of the existing SIF area and whether human health will be impacted by the introduced traffic and construction/ operational activity from the MSP within the SIF.

Table 4: Existing and Proposed Mine Process Plant Irrigation Area location

Description	Location	Easting	Northing
Existing	North of the Process Plant area (see blue square in Figure 3, below)	800638.0	7515375.4
		800524.8	7515334.0
		800568.4	7515214.8
		800681.6	7515256.1
New (to be moved prior to MSP construction)	North/ northeast of the Process Plant area (see red polygon in Figure 3, below)	800652.2	7515437.2
		800705.9	7515324.2
		800576.2	7515276.1
		800533.0	7515311.4
		800524.8	7515334.0

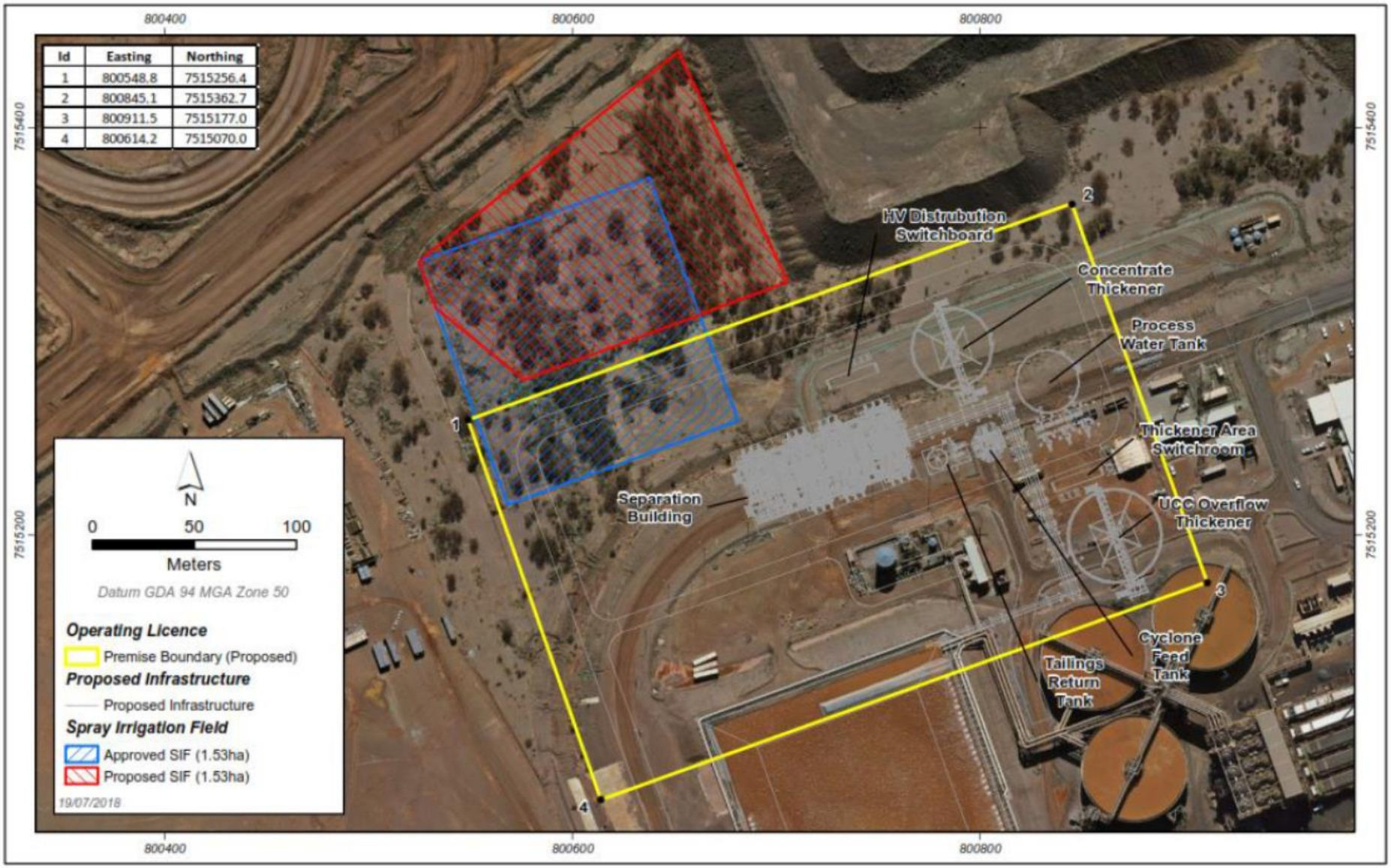


Figure 3: MSP location and spray irrigation field

Management and monitoring

The MSP construction and operation will be managed in accordance with the RHIO Surface Water Management Procedure (OP-REP-00034), Hazardous Materials Management Procedure (OP-PRO-00289), Bunds, Sumps, Washdowns and Oily Water Separators Management Procedure (OP-PRO-00178) and Dust Management Procedure (OP-REP-00180)). The key aspects of these procedures applicable to the operation of the MSP include:

- All relevant staff will be trained in the management actions related to the operation of the MSP;
- Maintenance of stormwater diversion structures to direct uncontaminated stormwater (water collected outside the facility) away from hazardous material storage facilities;
- Maintenance of oily water separator (OWS) equipment as per manufacturer's instructions or more regularly as required to ensure efficient operation;
- Monitoring of the sump water level following rainfall events and pump out the sump to prevent overflows;
- Removal of material (including sediment and hydrocarbons waste) from the OWS to a licensed facility for disposal to maintain the capacity of the facility. Alternatively deposit the sediment within the bioremediation facility for further treatment;
- Treated oily water from the separators at the MSP shall have a total recoverable hydrocarbons (TRH) concentration of <15 mg/L prior to discharge to the environment;
- In the event of a spill at the MSP facility all containing, controlling, clean up and reporting actions shall be undertaken in accordance with the RHIO Spill Response Procedure (OP-PRO-00275);
- Appropriate spill kits will be provided, accessible and regularly stocked within the MSP area;
- Visual inspections will be undertaken to ensure dust control measures are operating appropriately; and
- Environmental inspections will be undertaken as per the existing Licensee Mine Inspection Schedule.

DEWATERING DISPOSAL (MAR)

This assessment covers the period of the MAR Trial, for the Licensee's development of information surrounding the disposal of mine dewatering discharge and identification of longer-term environmental and hydrogeological impacts from the construction and operation of the Trial. This Trial has largely been assessed under Part IV of the EP Act (see 'Other Approvals' Section below).

Previous abstraction, modelling and groundwater investigations

Hydrogeological investigation reports for the Roy Hill Project have been previously submitted to DWER (Water) as well as previous Annual Aquifer Review reports to support abstraction under groundwater abstraction licence GWL172642.

During the 2016-2017 water (reporting) year (OP-REP-00471) the total groundwater abstraction was 13.9 GL, which was a significant increase from 2015-2016 (7.15 GL) (OP-REP-00392) reflecting the ramp up of dewatering and ore processing which continues into the current 2017-2018 period (RHIO Groundwater Operating Strategy [GWOS], 2018).

Hydrogeological reassessment of the Roy Hill Project was carried out in November 2017 and reported in March 2018 (OP-REP-00510 and OP-REP-00511) to support this application for the MAR Trial comprising two proposed reinjection borefields, as well as infiltration basins. The assessment included a review of all existing datasets and hydro-conceptual model characterisation to support a FEFLOW numerical groundwater model developed to assess injection over an initial 24-month period (RHIO GWOS, 2018). The November 2017 trial report

(OP-REP-00511) outlined the following geological sequences within the Southwest Injection Borefield (SWIB) area as displayed in Figure 4, with the hydrogeological summary of these geology units presented in Table 5. Multiple injection bores used in the November 2017 trial were installed with open intervals within the Marra Mamba and Jeerinah Formation.

The high transmissivity of the receiving aquifer enabled high rates of injection to be achieved over a sustained period during the November 2017 trial. The trial identified that overlying detrital sequences in the SWIB area contain thick sequences of clays which impeded groundwater pressure response transmitting vertically to shallower levels in the aquifer system (within Alluvium) (OP-REP-00511).

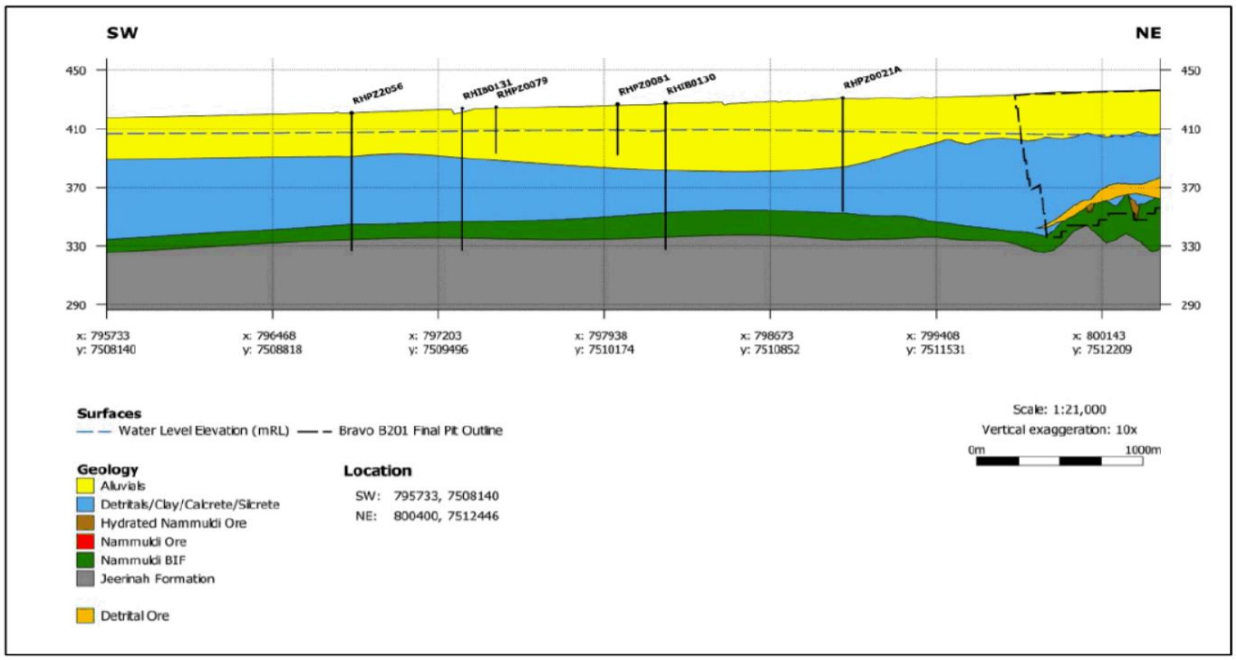


Figure 4: SWIB (Bravo West) Geological Sequences Looking Northwest

Table 5: Hydrostratigraphy of MAR areas

Geology Unit	Hydrostratigraphic Unit	Hydrogeology Summary
Alluvium	Shallow unconfined aquifer	Within the proposed MAR areas, this unit is typically a low permeability aquifer with a saturated thickness of between 10 – 30 metres (m). Groundwater is fresh to brackish.
Clay	Aquitard	Within the proposed MAR areas, this unit is dominated by a Tertiary clay sequence with weak variable development of secondary silcrete and calcrete. The unit acts as the confining layer above the deeper aquifer and ranges between 20 – 40 m thickness. Groundwater salinity is variable and ranges from brackish to hypersaline with increasing depth.
Nammuldi Banded Iron Formation (BIF) and Jeerinah Formation	Deep confined aquifer	Within the proposed MAR areas, this aquifer contains hypersaline groundwater. In the Bravo West trial area, the Nammuldi Formation can be highly permeable and up to 30 m thick.

From OP-REP-00511, March 2018.

The modelling and trial information predicted the water table in the SWIB (also known in the associated report as Bravo West [area]) to be influenced up to 3 kilometres (km) in a south to south west direction (extending outside the current Premises boundary) and to be greater than 6 m below ground level (mbgl) outside the immediate borefield area.

The water table in the Stage 1 injection borefield (southeast of the Processing area, north of Ginbata airfield within the Premises boundary) is predicted to be influenced up to approximately 8 km in a south to south west direction with a depth greater than 10 mbgl outside the immediate borefield vicinity (RHIO GWOS, 2018).

Dewatering Bores

The Licensee has advised that to identify where the source (dewater) for this MAR Trial period will be directed to, planning for and delivery of surplus water disposal (the location) will be based on the bulk water quality of the borefield which will be done by calculating integrated individual bore flow and Electrical Conductivity (EC) (µS/cm) measurements to calculate 'net EC'. Bore flow and EC readings will be taken continuously at each source bore and recorded for review in the site Supervisory Control and Data Acquisition (SCADA) system. As such, a single deposition location for a single dewatering stream cannot be specifically identified as it will depend on the water chemistry of the source bore(s), as to where the discharge location will be.

Figure 5 outlines the Process Flow of water within the Premises, with distribution as determined by salinity EC (mg/L).

Management and monitoring

Dewatering bores are currently equipped with a flow meter, EC sensor, water level sensor and a sample tap. The current operational monitoring requirements for the Licensee's mine dewatering bores are:

- Continuous monitoring for flow volume and EC. The Licensee has stated (RHIO, 2018c) that data is collected continuously at each location via a Miri telemetry system. The information is then transmitted back to the telemetry master station and then collected on the SCADA system. Flow is sampled every 60 seconds and EC every 120 seconds. The Licensee is proposing to provide a 24 hour flow volume and 24 hour average for EC;
- Monthly for flow volume, EC, and water level; and
- Annual: Lab water quality for operational, bores (full analysis) (GWOS, 2018).

The instruments are calibrated on-site approximately every 3 months by site personnel. Occasionally (approximately once every 6 to 8 months) the equipment suppliers attend site to ensure the calibrations are correct (RHIO, 2018c).

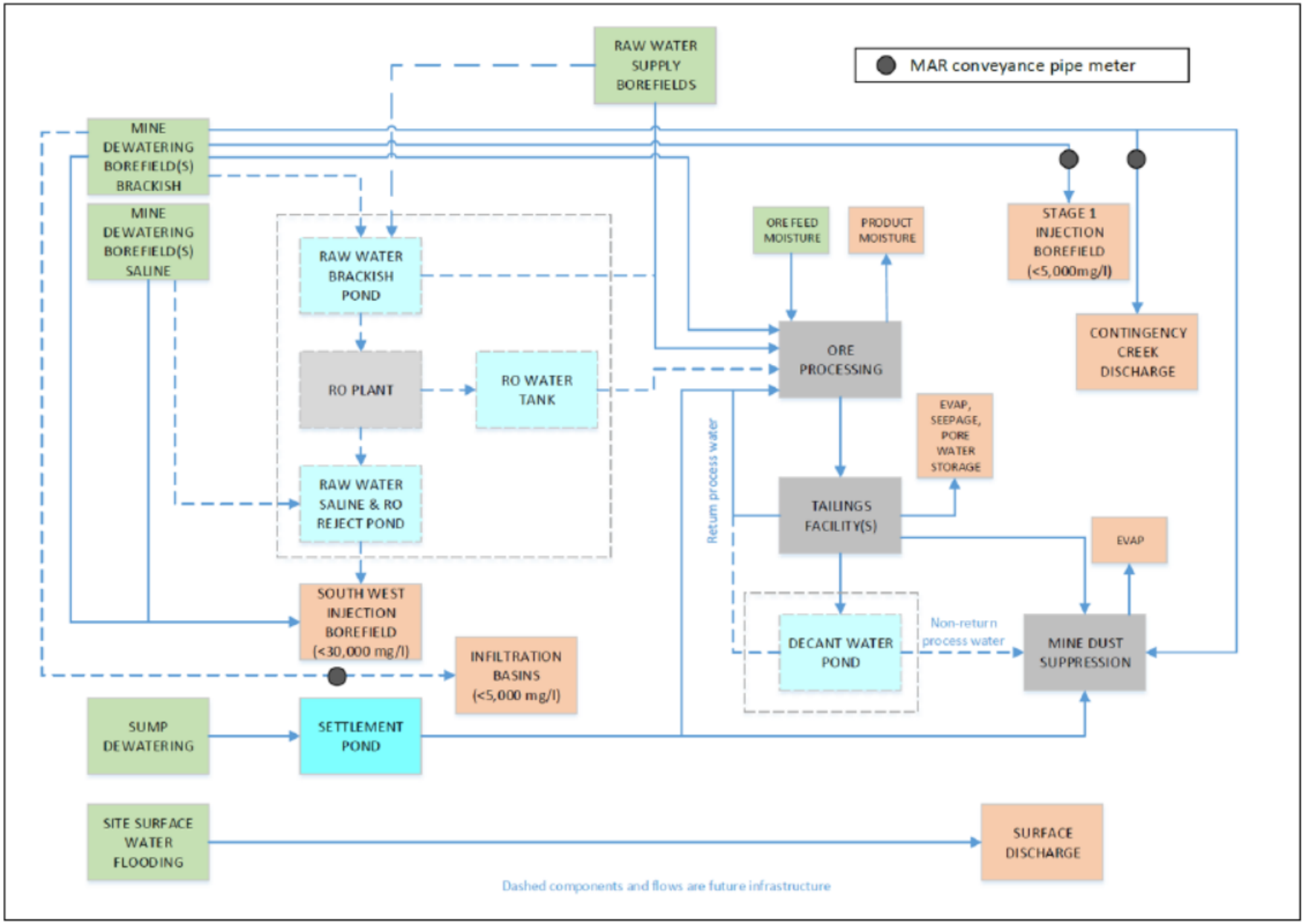


Figure 5: Site Water Movement and MAR process

Note: MAR conveyance pipe meter as shown in Figure 5 measures flow rate. The MAR conveyance pipe meters were installed on this pipework prior to planning to use the borefield for MAR purposes. The Licensee has advised that the MAR conveyance pipe meters are not an essential monitoring requirement for management of MAR (because monitoring will be installed at individual injection bores) and therefore has not been added to SWIB.

Construction and Operation of the MAR Trial

The Licensee has advised that the MAR (Trial) system will be a closed system from source bore to disposal location. Pipework from each source bore will feed into a single pipe to deliver the water to the disposal location (as shown in Figure 6). As such, there is to be no temporary mixing pond for any short or long term storage of the dewatered water prior to its distribution between the three priority areas (discussed below).

Future site water management will include ponds that have not yet been installed (Raw Water Brackish Pond and Raw Water Saline and Reverse Osmosis [RO] Reject Pond). The RO reject pond will be installed at the time of the RO Plant, which is not anticipated to be constructed until July 2019. The timing of the construction of the Raw Water Brackish Pond and the timing of mixing of dewatering into the RO reject pond is under review.

Based on bulk borefield water quality (calculated based on relationship between EC and TDS) water is directed to one of three disposal areas, by manual adjustment of network valves, in accordance with the (site operational) plan and calculated bulk water quality of the borefield, on a priority basis, being:

- **Priority 1**: Stage 1 (Re) Injection Borefield will receive a dewatering stream of less than 5,000 mg/L TDS (less than 7,300 µS/cm)
- **Priority 2**: South West (Re) Injection Borefield (SWIB) will receive a dewatering stream of up to 30,000 mg/L TDS (less than 40,000 µS/cm)
- **Priority 3**: Recharge Basins will receive a dewatering stream of less than 5,000 mg/L TDS (less than 7,300 µS/cm).

Injection bores

The Stage 1 Borefield is located (Figure 7) to the southeast of the Premises, in the area to the north of the Ginbata Aerodrome. The SWIB is located south –southeast of the TSF and to the southwest of the mine infrastructure and mine pits.

The SWIB will comprise a MAR combination of up to 32 re-injection bores and 2 recharge (infiltration) basins. The receiving aquifers in this area comprise a combination of Ore/Jeerinah, Ore/BIF/Jeerinah, Ore/BIF. The Stage 1 Borefield MAR area will consist of approximately 18 re-injection bores. Appendix 1 displays the Injection Bore details and status of installation.

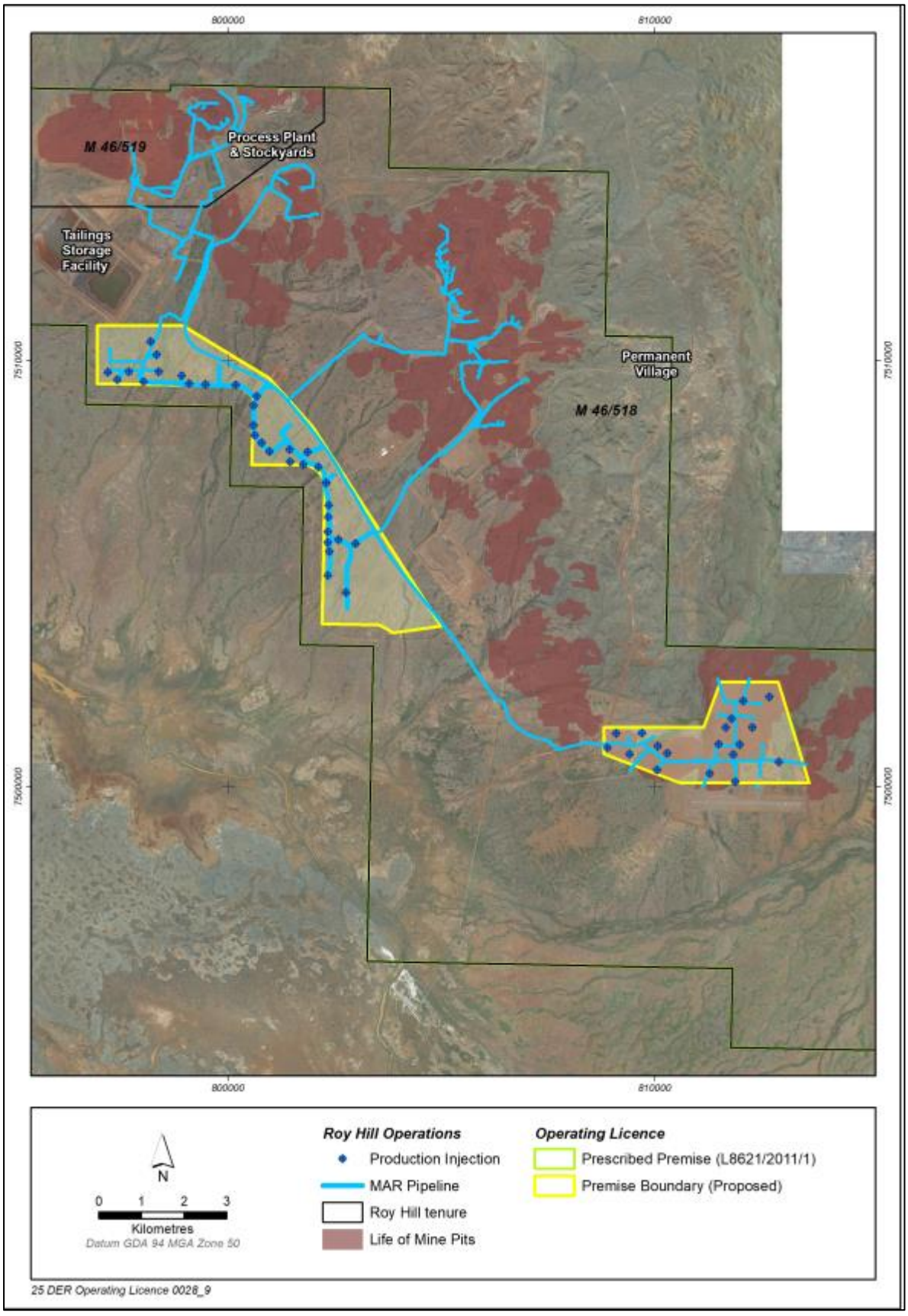


Figure 6: MAR Pipeline

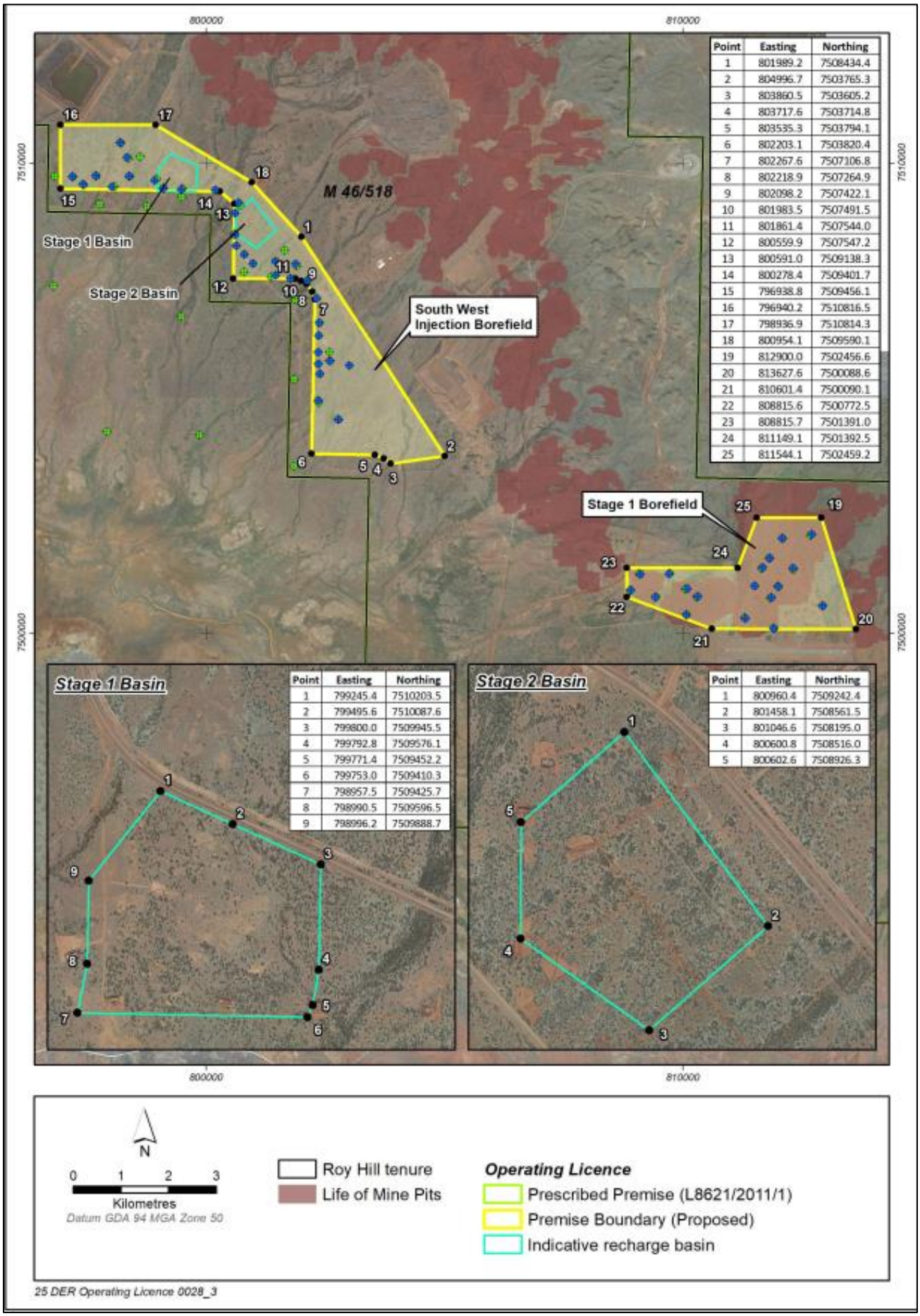


Figure 7: MAR Borefield, reinjection bores and Staged Recharge Basin locations

Infiltration (Recharge) Basins

The two infiltration basins (also known as recharge basins [Stage 1 Basin, Stage 2 Basin]) assessed for the MAR Trial are located within the SWIB (Figure 7). No geotechnical investigation has been conducted, or information provided for the concept design location of the Stage 1 and Stage 2 Basins. Analysis of infiltration from the (existing) TSF has formed the basis of estimated infiltration rates.

The Licensee has advised that the two recharge basins will not be constructed within creek lines or nearby to riparian vegetation and surface water will be diverted away from the basin structures using berms constructed with the spoil excavated from each basin.

Dewatering in-flow to the recharge basins will be controlled during operation to prevent overtopping and a minimum freeboard of 0.25 m will be maintained within each basin.

Water to be disposed in the recharge basins will have TDS of less than 5,000 mg/L and discharge water quality and infiltration rates will be continuously monitored.

Figures 8 to 11 display the conceptual layout plans and cross sectional design and construction detail for the Stage 1 and Stage 2 Basins.

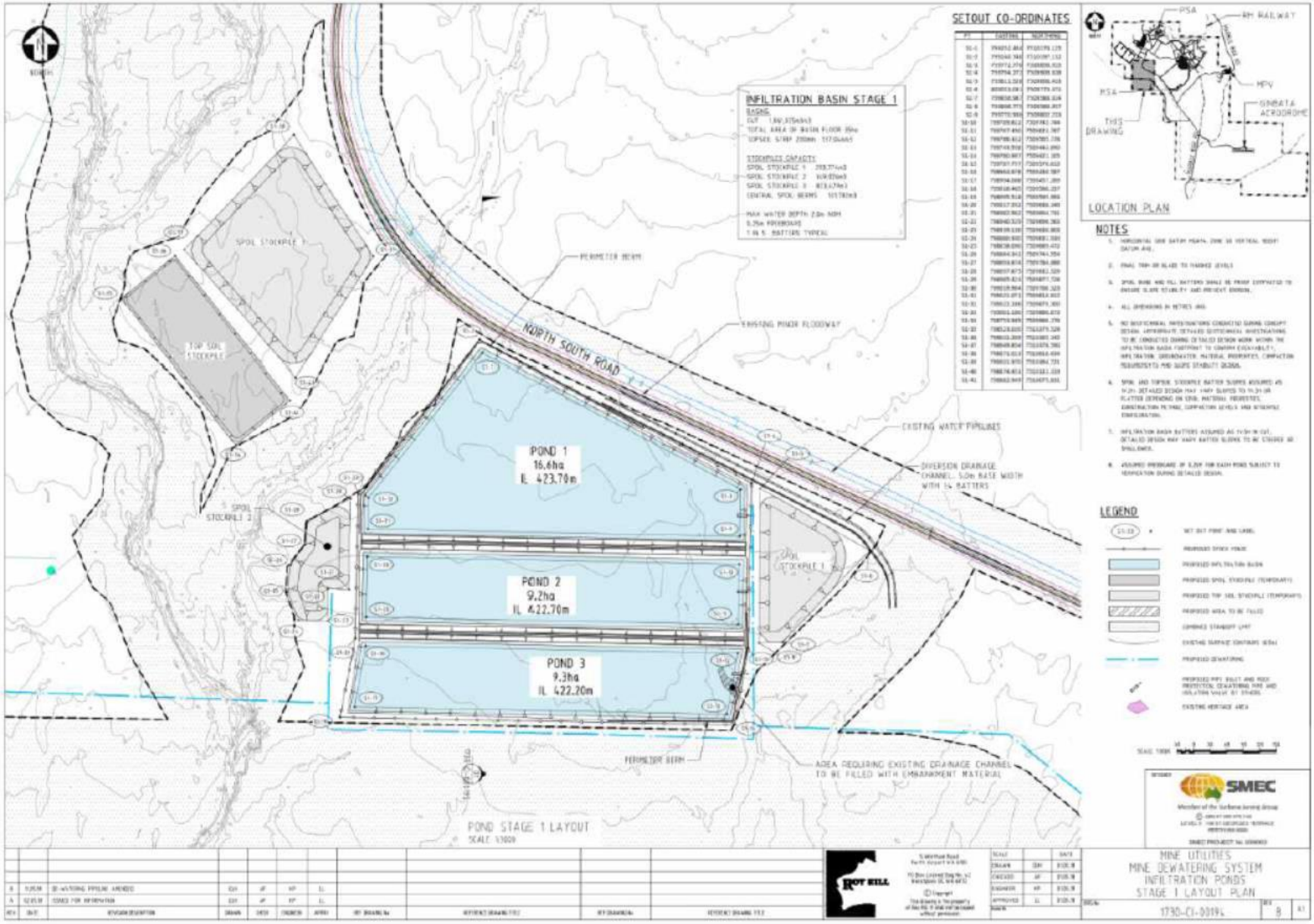


Figure 8: Stage 1 Basin Layout Plan

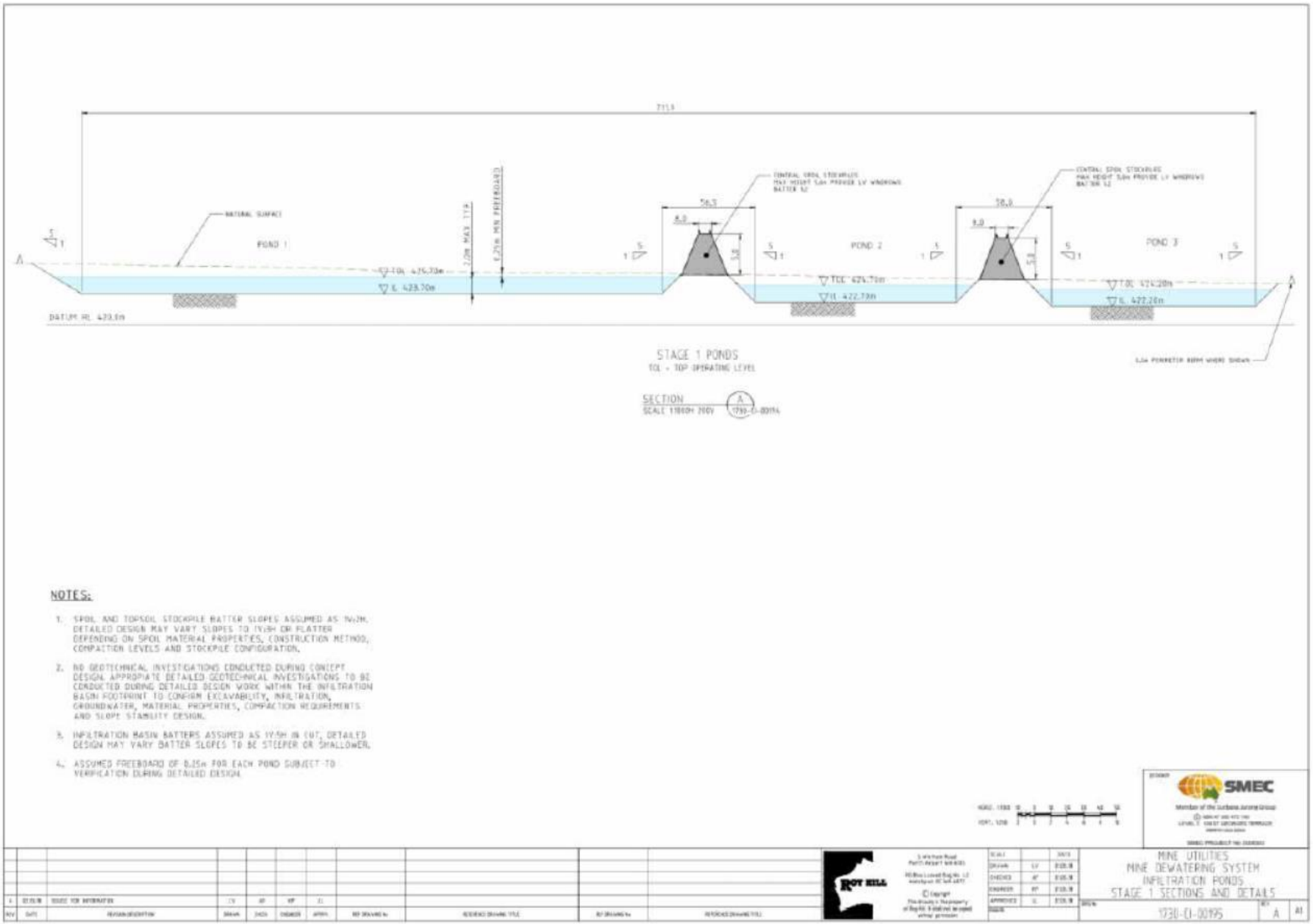


Figure 9: Stage 1 Basin cross sectional design detail

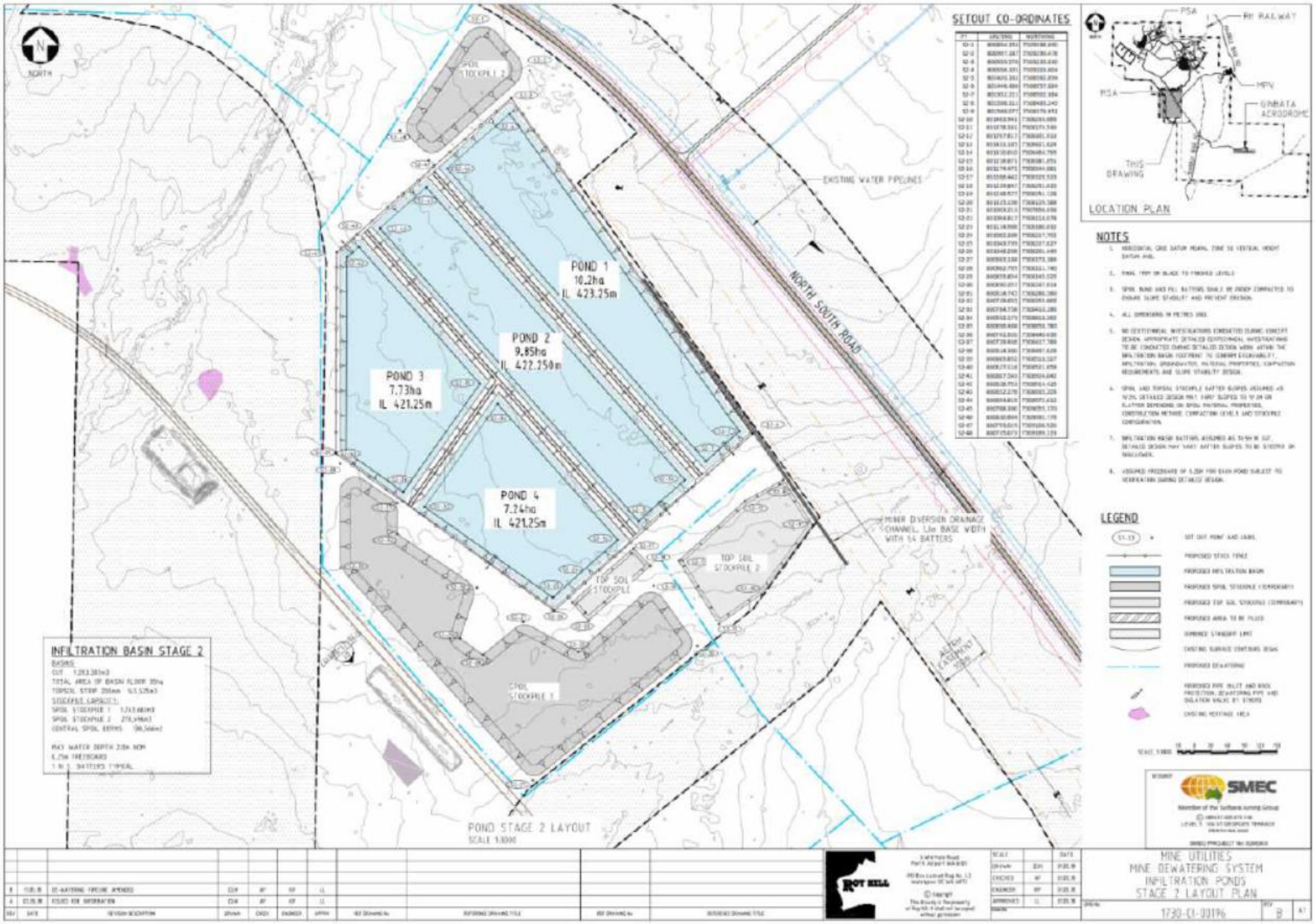


Figure 10: Stage 2 Basin Layout Plan

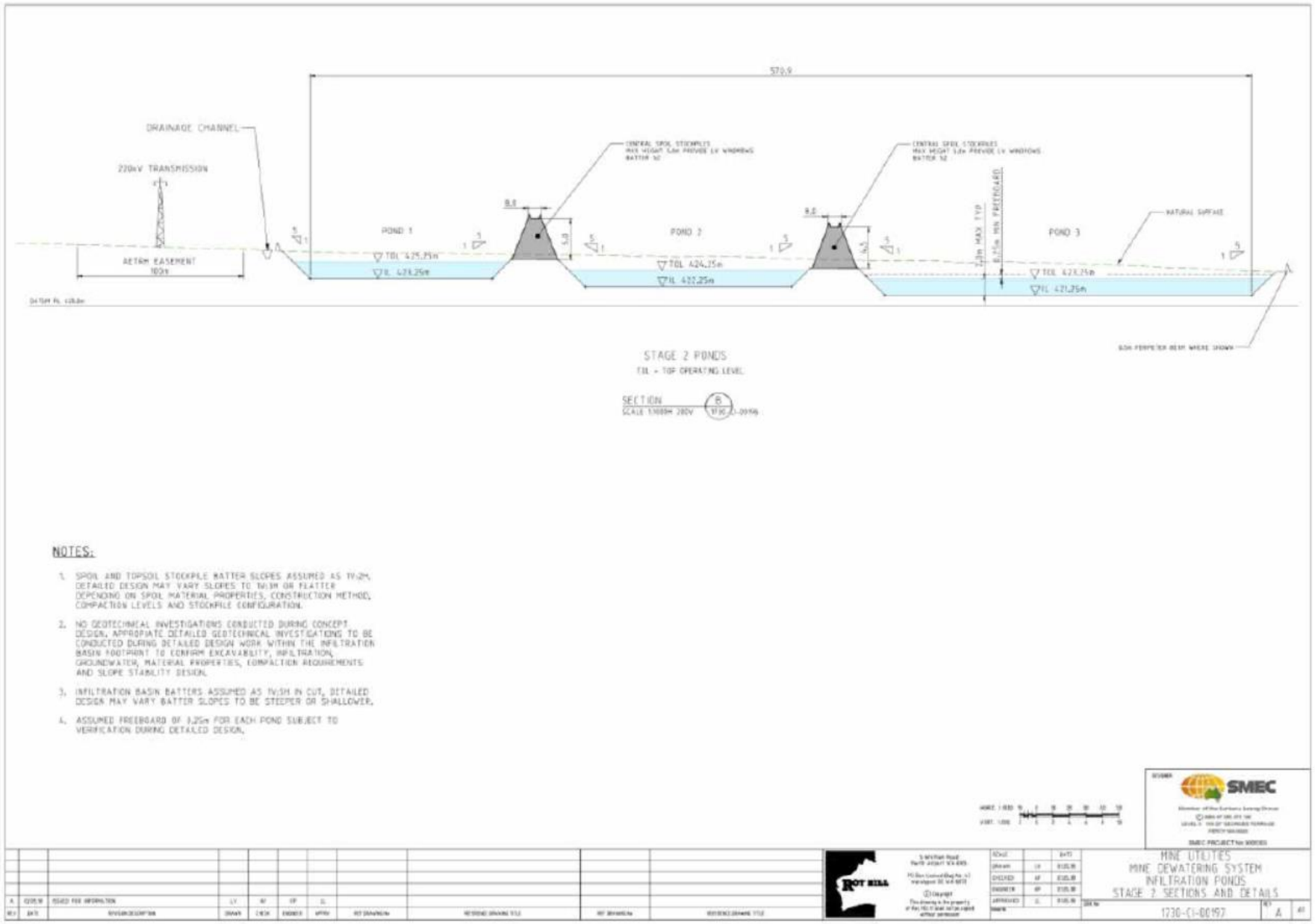


Figure 11: Stage 2 Basin cross sectional design detail

The Licensee will employ the Roy Hill Surface Water Management Procedure (OP-PRO-00035) to manage surface water emissions and boundary surface water monitoring will be undertaken in accordance with Ministerial Statement (MS) 824, Condition 8 and MS 829, Condition 10.

Vegetation health monitoring (including baseline sampling for specific MAR Vegetation Monitoring Zones) (Figure 12) will be undertaken to determine the current condition of the key vegetation species and identify monitoring locations (including reference sites) for the areas.

Monitoring within the MAR Vegetation Monitoring Zones (Appendix 2) will incorporate remote sensing, targeted on-ground inspection, and establishment of permanent monitoring sites within the Groundwater Dependent Vegetation (GDV) and non-GDV areas. The vegetation monitoring will be managed in accordance with the RHIO Vegetation Condition Environmental Management Plan (OP-REP-00363) which is administered in accordance with the Licensee's Part IV EP Act Approvals (MS 824 and MS 829).

MAR and TSF Operation interfaces

Monitoring of the zone of influence from the TSF seepage has indicates that TSF seepage reflects the south-westerly groundwater flow direction in the area. Current monitoring data indicates that TSF seepage has stabilized (RHIO, 2018c). The TSF seepage is anticipated to interact with mounding from injection in the SWIB within the two year MAR Trial period.

The Licensee has advised that ongoing groundwater monitoring will measure mounding related to the TSF, MAR and any interaction between the two. Water levels will be assessed according to the established MAR trigger levels.

Water Balance

The Licensee provided the following (nominal) MAR Trial water balance for assessment purposes (Table 6) and has been prepared in accordance with the International Council on Mining & Metals guide for water reporting (https://www.icmm.com/water-disclosure-standard). The water balance describes:

- Inputs: water inputs from abstraction of groundwater and moisture contained in ore materials;
- Tasks: project activities that have inputs and outputs of water; and
- Outputs: water outputs from the project, including returns to groundwater, storage, and product moisture.

The allocation of surplus water to MAR will be subject to performance of the injection borefields, within the water level constraints agreed with the Environmental Protection Authority (EPA) (i.e. depth to groundwater and quality). Therefore, injection rates may exceed the nominal rates described in the water balance during the Trial but will remain in accordance with the limit of 55 GL/a approved by the EPA.

In addition, the Licensee has advised the *'TSF task'* the output *'non-return process water'* is directed to Dust suppression input (Dust Sup. Task). Dust suppression output is represented by 'road evap' (please see below blue arrow annotation in Table 6 showing relationship between TSF decant and dust suppression). In addition, the water intended for creek discharge (approved within L8621/2011/1 Amendment Notice No. 4, May 2018) has not been captured as a separate row within Table 6, but is incorporated in the '*Outputs - SWIB and Stage 1 borefield'*.

Table 6: Nominal water balance for MAR Trial

	Water Balance Components	Rate at Aug-18		Nominal Peak rate (2yrs)	
INPUTS	**Inputs**	ML/d	GL/a	ML/d	GL/a
	Mine dewatering brackish	54	20	125	46
	Mine dewatering saline	4	1	45	16
	Ore feed moisture	16	6	15	5
	Sum Inputs	**74**	**27**	**185**	**67**
PROCESS PLANT TASK	**Process plant Inputs**				
	process plant raw	39	14	25	9
	return process water	9	3	7	3
	feed moisture	16	6	15	5
	Total In	**63**	**23**	**47**	**17**
	Process plant outputs				
	TSF discharge	54	20	33	12
	product moisture	9	3	14	5
	Total Out	**63**	**23**	**47**	**17**
TSF TASK	**TSF Inputs**				
	TSF discharge from Process Plant	54	20	33	12
	Total In	**54**	**20**	**33**	**12**
	TSF Outputs				
	seepage, evap & entrainment (pore water storage)	33	12	13	5
	process return water	9	3	7	3
	non-return process water	12	4	13	5
	Total Out	**54**	**20**	**33**	**12**
DUST SUP. TASK	**Dust suppression Turkey Nest(s) Input**	**13**	**5**	**13**	**5**
	Dust suppression Turkey Nest(s) Output	**13**	**5**	**13**	**5**
OUTPUTS	**Outputs**				
	TSF seepage, evap & entrainment	33	12	13	5
	road evap	13	5	13	5
	process evap	0	0	0	0
	product moisture	9	3	14	5
	South West Injection Borefield (<30,000 mg/l)	11	4	55	20
	Stage 1 Injection Borefield (<5,000 mg/l)	8	3	45	16
	Recharge basin (stage 1) (<5000 mg/l)	0	0	15	5
	Recharge basin (stage 2) (<5000 mg/l)	0	0	15	5
	Recharge basin (stage 3) (<5,000 mg/l)	0	0	15	5
	Sum Outputs	**74**	**27**	**185**	**67**

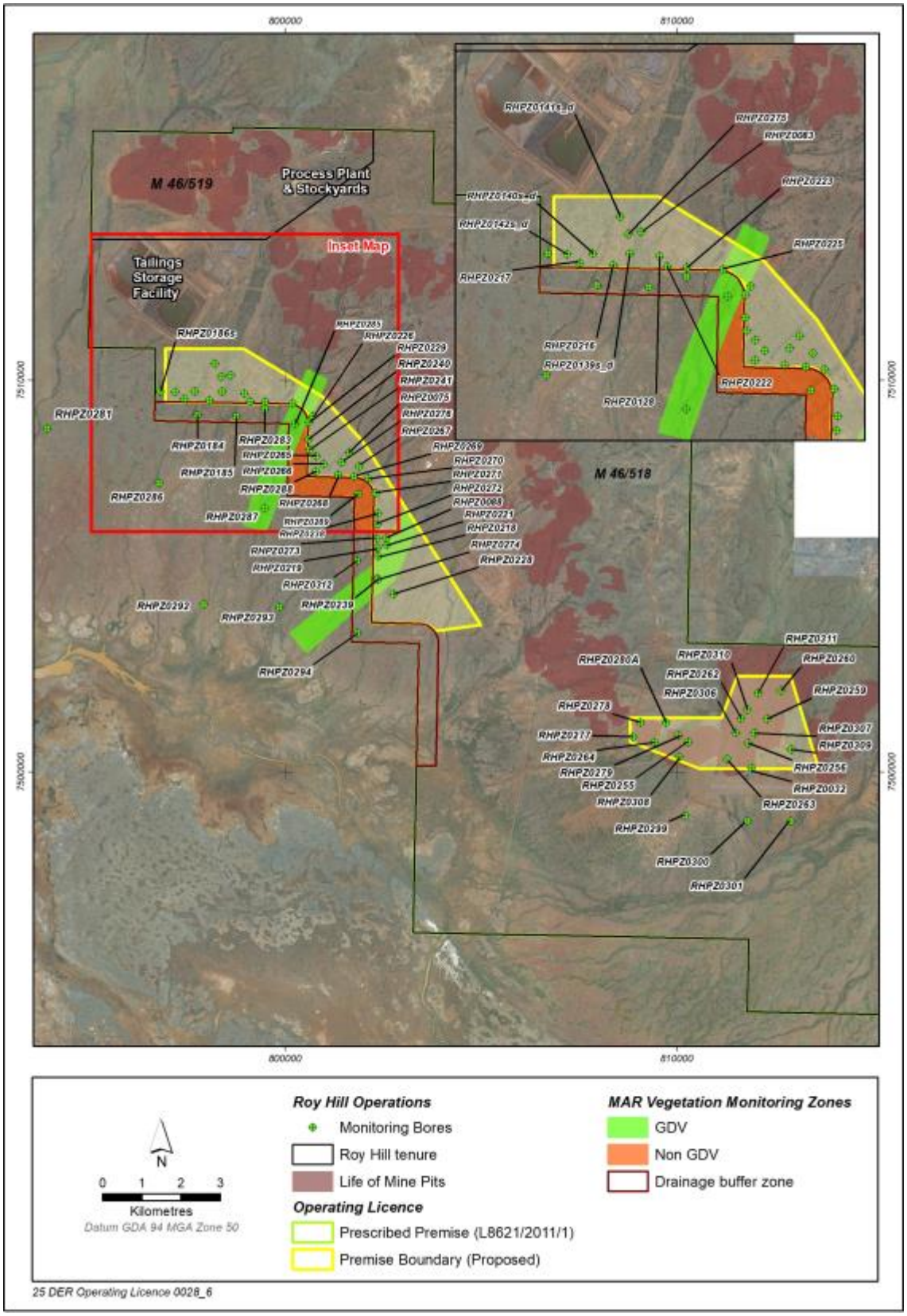


Figure 12: MAR Monitoring locations and identified GDV areas

Management and monitoring

A network of automated monitoring bores are proposed both within the lease and off-lease (outside the current Premises boundary) to monitor groundwater levels, EC and flow rates. The monitoring of water volume and EC for the purpose of the MAR Trial (as opposed to the monitoring for effects on vegetation health from the MAR Trial) will be conducted at the reinjection bores and recharge basins, themselves. These monitoring and management of the MAR Trial areas comprise:

- **Overall monitoring/ management:**
  - Associated monitoring bores (multipiezometers) – to monitor flows, water quality, groundwater levels and 'response and control' injection rates.
  - Pipeline integrity, pumps and monitoring equipment will be inspected weekly.
- **Injection Bores monitoring:**
  - Equipped with flow meter, EC sensor, water level sensor and sample tap.
  - Monitoring requirements comprise the monthly recording of flow meter volume, Sensor EC, Sensor water level.
  - Pipeline integrity, pumps and monitoring equipment will be inspected weekly.
- **Recharge Basin monitoring:**
  - EC, disposal volumes and infiltration rates will be monitored continuously.
  - Groundwater of less than 5,000 mg/L (only) will be discharged into the recharge basins.
  - Groundwater quality and levels of the aquifers recharge and recovery response will be monitored.
  - Pipeline integrity, fence integrity, pumps and monitoring equipment will be inspected monthly.

Monitoring locations for Standing Water Level, TDS and to specifically assess vegetation health within designated MAR Vegetation Monitoring Zones are presented in Figure 12. Trigger levels and limits have been set by the Licensee for these MAR groundwater monitoring bores specific to GDV areas and non – GDV areas. These are presented in Table 7.

Table 7: MAR Trigger Level Framework within MAR Vegetation Monitoring Zones

Risk Area	Triggers	Limits
GDV	• Groundwater at 5 m or less from the surface. • Significant decline in GDV tree health compared to reference area.	• Groundwater at 4 m or less from the surface. • Groundwater quality <5,000 mg/L TDS at the water table (alluvial aquifer).
Non - GDV	• Groundwater at 3 m or less from the surface. • Significant decline in vegetation health compared to reference area. • Significant change in vegetation composition.	• Groundwater at 2 m or less from the surface. • Groundwater quality <5,000 mg/L TDS at the water table (alluvial aquifer).

From: Groundwater Operating Strategy OP-REP-00512

The monitoring results will be regularly reviewed via the Licensee's internal reporting processes. In addition, automated trigger level exceedance notifications will be established within the MIKE Workbench data management system recently implemented by the Licensee. The Licensee will investigate measures to avoid any potential adverse impacts if the monitoring review indicates a trend that may result in water levels reaching the nominated trigger level earlier than predicted.

Impact measures may include:

- Reprioritisation of bore operating rules.
- Reduced reinjection into individual MAR bores and/or the MAR borefields in total.

Ongoing groundwater monitoring will measure mounding related to the TSF, MAR and any interaction between the two. Water levels will be assessed according to the established MAR trigger levels.

Other approvals

The Licensee has provided the following information relating to other approvals as outlined in Table 8.

Table 8: Relevant approvals summary

Legislation	Number	Approval
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	EPBC No: 2008/4624	Notification of Referral Decision – Not a Controlled Action
EP Act	Part IV MS 824 (stage 1) and MS 829 (Stage 2)	MS 829: S45C for removal of maximum ore processing throughput and transfer of regulatory responsibility to Part V of the EP Act (signed 21 May18). MS 829 and MS 824: S45C MAR Trial to inject 55 GL/a into the aquifer below the development envelope for a two year trial period (signed 11 May 2018). (See below this table for more detail on the s45C application). Note: MS 824 and MS 829 provide conditions for the management of groundwater drawdown, groundwater dependent vegetation (from groundwater abstraction) and groundwater and surface quality impacts from run-off and seepage from the waste rock dump, waste fines storage facility and evaporation pond.
	Part V W5732/2014/1 for the construction of the Mine Process Plant Irrigation Area and wastewater treatment plant (WWTP)	Approval to construct WWTP for 35 m^3/day throughput with 4,500 m^2 irrigation area. Note: L8621/2011/1 amendment dated 24/11/2016 approved an increase to the Mine Process Plant Irrigation Area of 15,000 m^2 to accommodate higher nitrogen and phosphorus values through the WWTP. A 15,300 m^2 irrigation area is in operation[*1].
Mining Act 1978	Mining Proposal (Reg ID 32525) – Part A Mining Proposal (Reg ID 37113) – - Part B Mining Proposal (Reg ID56658) – Part C	Mining Proposal Years 1 to 5 M46/518 and M46/519- Part A (Reg ID 32525) – includes the Mine Process Plant and TSF Mining Proposal for Years 1 – 5 M46/518 and M46/519 - Part B (Reg ID 37113) – included amendments to the Mine Process Plant and TSF footprints. Mining Proposal C for M46/518 and M46/519

Legislation	Number	Approval
		(Reg ID56658)
*Rights in Water and Irrigation Act 1914 (*RiWI Act*)*	GWL172642(3)	17,000,000 kilolitres per annum approved allocation, 'Licence to Take Groundwater (s5C)' in accordance with the RiWI Act provides authorisation for the ability to: • abstract for the purpose of dewatering; • dust suppression for earthworks and construction purposes; • earthwork and construction purposes; and • mineral ore processing and other mining purposes.
	Amendment to GWL172642 *(still under assessment)*	Online Application submitted 20 June 2018 by Licensee for '*Additional 53 GL/a (total 70 GL/a) annual allocation to meet dewatering demands.'* Updated Groundwater Operating Strategy provided in support of the increased allocation application.

[*1]: Water Quality Protection Note (WQPN) 22 comparison for irrigation area loading is as follows;

1.55ha: (N) 412.09 kg/ha/yr and (P) 98.90 kg/ha/yr (as applied for by RHIO on 10/3/2016 OP-APP-00003)

1.53ha: (N) 417.48 kg/ha/yr and (P) 100.19 kg/ha/yr (current irrigation area as advised by RHIO on 19/7/2018)

1.50ha: (N) 425.83 kg/ha/yr and (P) 102.2 kg/ha/yr (approved irrigation area size in 24/11/16 L8621/2011/1 amendment)

WQPN 22 Guideline: 480 kg/ha/yr (N) and 120 kg/ha/yr (P)

Part IV of the EP Act – further detail

Change to Processing Rate and MSP operation

The Licensee applied to the EPA on 28 February 2018 for a s45C amendment to MS 824 and MS 829 for changes to amend the processing rate for the Stage 1 Mining phase of the Project. The EPA Chairman determined on 21 May 2018 that the increased processing rate was unlikely to result in a significant detrimental effect on the environment, or differ from the original proposal. The Chairman identified that the MSP is associated infrastructure and no change to either MS was required for the construction of the MSP infrastructure.

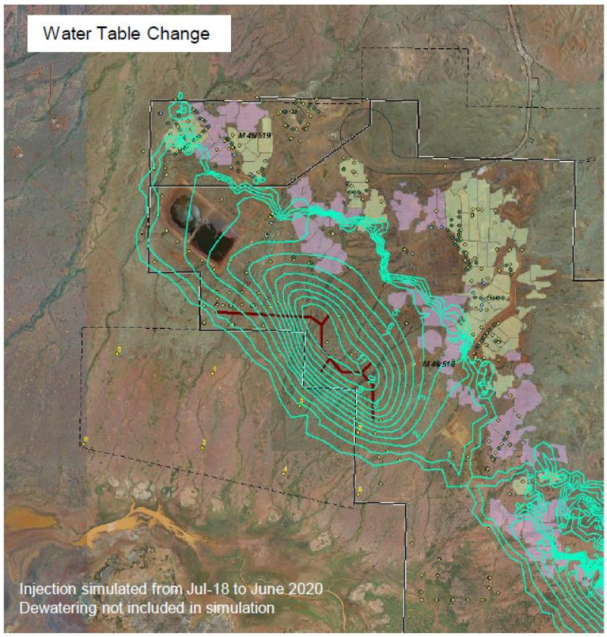
As a result of the s45C approval, the Processing Rate element was removed from Attachment 4 of MS 829, and Attachment 6 of MS 824, with the Processing Rate thereafter to be regulated for this Project under Part V of the EP Act.

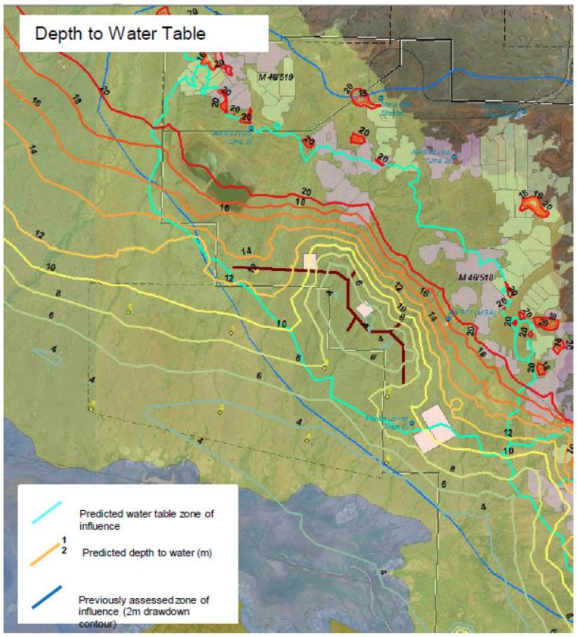
Increase in Dewater Discharge Volumes (MAR Trial)

The Licensee applied to the EPA for s45C amendment to MS 824 and 829 for the MAR Trial, submitting a revised s45c application to the EPA (Services) on 29 March 2018. The MAR Trial was presented to the EPA (Services) and DWER on 10 April 2018.

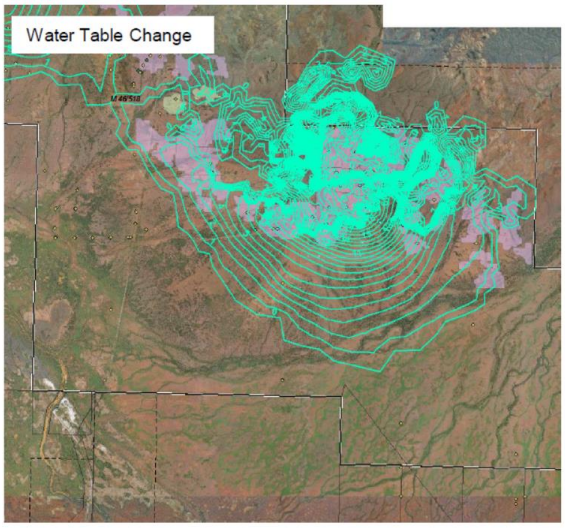
As part of this presentation, the changes to the water table and depth to water table were presented as follows:

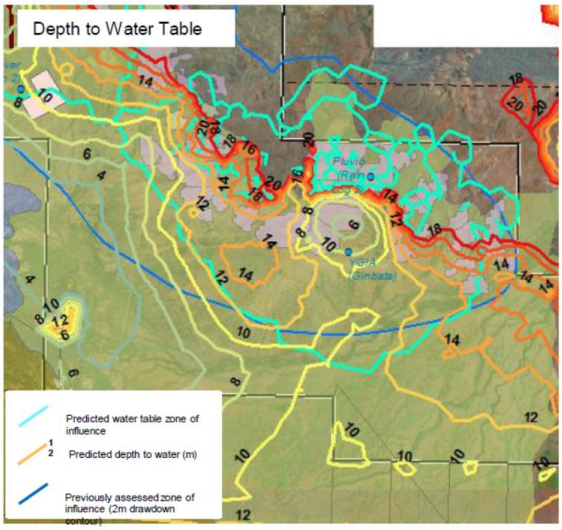
SWIB - Predicted groundwater influence





Stage 1 Borefield injection - Predicted groundwater influence





These diagrams indicate the potential for mounding of groundwater close to the reinjection areas.

The Licensee identified (in RHIO Presentation, 2018) the following (in Table 9) as the Key Environmental factors that may be effected as a result of the MAR Trial operation.

Table 9: Part IV EP Act - Key environmental factors for the MAR Trial and implementation requirements

Licensee identified	Potential Additional or Different Effect	Licensee consideration and management	EPA/SU requirements to implement as determined on 11 May 2018 (s45C approval)*
Inland water quality	Change in groundwater quality from recharge water	No significant additional or detrimental effect predicted as: - better quality water (<5,000 mg/L) (will be injected) into shallow aquifer from recharge ponds and injection bores in Stage 1 borefield area. - poorer quality water (5,000 – 30,000 mg/L) (will be injected) into deeper aquifer which has salinity in the order of 100,000 mg/L.	• Modelling. • Monitoring of lateral saturation. • Monitoring of vegetation decline due to waterlogging and salinization. • (Development of) quantitative trigger levels that will trigger management and mitigation activities.
Flora and vegetation	Loss of vegetation due to: i. rise in groundwater level causing waterlogging in the root zone ii. change in groundwater quality causing salinization within the root zone	- MAR system managed to prevent water table rising to within 2 mbgl on non –GDV (mostly mulga areas) and 5 mbgl in areas of GDV; - There will not be significant change in water quality of the shallow aquifer; - Areas where vegetation could potentially be impacted are relatively small compared to total area of clearing approved for Project (11,993 ha); and - Quality of vegetation is generally poor to degraded due to long term pastoral activity. Monitoring Groundwater monitoring will be undertaken within reinjection areas, MAR vegetation monitoring zones and in hydraulically downgradient areas, comprising: - Remote sensing monitoring (satellite imagery) of entire landscape. - Target ground inspection of vegetation condition and plant health. - Permanent monitoring sites within the MAR vegetation monitoring zones, GDV and non- GDV. - Consistent (monitoring) with existing Vegetation Health Monitoring Plan (as approved under existing MS, Part IV documentation). Trigger Levels for the management of	

Licensee identified	Potential Additional or Different Effect	Licensee consideration and management	EPA/SU requirements to implement as determined on 11 May 2018 (s45C approval)*
		waterlogging and increased salinity risks, Table 7. Reduction in groundwater levels through the redistribution of dewatering injection throughout the MAR system will be the Licensee's primary response mechanism to the management of potential impacts from the waterlogging and increased salinity risks.	
Subterranean fauna	Impacts to subterranean fauna due to: i. Rise in groundwater level impacting troglofauna habitat ii. Change in groundwater quality affecting stygofauna habitat	No significant additional or different detrimental effect predicted as: - There is an absence of significant subterranean fauna within Project area; - The connectivity of both unsaturated soil zone and groundwater the connectivity of both unsaturated soil zone and groundwater aquifers outside of the Project area; - The small change to overall troglofauna unsaturated soils habitat due to rise in water table; and - Limited change in groundwater quality the aquifers.	

* The s45C approval for the Trial, determined on 11 May 2018 highlighted that the abovementioned actions relating to the management of the Trial were required to be implemented by the Licensee.

The s45C approval authorized the following amendments within Attachment 3 of MS 829, and Attachment 5 of MS 824:

- *'Mine Dewatering Element'* was amended from 286 GL total for Stage 1 and Stage 2 to 396 GL total for Stage 1 and Stage 2;
- *'Dewatered Saline Groundwater to be disposed of to Evaporation Ponds'* was reduced from up to 198 GL for up to 36 GL total for Stage 1 and Stage 2; and
- A new Element was added, being '*Dewatered Saline Groundwater (up to 30,000 mg/L TDS) and RO Plant reject water to be disposed to recharge basins and/or reinjection bores*' of an Authorised Extent of up to 55 GL/a for a period of up to 2 years.

Amendment history

Table 10 provides the amendment history for L8621/2011/1.

Table 10: Licence amendments

Instrument	Issued	Amendment
L8621/2011/1	22/03/2012	New Licence issued approving operation of category 85 (WWTP)
L8621/2011/1	30/05/2013	Amendment to include category 89 (putrescible landfill)
L8621/2011/1	19/09/2013	Amendment to include category 12 (screening of material) and upgrade from category 85 to category 54 (WWTP)
L8621/2011/1	8/5/2014	Amendment to incorporate expansion to the landfill (category 89)
L8621/2011/1	5/2/2015	Amendment to add category 57 (used tyre storage), increase category 64 landfill design capacity and excise land for a small WWTP
L8621/2011/1	9/4/2015	Administrative amendment
L8621/2011/1	5/11/2015	Amendment to include the Mine Services Area WWTP and update licence template
L8621/2011/1	7/4/2016	Amendment to include category 6 (dewatering) and 73 (bulk storage of chemicals), construction of northern recharge basin and southern and northern discharge locations to No-name Creek. Removal of Mankarlyikkakurra Exploration Camp
L8621/2011/1	29/04/2016	Amendment by Notice to extend Licence expiry date to 25/03/2034
L8621/2011/1	24/11/2016	Amendment to include category 5 operations including ore processing plant (Process Plant) and TSF, the operation of the Mine Process Plant WWTP constructed under W5732/2014/1 (as amended) including an increased WWTP irrigation area of 15,000 m^2, operation and construction of Class II landfill and operation dewatering recharge basins. Removal of conditions related to the discharge of dewatering effluent to the southern and northern discharge locations to No Name Creek, and the monitoring of those emissions, due to expiry of the Office of the EPA temporary authorisation to discharge
L8621/2011/1	13/1/2017	Amendment Notice 1 - approved operation of TSF evaporators to enhance water evaporation within TSF
L8621/2011/1	16/11/2017	Amendment Notice 2 –approved changes to the design and construction of the stage 2 raise of the TSF; addition of groundwater monitoring conditions around TSF, administrative changes
L8621/2011/1	17/11/2017	Amendment Notice 3 – approved operation of new power station, in-pit tyre disposal areas and additional crushing/screening facilities
L8621/2011/1	29/05/2018	Amendment Notice 4– addition of three creek discharge points for the purpose of scheduled and unscheduled water dewatering water and Process Dam discharge. Addition of category 52 to the front page of this Amendment Notice (administrative only as previously assessed under Amendment Notice 3)
L8621/2011/1	31/05/2018	Amendment Notice 5 – addition of 7 new 90 kilowatt (kW) TSF

Instrument	Issued	Amendment
		evaporators to increase water evaporation volumes within the TSF
L8621/2011/1	05/10/2018	Amendment Notice 6 (this notice) – increase of (category 5) ore processing throughput to 86 Mtpa (wet); construction and operation of 4 Mtpa MSP; increase of (category 6) dewatering disposal volume to 55 GL/a for a period of two years following submission of the construction compliance report for the MAR System; and movement of the (category 54) Mine Process Plant Irrigation Area immediately north of where it currently exists

Location and receptors

Table 11 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 11: Receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises
Roy Hill Homestead	Approximately 19.6 km away from the Processing Plant and MSP Approximately 12.4 km south-southeast from the SWIB re-injection area Approximately 13.7 km from the nearest recharge basin (Stage 2 Recharge Basin) Approximately 8.79 km southwest from the Stage 1 Borefield re-injection area
Chichester Metals Pty Ltd's Christmas Creek mining operation accommodation village	Approximately 30 km to the west of the Premises

Table 12 below lists the relevant environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 12: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Fortescue River and Marsh – Priority 1, Priority Ecological Community	The Fortescue River and Marsh are located more than 2 km southwest of the Project infrastructure (at the nearest point in the south of the Premises boundary) and approximately 7.2 km from the TSF which is located closer to the Marsh than the Process Plant and MSP (approximately 12 km from the Marsh). The SWIB is located 1.6 km to the north-northeast of the Marsh and the Stage 1 Borefield is located 5.6 km to the east. Inflows to the Marsh occur from the Fortescue River (outside the Premise boundary) and other creeks within the region, along with sheet flow after storm events. The Kulbee Creek (and Kulbee Creek west arm) passes through the centre of the Premises, with the Kulkinbah Creek located to the southeast and No Name Creek to the northwest. These ephemeral creeks flow in a southwest direction towards the

Environmental receptors	Distance from Prescribed Premises
	Fortescue River and Marsh.
Surface water body	Kulbee Creek west arm, Kulbee Creek (main) and No Name Creek are the three main surface water drainage lines within the Premises. During early construction of the mine project, upstream sections of Kulbee Creek were diverted and re-instated in a nearby, alternate location to avoid infrastructure.
Vegetation	The Premises contains pockets of riparian and potentially groundwater dependent (phreatophytic) vegetation dominated by *Eucalyptus victrix* (coolibah) and *Eucalyptus camaldulensis* (river red gum) in the vicinity of major creeks, drainage lines and adjacent floodplains. GDV (as well as other riparian vegetation) – has been identified along the creek lines (No Name Creek and Kulbee/West Kulbee) that run parallel to the Stage 1 and Stage 2 Recharge basins (Figure 12) and to the southeast of the SWIB. No threatened or priority ecosystems have been identified within the Premises boundary. No Declared Rare Flora were located within the Premises boundary.
Groundwater	Groundwater levels range from 17 to 20 mbgl at the TSF; 13 to 16 mbgl in the SWIB (Bravo West trial area) and 23 to 29 mbgl at the Stage 1 Borefield. Salinity within SWIB ranges between 500 to 3,000 µS/cm at the surface to over 100,000 µS/cm at depth (Jeerinah). Salinity within the Stage 1 Borefield range up to 3,000 µS/cm across all geological formations (RHIO, 2018b). Salinity of groundwater beneath the Project site (entire Premises) ranges from 600 to 100,000 mg/L TDS. The regional groundwater gradient generally mirrors the topography, broadly falling from a high in the north east to a low in the south west on the flank of the Fortescue River valley (Fortescue Marsh). A general steepening of the gradient approaching the outcrop areas of the Nammuldi Member and Jeerinah Formations is considered to be a function of their lower permeability, in particular the shale of the Jeerinah Formation (MWH, 2010).
Groundwater bores	Fortescue Metals Group Pty Ltd – About 4 km to the northwest of the Premise boundary and 6 km from the SWIB.

Vegetation

Monitoring reports provided by the Licensee indicate that the vegetation within the Roy Hill Project area, in particular the riparian communities, are in relatively poor condition due to extensive historical and current pastoral activities that extend to the Fortescue Marsh. This also applies to a lesser yet significant degree to mulga (*Acacia aneura*) communities within the Project area (Ecologia, 2009).

The vegetation within the Premises generally is described as comprising of *Triodia* sp. hummock grasslands, riparian associations, *Acacia aneura* low woodlands, tall shrublands and miscellaneous shrublands associations. No floristic communities or threatened flora species listed under the EPBC Act or the *Wildlife Conservation Act 1950* (WC Act) were recorded during

the surveys.

Five (5) priority flora species have been recorded on the tenements (within the Premises) comprising three Priority 3 species and two Priority 4 species. The implementation of the Mine was assessed (under Part IV of the EP Act) as unlikely to impact on the conservation significance of these species.

Twenty-eight introduced species (weeds) were recorded on the Mine area during the Level 2 vegetation and flora assessment and subsequent surveys conducted for the Part IV (baseline and additional) assessment of the entire mining project.

Parkinsonia aculeata was recorded in the south-western margins of M46/518, nearby to the SWIB area. This species is listed as a weed of national significance and a Declared Plant in the East Pilbara. One species with Declared Plant status in areas of Western Australia, but not in the East Pilbara, was recorded - *Argemone ochroleuca* subsp.*ochroleuca*. The most widespread and abundant introduced species recorded is *Cenchrus ciliaris* (Buffel Grass) which dominates many of the creek banks in the area. The perennial herb *Malvastrum americanum* was also relatively widespread and abundant.

Regional hydrology and identified environmental values

The main surface water drainage through the Roy Hill Project area occurs in several significant southward draining catchments that have headwaters in the Chichester Range and terminate in, and provide minor surface water contributions to the Fortescue Marsh (No Name Creek, Kulbee Creek, Kulkinbah Creek and others) (MWH, 2015).

Groundwater contribution to the Fortescue Marsh water balance is minor when compared to surface water contributions; however, the Marsh is underlain by a large storage of saline to hypersaline groundwater. Recharge is associated with major cyclonic events that are episodic and relatively short-lived, resulting in some short-term mounding within the shallow groundwater system (MWH, 2015).

The Fortescue Marsh management area is zoned according to key environmental values (EPA, 2013). The location of the three proposed creek discharge locations is within the 'Kulbee Alluvial Flank' Fortescue Marsh management zone (zone 3a). This Zone has been characterized as having the "lowest environmental significance" "Relative priority" (EPA, 2013); however it has an important hydrological contribution to supporting the values in management zone 2c (Fortescue River Coolibah) and 1b (Marsh).

The key environmental values as identified in the report (EPA, 2013) comprise natural water regimes, natural springs and pools, mulga woodlands, species of conservation significance and subterranean fauna. The key environmental values of natural springs and pools, species of conservation significance and significant subterranean fauna have not been identified at or within the proposed creek discharge locations.

Hydrogeology

The Roy Hill orebody is in direct hydraulic connection with the regional aquifers via the mineralised Marra Mamba Formation being in direct connection with the Tertiary detritals and Oakover Formation, and potentially the regional karst aquifer of the Wittenoom Formation to the south (MWH, 2015).

Current operational groundwater activity

Groundwater abstraction from 21 equipped Stage 1 Borefield water supply bores is distributed via high density polyethylene (HDPE) collector pipelines to the main (DN800) water transfer pipeline across site that supplies raw water to the Process Plant. There is also an offtake from the main transfer pipeline which provides water to an RO plant for potable supply for the Mine Village (RHIO GWOS, 2018).

The Stage 1 Borefield is also controlled remotely via a SCADA telemetry system. All bores are equipped with inline electromagnetic flow meters, EC and water level sensors. The Stage 1

Borefield data is available real-time and stored in a Pi Historian database (RHIO GWOS, 2018).

The Stage 1 Borefield mining area is designated for mining in future years (circa 2025) and is currently a supplemental supply meaning the water supply bores are only operational when dewatering abstraction does not meet the volume and/or quality requirements for the raw water demand at the Process Plant. Individual bores are operated on a regular basis to maintain genset and pump condition. Recent abstraction rates from the Stage 1 Borefield average 2 million litres per day, but is expected to increase as water quality from the dewatering supply no longer meets the process water quality criteria (less than 5,000 mg/L TDS) (RHIO GWOS, 2018).

The Stage 1 borefield pumping schedule in conjunction with the dewatering plan are reviewed monthly to achieve alignment of mining and dewatering plans. These monthly reviews may trigger adjustment to abstraction schedules (RHIO GWOS, 2018).

Risk assessment

Tables 13 and 14 below describe the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. Both tables identify whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 13: Risk assessment for proposed amendments during construction

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Category 5 Processing or beneficiation of metallic or non-metallic ore	Construction of mine infrastructure (Process plant and MSP plant)	**Dust**: associated with construction activities	Local vegetation	Air / wind dispersion	Vegetation health impacts	-	-	-	Construction activities, and associated dust emissions (if any), will be of relatively short duration.
		Noise: associated with earthworks and vehicle movement	No nearby residences or other sensitive receptors. The Roy Hill Homestead is more than 19.6 km to the south of the MSP construction area	Air / wind dispersion	None	-	-	-	Construction activities, and associated noise emissions (if any), will be of relatively short duration.
Category 6 Mine dewatering	Vehicle movements on unsealed access roads	**Dust**: associated with earthworks and vehicle movement **Noise**: associated with earthworks and vehicle movement	Local Vegetation No nearby residences or other sensitive receptors. The Roy Hill Homestead is more than 13.7 km to the south of the closest (recharge basin) construction area	Air / wind dispersion	None	-	-	-	The buffer distance between the recharge basin construction areas, the re-injection bore areas and the Roy Hill Homestead is considered sufficient to prevent noise and dust impacts from occurring at the receptor. Construction activities, and associated noise and dust emissions, will be of relatively short duration and no greater than normal mine site operational use of unsealed roads.
	Construction, mobilization, positioning of pipeline infrastructure and pipeline commissioning	**Dewatering water**	Terrestrial vegetation near construction area	Pipeline failure/ leaks during commissioning resulting in direct discharge to	Vegetation loss	Slight	Possible	Low	The impact from the mobilisation, positioning and commissioning of the pipeline infrastructure should result in minimal onsite impacts to terrestrial vegetation near the construction area. Therefore the Delegated Officer considers the

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
				land					consequence to be **slight**. Discharges to land from a pipeline rupture/leak and commissioning impacting on vegetation could occur. Therefore, the Delegated Officer considers the likelihood of the consequence to be **possible**. The overall rating for the risk of impacts from the construction, mobilisation, positioning and commissioning of the pipelines is **low**.
Category 54 Sewage facility	Movement and reinstallation of 15,000 m^2 Mine Process Plant Irrigation Area	**Treated sewage**	Terrestrial vegetation near construction area Human	Pipeline failure during commissioning resulting in direct discharge to land	Vegetation loss Health impacts	-	-	-	The Delegated Officer considers the risks associated with construction of the Irrigation Area and commissioning of the pipework and spray mechanisms has already been assessed under W5732/2014/1 and L8621/2011/1 amendment dated 24/11/16. As the risks for these activities have been assessed, and the re-installation activities proposed by the Licensee are like-for-like and within the same Process Plant area, then no further assessment of risk is deemed required.
		Dust associated with disturbed soil with accumulated contaminants from treated sewage:	Human	Air / wind dispersion	Health impacts	-	-	-	The risk of future works carried out in the area of the existing Irrigation Area have not been assessed here as *Guidance Statement: Risk Assessment* considers employees in the identification of potential receptors as being covered by

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
									site-based prevention strategies and management of impacts is managed under other State legislation.

Table 14: Risk assessment for proposed amendments during operation

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
Category 5 Processing or beneficiation of metallic or non-metallic ore	Operation of infrastructure (including the MSP), ore handling and movement of tailings and ore product at the Process Plant	**Dust**: during operations	No nearby residences or other sensitive receptors	Air / wind dispersion	Health/ amenity impacts	-	-	-	The Delegated Officer considers that impacts from dust during the operation of the MSP are not expected as the MSP process is essentially a 'wet' process, limited dust will be generated. Dust impacts from the general Processing Plant operation have already been assessed in the November 2016 L8621/2011/1 amendment. Controls, management processes and general provisions of the EP Act for the management of dust emissions are currently deemed appropriate for dust mitigation at the Processing Plant area and as such, no further assessment of risk is deemed required.
		Noise: during operations	No nearby residences or	Air / wind dispersion	Health/ amenity	-	-	-	The Delegated Officer considers noise emissions are

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
			other sensitive receptors		impacts				not expected to impact sensitive premises as the Premises is isolated with the nearest sensitive premises located at least 10 km away. The Licensee has an ongoing legislative requirement to comply with the Prescribed standard for noise emissions, as set out in regulation 7 of the Noise Regulations.
		Stormwater: potentially contaminated with sediment and / or hydrocarbons	The nearest sensitive receptor to the MSP is the Fortescue Marsh which is located approximately 10 km to the south of the MSP	Overland flow into surface water features (rivers/creeks/ marsh)	Soil contamination inhibiting vegetation growth and survival and health impacts to fauna Contamination of surface water bodies	Slight	Unlikely	Low	Drainage in the Processing area does lead to other smaller tributaries such as No Name Creek however, the Licensee has a number of controls to mitigate the risk of impacts from contaminated stormwater being discharged to the environment, including: • Maintain stormwater diversion structures to direct uncontaminated stormwater (water collected outside the facility) away from hazardous material storage facilities; • Maintain OWS equipment as per manufacturer's instructions or more regularly as required to ensure efficient operation; • Monitor the sump water level following rainfall events and pump out the sump to prevent overflows; • Remove material (including

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
									sediment and hydrocarbons waste) from the OWS to a licensed facility for disposal to maintain the capacity of the facility. Alternatively deposit the sediment within the bioremediation facility for further treatment; • Treated oily water from the separators at the MSP shall have a TRH concentration of <15 mg/L prior discharge to the environment; • In the event of a spill at the MSP facility all containing, controlling, clean up and reporting actions shall be undertaken in accordance with the RHIO Spill Response Procedure (OP-PRO-00275); • Appropriate spill kits will be provided, accessible and regularly stocked; • Visual inspections undertaken to ensure dust control measures are operating appropriately; and • Environmental inspections undertaken as per existing Mine Inspection Schedule. The Delegated Officer has had regard to the separation distance to sensitive receptors and the Licensee's controls for reducing the risk of impacts from discharges of contaminated stormwater.

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
									If stormwater was to become contaminated and be discharged to the surrounding environment, then the Delegated Officer has determined that the impacts to soil and groundwater will be minimal. Therefore the Delegated Officer considers the consequence to be **slight**. Based upon the Licensee's controls listed above, the Delegated Officer has determined that the likelihood of impacts from contaminated stormwater discharges will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the consequence occurring to be **unlikely**. The overall rating for the risk of impacts from contaminated stormwater is **low**.
		Waste: Tailings disposal	Groundwater with beneficial use (Groundwater Dependent Ecosystem)	Seepage of leachate	Adverse impacts to the health and survival of GDV	-	-	-	Outside of scope: regulated under Part IV of the EP Act.
Category 5 Processing or beneficiation of metallic or non-	Transfer of tailings from the Process Plant, through the MSP plant	**Waste:** Tailings disposal/ spillage	Soil Vegetation Surface water	Seepage of spilled leachate through soil	-	-	-	-	Condition 1.2.10 regarding the transfer of tailings to the TSF already exists. Being: *(a) all tailings delivery pipelines are equipped with automatic*

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
metallic ore	and to the TSF		Groundwater						*cut-outs in the event of a pipe failure;* *(b) all tailings delivery pipelines are provided with secondary containment at the booster station area sufficient to contain any spill for a period equal to the time between routine inspections; and* *(c) twice daily inspections are undertaken on the integrity of all the tailings delivery and tailings decant pipelines.* Tailings transport between the main Processing Plant and the MSP is expected to be in the order of less than 100 m and the MSP area will contain external bunding that will contain any spillage of tailings. Whilst there will be an increase in the volume of tailings that are to be transferred through the existing pipework, the Delegated Officer considers that the conditions and measures (Roy Hill Bunds, Sumps, Washdowns and Oily Water Separators Management Procedure (OP-PRO-00178) and Roy Hill Spill Response Procedure (OP-PRO-00275) already in place are sufficient to manage the risk and no additional conditions are to be applied to manage tailings disposal/ spillage from the

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
									MSP.
		Water: Potentially contaminated water from the MSP (hydrocarbon contaminated)	None	-	-	-	-	-	The Delegated Officer considers that there is no further requirement for risk assessment as measures for the management of hydrocarbon contaminated water proposed by the Licensee are considered adequate and there are no sensitive receptors within the area to which an expected spill from this facility, could impact.
Category 6 Mine dewatering	Physical activity of dewatering (abstraction from aquifers)	Nil	Receiving aquifers	-	Depletion of water resource Disruption to: Inland water quality Flora and vegetation Subterranean fauna	-	-	-	The potential adverse impacts from the physical activity of groundwater abstraction for mine dewatering has been assessed by the EPA and approved under s45C approvals to MS 824 and MS 829 as signed 11 May 2018. As these impacts are managed under Part IV of the EP Act, no further assessment of risk has been considered here.
	Discharge of dewatering water during the MAR Trial Pipeline ruptures/ spills before injection	**Water:** Water of varying qualities (chemistry may vary) and salinities entering differing aquifers and hydrostratigraphic units	Receiving aquifers water chemistry	Groundwater	Depletion of water resource Change and/or disruption to: groundwater chemistry, short and longer term Loss or impact to fauna	Moderate	Possible	Medium	Dewatering of saline groundwater (up to 30,000 mg/L TDS and RO plant reject water to be disposed to recharge basins and/or reinjection bores, was assessed and approved under Part IV of the EP Act (s45C approvals to MS 824 and MS 829 as signed 11 May 2018). Salinity of groundwater beneath

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
					and/or Subterranean fauna Impacts to vegetation				the Project site (entire Premises) ranges from 600 to 100,000 mg/L TDS. Changes to water chemistry has potential for localised impacts which may not be determined for some time. This could possibly result in a mid-level impact offsite or further afield. Groundwater chemistry and the potential for change has not been assessed, hence any changes to groundwater chemistry in shallow and deep aquifers in the short and long term cannot be determined. A medium risk to groundwater chemistry change is therefore determined, as a result of the MAR Trial. Considering this is a trial, the collection and collation of groundwater chemistry data as a result of the MAR will enable changes/responses to be observed and management responses developed, should longer term MAR also be required. Impacts to vegetation from changed water levels and TDS are managed under Part IV of the EP Act, no further

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
									assessment of these parameters have been considered here.
		Water: additional volume to existing groundwater resources causing mounding and waterlogging of soil and vegetation roots	Soil and Vegetation	Groundwater and soil profile	Death to GDV and non-GDV	-	-	-	The potential adverse impacts from groundwater mounding has been assessed by the EPA and approved under s45C approvals to MS 824 and MS 829 as signed 11 May 2018. As these impacts are managed under Part IV of the EP Act, no further assessment of risk has been considered here.
	Discharge of dewatering water to recharge basins as an attractant for fauna	Nil	Local fauna and roaming livestock	-	Fauna death	-	-	-	The Delegated Officer considers that there is no further requirement for risk assessment as access to the recharge basins will be restricted by stock fencing and humans/ large fauna will not be able to enter the basin areas.

Decision

Licensee controls for the construction of the MAR Trial, MSP and Mine Process Plant Irrigation Area works are conditioned on the Licence to ensure that infrastructure nominated to mitigate environmental impacts, are installed.

The Key Documents used to undertake this assessment have been provided in Appendix 3.

As no information has been provided by the Licensee with regards to soil or contamination testing of the existing Mine Process Plant Irrigation Area and whether human health will be impacted by the introduced traffic and construction/ operation activity from MSP, the onus will be on the Licensee to ensure that there is no impact to its employees from the disturbed soil.

It is understood that the Licensee intends to regularly review the monitoring results (Groundwater Operating Strategy OP-REP-00512) and install an automated trigger level exceedance notifications system within the MIKE Workbench data management system recently implemented by the Licensee. The Licensee has indicated that they will investigate measures to avoid any potential adverse impacts if the monitoring review indicates a trend that may result in water levels reaching the nominated trigger level earlier than predicted.

To facilitate the monitoring review commitment and to allow for earlier detection of environmental impacts/ water quality changes (and subsequent impacts to the environment from water chemistry changes) that may be occurring during the MAR Trial period, monitoring of ambient groundwater quality (Condition 3.6.1) has been increased from the Licensee-proposed frequency of six monthly (MAR Trial Application) to monthly for the first 12 months then quarterly thereafter for the duration of the 2 year MAR Trial.

In addition, it is considered that six-monthly water quality sampling will not provide a broad-enough dataset to indicate whether the injection of wastewater will cause the release of environmentally harmful chemical constituents into groundwater, or will lead to the clogging of the aquifer matrix by mineral precipitates. Quarterly data will also provide more information for a longer term MAR to ensure there are no detrimental changes as a result of moving water.

These issues are important because, although there is no extractive groundwater use in the area, excessive mounding of the water table due to local aquifer clogging could lead to high concentrations of soluble salts and dissolved metals being discharged to the land surface, potentially leading to significant environmental impacts. Additionally, the injection of wastewater containing high concentrations of nitrate could lead to the oxidation of pyrite in the aquifer matrix (dissolved nitrate is a strong oxidising agent) and the release of environmentally harmful concentrations of metals into groundwater. As such, the NO_2 and Nitrate as NO_3 parameters have also been included in Table 3.6.1 of the conditions.

It is noted that not all reinjection bores had been drilled at the time of this assessment and as such, the locations as proposed have been inserted within the relevant conditions of this amendment.

Other amendments

During this amendment the following changes have also been made to the Licence:

- All references to Department of Environment Regulation (DER) changed to DWER.
- Definitions for ‘CEO’; ‘CEO’ for the purposes of notification; and ‘Landfill Definitions’ updated and the definitions for ‘Australian and New Zealand Guidelines for Fresh and Marine Water Quality’; ‘MAR’; ‘MSA’; ‘MSP’; ‘PLC’, ‘SWIB’; and ‘TSF’ included.
- All conditions and table numbers under ‘Premises Operations’ updated in line with

Amendment Notices 1 to 5.

- Administrative changes to Table 1.2.2 (previously Table 1.3.2).
- Previous condition 1.3.11 (now Condition 1.2.11) has been updated to include the Premises containment infrastructure for dewatering water (Southern Recharge Basin, Northern Recharge Basin, Stage 1 Recharge Basin and Stage 2 Recharge Basin) and requirements.
- The works specifications for the Zulu Dewatering Creek Discharge location and Delta Dewatering Creek Discharge location in Table 1.2.6 (previously Table 1.3.6) has been removed. The Licensee provided compliance documentation (Delta and Zulu Compliance Report) to DWER on 16 July 2018.
- The works specifications for the In-pit tyre disposal area from Table 1.2.6 (previously Table 1.3.6) has been removed. The In-pit Tyre Disposal Location is shown on the Premises map (Attachment 1). Table 1.2.2 (previously Table 1.3.2) has been updated to include the work specification "*Base of In-pit Tyre Disposal areas (D101, D301) shall be greater than 3 m above original groundwater level".*
- The production or design capacity limit for category 52 has been added to Table 1.2.7 as this was previously missing.
- Condition 2.5.3 has been amended as the ANZECC/ARMCANZ water quality guideline updates have now been released. This is available at http://www.waterquality.gov.au/anz-guidelines.

Licensee's comments

The Licensee was provided with the draft Amendment Notice on 10 August 2018 and 11 September 2018. Comments received from the Licensee have been considered by the Delegated Officer as shown in Appendix 4.

Amendment

1. Page 1 of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
5	Processing or beneficiation of metallic or non-metallic ore	50,000 tonnes or more per year	~~65~~**86**,000,000 **(wet)** tonnes per annual period **(to produce 65,000,000 [wet] tonnes of ore per annual period for export)**
6	Mine dewatering	50,000 tonnes or more per year	**55,000,000 tonnes per annual period discharged for a period of up to two years following submission of the construction compliance document required under condition 1.2.16. Thereafter, the discharge throughput will** revert~~ing~~ back to 843,000 (scheduled) tonnes per annual period

12	Screening, etc. of material	50,000 tonnes or more year	6,570,000 tonnes per annual period
52	Electric power generation	10 MW or more in aggregate (using a fuel other than natural gas)	45 MW
54	Sewage facility	100 cubic metres or more per day	593 cubic metres per day
57	Used tyre storage (general)	100 tyres or more	No more than 5,000 tyres
64	Class II putrescible landfill site	20 tonnes or more per year	8,000 tonnes per annual period
73	Bulk storage of chemicals, etc.	1,000 cubic metres in aggregate	5,530 cubic metres in aggregate

2. Definitions of the Licence are amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' refers to the default guideline values for freshwater available at http://www.waterquality.gov.au/anz-guidelines;

'CEO' *means Chief Executive Officer ~~of the Department of Environment Regulation~~;*

'CEO' *for the purpose**s*** *of ~~correspondence~~* ***notification*** *means:*
~~Chief Executive Officer~~ ***Director General***
Department ~~Div.3 Pt. V~~ ***Administering the*** *EP Act*
Locked Bag 33 Cloister Square
PERTH WA 6850
info@dwer.wa.gov.au;

~~'DER'~~ *~~Department of Environment Regulation (former) (from 1 July 2017 DER is part of the Department of Water and Environmental Regulation – see https://publicsector.wa.gov.au/public-administration/machinery-government/2017-machinery-government-changes for further details);~~*

'Landfill Definitions' *means the document titled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer of the Department of* ***Water and*** *Environmen**tal Regulation*** *~~and Conservation~~ as amended from time to time;*

'MAR' means Managed Aquifer Recharge;

'MSA' means Mine Services Area;

'MSP' means Magnetic Separation Plant;

~~'OEPA'~~ *~~Office of the Environmental Protection Authority (former) (from 1 July 2017 the Office of the EPA is part of the Department of Water and Environmental Regulation – see https://publicsector.wa.gov.au/public-administration/machinery-government/2017-machinery-government-changes for further details);~~*

'PLC' means Programmable Logic Control;

'SWIB' means Southwest Injection Borefield;

‘TSF’ means Tailings Storage Facility;

3. Previous condition 1.3.4 (now condition 1.2.4) of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

*1.**2**~~3~~.4 The Licensee shall ensure that wastes accepted onto the Premises are only subjected to the process(es) set out in Table 1.**2**~~3~~.2 and in accordance with any process limits described in that Table.*

Table 1.23.2: Waste processing		
Waste type	***Process(es)***	***Process limits[1,2]***
Inert Waste Type 1	*Receipt, handling and disposal of waste by landfilling*	*Disposal of waste by landfilling shall only take place within the ~~Landfill,~~ Landfill 2 and Delta 1 Pit Landfill shown on the ~~Landfill Area~~ **Premises map** ~~Maps~~ in Schedule 1.* *The separation distance between the base of the landfill and the highest groundwater level shall be greater than 3 m.* *Disposal of waste shall not exceed 3,000 tonnes per annual period.* *The size of the tipping face is kept to a minimum and not larger than 30 m in length.* *Must meet the acceptance criteria for a Class II landfill[3].*
Putrescible Waste		
Clean Fill		
Inert Waste Type 2[1]	*Receipt, handling and disposal of waste by landfilling*	*Disposal of Inert Waste Type 2 shall not exceed 5,000 tonnes per annual period and shall only include tyres, conveyors and HDPE pipe.* ***Tyre disposal** shall only occur ~~within the Landfill~~ at the In-pit Tyre Disposal areas (D101, D301) and ROM 3 Tyre ~~Disposal~~ **Storage** Area identified on the ~~Landfill Area~~ **Premises m**~~M~~aps in Schedule 1~~, with tyre disposal only occurring at In-pit Tyre Disposal areas (D101, D301) and ROM 3 Tyre Disposal Area~~.* ~~*Disposal of waste shall not exceed 5,000 tonnes per annual period and shall only include tyres, conveyors and HDPE pipe.*~~ ***Base of In-pit Tyre Disposal areas (D101, D301) shall be greater than 3 m above original groundwater level.*** *Not more than 5,000 used tyres shall be stored at the Premises at any one time.* *Storage of used tyres in the **ROM 3** Tyre Storage Area shown on the ~~Landfill Area~~ **Premises** ~~M~~**m**ap in Schedule 1 shall only occur in units not more than 100 tyres.*

		Used tyres must be stacked on their side walls or if stored on treads, the area shall be baled with a securing device made of non-combustible material. *A separation distance of 6 m must be maintained between units.*
Sewage	*Biological, physical and chemical treatment*	*Treatment of sewage waste at the* ***MSA WWTP and Mine Process Plant WWTP*** ~~*Exploration Camp wastewater treatment plant*~~ *shall be at or below the treatment capacity of* ***48*** ~~*93.1*~~ *m^3/day* ***and 35 m^3/day respectively.***
Sewage	*Biological, physical and chemical treatment.*	*Treatment of sewage waste at the Accommodation* ***V***~~*v*~~*illage* ***WWTP*** ~~*wastewater treatment plant*~~ *shall be at or below the treatment capacity of 510 m^3/day.*

Note 1: Requirements for landfilling tyres are set out in Part 6 of the Environmental Protection Regulations 1987.
Note 2: Additional requirements for the acceptance and landfilling of controlled waste (including asbestos and tyres) are set out in the Environmental Protection (Controlled Waste) Regulations 2004.
Note 3: Defined in the Landfill Definitions.

4. Previous condition 1.3.11 (now condition 1.2.11) of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

*1.**2**~~3~~.11 The Licensee shall ensure that tailings material, dewatering water and hydrocarbons are only stored and/or treated within vessels or compounds provided with the infrastructure requirements specified in Table 1.**2**~~3~~.4 and identified in Schedule 1.*

Table 1.2~~3~~.4: Containment infrastructure		
Containment cell or dam number(s) as depicted in Schedule 1	***Material***	***Infrastructure requirements***
~~*Tailings Storage Facility*~~ ***TSF***	*Tailings*	*A minimum top of embankment freeboard of 1,200 mm[1] is maintained.* *Methods of operation minimise the likelihood of erosion of the embankments by wave action.* *The supernatant pond on the TSF is minimised as far as possible.* *Final perimeter embankment height of 456 mRL.*
Process Water Dam	*Mine dewatering water, tailings return water and water from the Stage 1 Borefield*	*HDPE lined (1.5 mm thickness) dam, which stores water prior to use in the mine process plant.*
Bulk Fuel ~~*Facility*~~ ***Yard***	*C1 Combustible Liquid (diesel)*	*Two 2,765,000 litre storage tanks situated inside a HDPE lined bund, with bund permeability no less than 10^{-9} metres per second.*

		Bund height sufficient to prevent surface water ingress up to 500 mm deep. *Bund floor with both mechanical and fire protection in the form of clean fill and sloped and graded to allow drainage to sump.* *Ring beam has floor leak detection indicators.*
Southern Recharge Basin	***Mine dewatering water***	***Discharge controlled over a rock lined surface to the base of the basin to reduce erosion.***
Northern Recharge Basin		***Diversion drains installed to divert stormwater around the basins.*** ***Basins are fully fenced.***
Stage 1 Recharge Basin		***Minimum 2.25 m deep.***
Stage 2 Recharge Basin		***Spoil material to be stockpiled on the upslope side to prevent surface water runoff entering the basins.*** ***Minimum operational freeboard of 0.25 m.*** ***Basins are fully fenced.***

Note 1: Determined by the total sum of operational freeboard of 300 mm, beach freeboard of 200 mm and 10,000 year storm requirement of 700 mm.

5. Previous condition 1.3.14 (now condition 1.2.14) of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

*1.**2**~~3~~.14 The Licensee must not depart from the specifications in Table 1.**2**~~3~~.6 except:*

(a) where such departure is minor in nature and does not materially change or affect the infrastructure; or

(b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment; and

(c) all other Conditions in this Licence are still satisfied.

Table 1.2~~3~~.6: Works specifications	
Column 1	***Column 2***
~~Zulu Dewatering Creek Discharge location~~	*~~1. Construction and placement of the rock rip-rap area in the defined creek bed/channel (at 'Zulu Creek Discharge Point' in Schedule 1: Map of dewatering bore areas and creek discharge points) to minimise erosion and vegetation disturbance.~~* *~~2. Spreader pipe to disperse flow across the rip-rap area~~* *~~3. Flow meter near the discharge point to record discharge volumes~~* *~~4. Pipelines are/will be buried beneath road and creek lines~~* *~~5. The length (to nearest bore of the pipeline to the discharge point) will be approximately 2.7km.~~*

Bravo Dewatering Creek Discharge location	1. *Construction and placement of rock rip-rap in the defined creek bed/channel (at 'Bravo **Dewatering** Creek Discharge ~~Point~~' **as shown on the** Map of dewatering bore areas and creek discharge points in Schedule 1) to minimise erosion and vegetation disturbance.* 2. *Spreader pipe to disperse flow across the rip-rap area.* 3. *Flow meter near the discharge point to record discharge volumes.* 4. *Pipelines are/will be buried beneath road and creek lines.* 5. *The length (to nearest bore of the pipeline to the discharge point) will be approximately 7.5 km.*
~~*Delta Dewatering Creek Discharge location*~~	~~1. Construction and placement of rock rip-rap in the defined creek bed/channel (at 'Delta Creek Discharge Point' in Schedule 1: Map of dewatering bore areas and creek discharge points) to minimise erosion and vegetation disturbance~~ ~~2. Spreader pipe to disperse flow across the rip-rap area~~ ~~3. Flow meter near the discharge point to record discharge volumes~~ ~~4. Pipelines are/will be buried beneath road and creek lines.~~ ~~5. The length (to nearest bore of the pipeline to the discharge point) will be approximately 1.7 km.~~
Mine Power Station	1. *Comprised of:* • *56 x Caterpillar 3516B (XQ2000) diesel generators;* • *2 x 110,000 L double skinned diesel storage tanks;* • *28 x transformers in self-bunded modules;* • *1 x 27,000 L self-bunded lube storage tank; and* • *1 x ~~oil water separator~~ (OWS~~)~~* system*, designed to treat stormwater to less than 15 mg/L **total petroleum hydrocarbons** ~~TPH~~;* 2. *Constructed as per ~~Attachment 3 titled "Roy Hill Iron Ore Mine – **the map of the Mine** Power Station ~~Layout"~~ **shown in Schedule 1**; and* 3. *Exhaust emissions from each generator via two 0.45 m diameter stacks at a height of 2.9 m above ground level at a velocity of 34.6 metres per second.*
~~*In-pit tyre disposal area*~~	~~1. To be located within Delta Mine Pit as per Attachment 4 titled "Roy Hill Iron Ore Mine - In-pit Tyre Disposal Locations"; and~~ ~~2. Base of tyre disposal area to be at least 3m above original groundwater level~~
Stage 2 TSF raise	1. *Phased removal of relevant Cell (1 or 2) tailings delivery pipelines, decant pipework and associated infrastructure;* 2. *Phased bulk earthworks construction of embankment lifts of relevant Cell (1 or 2) including raising of decant structure, to a design level of 442 mRL;* 3. *Re-installation of tailings delivery pipelines, decant pipework and associated infrastructure at relevant Cell prior to commencement of raise on subsequent Cell; and* 4. *Pipelines located around the top of the dam wall are to be constructed of P12 DN450 HDPE and pipelines constructed from the Booster Station to the inflow area on the dam wall, constructed of C12 DN450 Carbon Steel Pipe.*
Cell 2 TSF evaporators	1. *Installation of seven Minetek 90 kilowatt evaporators on Cell 2 decant causeway.* 2. *Automated **PLC** ~~Programmable Logic Control~~ System.*

	3. Diesel generators that: • *have 110% tank capacity spill protection, including a double-bunded base;* • *have hydrocarbon fill-points with adequate spill-collection installed to prevent spills on the decant causeway and into the TSF;* • *are safely accessible for refuelling; and* • *spill kits available at each (generator) location.*
MSP	***1. Switchrooms.*** ***2. Scrubber.*** ***3. Reagent Storage Area.*** ***4. Concentrate Thickener.*** ***5. Tailings Thickener.*** ***6. Water Services Area (Water Storage tanks for MSP operation).*** ***7. De-slime cyclone.*** ***8. Hydro-separators.*** ***9. Concentrate Storage Tank.*** ***10. Return water pipeline (directed to Process Water Dam).*** ***11. Earthen bunding to separate MSP area from Mine Process Plant Irrigation Area, functional to retain surface water flow.***
Mine Process Plant Sprayfield (relocated)	***1. Reinstatement of 1.53 hectare Mine Process Plant Irrigation Area (to the location shown on the map in Schedule 1) including:*** • ***3 strand fencing.*** • ***Above ground PVC pipework with functioning sprinklers.*** • ***Exclusion / warning signage.*** • ***Construction of a levee and a diversion channel which protect the sprayfield from flood waters / limit overland flow to No Name Creek/ un-named minor creek lines.***
MAR System – reinjection bores	***1. Install monitoring equipment on up to 50 reinjection bores (located within SWIB and Stage 1 Borefield as shown on the MAR Trial areas map in Schedule 1).*** ***2. Each reinjection bore to be equipped with flow meter, Electrical Conductivity sensor, water level sensor and sample tap.***
MAR System – recharge basins	***1. Install two unlined recharge basins (Stage 1 and Stage 2 recharge basins as depicted on the maps in Schedule 1) to be located outside flood channels to dispose of excess dewatering water, to the following dimensions and characteristics:*** • ***Each basin is to be a minimum 2.25 m deep;*** • ***Spoil material from the basin construction to be stockpiled on the upslope side of the construction to prevent surface water runoff entering the basin;*** • ***Basins to be located outside of flood channels and surface water runoff areas to prevent groundwater egress or surface water ingress; and*** • ***Constructed for minimum operational freeboard of 0.25 m.*** ***2. Pipework to the basins to be connected to the higher quality dewatering network only via direct feed HDPE pipelines.*** ***3. Feed lines to contain:***

	• ***Isolation valves;*** • ***Magnetic flow meter; and*** • ***Electrical conductivity sensor.*** ***4. Float valves to be installed:*** • ***One solenoid control (acting as the primary control); and*** • ***One mechanical control (acting as the secondary control) to allow for maintenance of freeboard.*** ***5. Level transmitter to manage water level and primary solenoid control.*** ***6. All instrumentation connected to a telemetry panel which will transfer data back to a centralised Supervisory Control and Data Acquisition screen.*** ***7. Ability for manual shutdown of feed water delivery.*** ***8. Stock exclusion fencing and human exclusion signage erected.***

6. Previous condition 1.3.18 (now condition 1.2.18) of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

*1.**2**~~3~~.18 The Licensee shall ensure the limits specified in Table 1.**2**~~3~~.7 are not exceeded.*

Table 1.2~~3~~.7: Production or design capacity limits		
Category[1]	***Category description[1]***	***Premises production or design capacity limit***
5	*Processing or beneficiation of metallic or non-metallic ore*	*~~65,000,000 tonnes per annual period~~* ***86, 000,000 (wet) tonnes per annual period (to produce 65,000,000 [wet] tonnes of ore per annual period for export)***
6	*Mine dewatering*	*~~843,000 (scheduled)~~* ***55,000,000*** *tonnes per annual period discharged* ***for a period of up to two years[2] (following submission of the construction compliance report required under condition 1.2.16 for the MAR System)*** *, comprising:* • ***54,535,000 into reinjection bores and recharge basins;*** • *~~378,000 tonnes per annual period discharged to recharge basins;~~* • *5, 000 tonnes per day over 31 days per annum with a maximum of 7 days per scheduled event, discharged at Zulu Creek Discharge location. (Maximum discharge volume to Zulu Creek Discharge of 155,000 tonnes per annum);* • *5, 000 tonnes per day over 31 days per annum with a maximum of 7 days per scheduled event, discharged at Bravo Creek Discharge location. Maximum discharge volume to Bravo Creek Discharge of 155,000 tonnes per annum); and* • *5, 000 tonnes per day over 31 days per annum with a maximum of 7 days per*

		scheduled event, discharged at Delta Creek Discharge location. Maximum discharge volume to Delta Creek Discharge of 155,000 tonnes per annum). ***Thereafter the discharge throughput will revert back to** 843, 000 (scheduled) tonnes per annual period[2].* *In addition to the abovementioned 843,000 (scheduled) tonnes, once every 5 years* *Comprising:* • *100,000 tonnes per annual period; with no more than a maximum of 25,000 tonnes per day to the Zulu Creek discharge location.*
12	*Screening, etc. of material*	*6,570,000 tonnes per annual period*
52	***Electric power generation***	***45 MW***
73	*Bulk storage of chemicals, etc.*	*5,530 cubic metres in aggregate as per Bulk Fuel Facility specifications in Table 1.**2**~~3~~.4*

Note 1: Environmental Protection Regulations 1987, Schedule 1.
Note 2: For a period of up to two years as authorized by s45C dated 11 May 2018 for MS 824 and MS 829, thereafter reverting back to 843,000 (scheduled) tonnes per annual period discharged.

7. Condition 2.2.1 of the Licence is amended by the insertion of the bold text shown in underline below:

2.2.1 The Licensee shall ensure that where waste is emitted to groundwater from the emission points in Table 2.2.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 2.2.1: Emission points to groundwater		
Emission point reference and location on Map of emission points	***Description***	***Source including abatement***
Southern Recharge Basin	*Disposal of excess water where dewatering production exceeds other mine site demands for dust suppression and construction and when the mine process plant is shutdown for maintenance*	*Water from mine dewatering*
Northern Recharge Basin		
Stage 1 Recharge Basin	***Disposal of excess mine pit dewatering water***	
Stage 2 Recharge Basin		
SWIB Injection Bores ***Installed*** ***RHIB0128 to RHIB0131, RHIB0230, RHIB0232, RHIB0233, RHIB0235, RHIB0252, RHIB0253, RHIB0265, RHIB0267, RHIB0268***		

Proposed RHIB0231A, RHIB0233, RHIB0236, RHIB0237, RHIB0238, RHIB0239, RHIB0249, RHIB0250, RHIB0251, RHIB0254, RHIB0255, RHIB0257 to RHIB0264, RHIB0266		
Stage 1 Borefield Injection Bores ***Installed RHIB0188 to RHIB0191, RHIB0193, RHIB0194, RHIB0196, RHIB009, RHIB0023, RHIB0024, RHIB0027, RHIB0030, RHIB0036, RHIB0039, RHIB0275 to RHIB0277, RHIB0279***		

8. Condition 2.2.2 of the Licence is amended by the insertion of the bold text shown in underline below:

2.2.2 The Licensee shall not cause or allow point source emissions to groundwater greater than the limit listed in Table 2.2.2

Table 2.2.2: Point source emission limits to groundwater			
Emission point reference	***Parameter***	***Limit (including units)***	***Averaging period***
Southern Recharge Basin *Northern Recharge Basin*	*Total Dissolved Solids*	*6,000 mg/L*	*Spot sample*
Stage 1 Recharge Basin	***Total Dissolved Solids (Electrical Conductivity)***	***5,000 mg/L (less than 7,300 µS/cm)***	***Continuous during discharge***
Stage 2 Recharge Basin			
SWIB Injection Bores ***Installed RHIB0128 to RHIB0131, RHIB0230, RHIB0232, RHIB0233, RHIB0235, RHIB0252, RHIB0253, RHIB0265, RHIB0267, RHIB0268*** ***Proposed RHIB0231A, RHIB0233, RHIB0236, RHIB0237, RHIB0238, RHIB0239, RHIB0249, RHIB0250, RHIB0251, RHIB0254, RHIB0255, RHIB0257 to RHIB0264, RHIB0266***		***30,000 mg/L (less than 40,000 µS/cm)***	
Stage 1 Borefield Injection Bores		***5,000 mg/L (less than 7,300***	

Installed RHIB0188 to RHIB0191, RHIB0193, RHIB0194, RHIB0196, RHIB009, RHIB0023, RHIB0024, RHIB0027, RHIB0030, RHIB0036, RHIB0039, RHIB0275 to RHIB0277, RHIB0279		***µS/cm)***	

9. Condition 2.5.3 of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

2.5.3 The Licensee shall record and maintain daily records of the discharge of water to the emission points as referenced in Table 2.5.2 for the purpose of preparing a summary report to be submitted to the CEO within 4 weeks of discharge. The report is to detail the reason for discharge, volumes discharged at each location, water quality and duration of discharge. The report shall also assess the discharged water quality and compare that data to the relevant trigger levels for parameters 95% protection of freshwater ecosystems (~~ANZECC / ARMCANZ (2000)~~ ***Australian and New Zealand Guidelines for Fresh and Marine Water Quality****).*

10. Condition 3.2.1 of the Licence is amended by the insertion of the bold text shown in underline below:

3.2.1 The Licensee shall undertake the monitoring in Table 3.2.1 according to the specifications in that table.

Table 3.2.1: Monitoring of point source emissions to groundwater			
Emission point reference as depicted in Schedule 1	***Parameter***	***Units***	***Frequency***
Southern Recharge Basin and Northern Recharge Basin	*Volumetric flow rate[1]*	*m^3/day*	*Continuous*
	Duration of discharge	*Dates/days*	*Quarterly*
	Electrical Conductivity[1]	*µS/cm*	
	Total Dissolved Solids[1]	*mg/L*	
Stage 1 Recharge Basin Stage 2 Recharge Basin	***Volumetric flow rate[1]***	***Litres***	***Continuous (cumulative)***
	Duration of discharge	***Dates/days***	***Daily***
	Electrical Conductivity[1]	***µS/cm***	***Continuous during discharge***
	Total Dissolved Solids[1,2]	***mg/L***	
	Total Dissolved Solids	***mg/L***	***Quarterly***
SWIB Injection Bores Installed RHIB0128 to RHIB0131, RHIB0230, RHIB0232, RHIB0233, RHIB0235, RHIB0252, RHIB0253,	***Volumetric flow rate[1]***	***Litres***	***Continuous (cumulative)***
	Duration of discharge	***Dates/days***	***Daily***
	Electrical Conductivity[1]	***µS/cm***	***Continuous during discharge***
	Total Dissolved Solids[1,2]	***mg/L***	
	Total Dissolved Solids	***mg/L***	***Quarterly***

RHIB0265, RHIB0267, RHIB0268 ***Proposed RHIB0231A, RHIB0233, RHIB0236, RHIB0237, RHIB0238, RHIB0239, RHIB0249, RHIB0250, RHIB0251, RHIB0254, RHIB0255, RHIB0257 to RHIB0264, RHIB0266***			
Stage 1 Borefield Injection Bores ***Installed RHIB0188 to RHIB0191, RHIB0193, RHIB0194, RHIB0196, RHIB009, RHIB0023, RHIB0024, RHIB0027, RHIB0030, RHIB0036, RHIB0039, RHIB0275 to RHIB0277, RHIB0279***	***Volumetric flow rate[1]***	***Litres***	***Continuous (cumulative)***
	Duration of discharge	***Dates/days***	***Daily***
	Electrical Conductivity[1]	***µS/cm***	***Continuous during discharge***
	Total Dissolved Solids[1,2]	***mg/L***	
	Total Dissolved Solids	***mg/L***	***Quarterly***

Note 1: In field non-NATA accredited analysis permitted.
Note 2: Calculation from Electrical Conductivity.

11. Condition 3.6.1 of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

3.6.1 The Licensee shall undertake the monitoring in Table 3.6.1 according to the specifications in that table.

Table 3.6.1: Monitoring of ambient groundwater quality				
Monitoring point reference as depicted in Schedule 1	***Parameter***	***Units***	***Averaging period***	***Frequency***
~~*RHPZ0026S and RHPZ0034*~~	*Standing Water Level*~~[1]~~	*m(AHD)*	*Spot sample*	*Quarterly*
	pH[1]	*pH units*		
	Electrical Conductivity	*µS/cm*		

RHPZ0092 and RHPZ0091 ~~*Landfill2: 2 bores as shown in Landfill 2 map, following construction and prior to operation.*~~	*Total Dissolved Solids*	*mg/L*		
	Total Hardness			
	Aluminium (Al), Arsenic (As), Barium (Ba), Boron (B), Cadmium (Cd), Chloride (Cl), Chromium (Cr), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Selenium (Se), Silver (Ag), Sodium (Na) and Zinc (Zn)			
~~*RHZ0026S, RHPZ0034*~~ ***RHPZ0092, RHPZ0091*** *and RHPZ0035*	*Total Recoverable Hydrocarbons*	*mg/L*		
TSFMW01, TSFMW02, TSFMW03, TSFMW04, TSFMW05, TSFMW06, TSFMW07, and TSFMW08	*Standing Water Level[1]*	*m(AHD)*	*Spot sample*	*Monthly*
Bores providing water to the ***creek*** *discharge points from the Zulu, Bravo and Delta Dewatering Bore Areas*	*Electrical Conductivity~~1~~*	*µS/cm*	*Daily*	*Continuous during discharge*
	~~*Total Dissolved Solids*~~	~~*mg/L*~~		
	Volumetric flow rate[1]	*m^3/day*		
	Total Dissolved Solids *Other parameters ~~(mg/L)~~: Alkalinity ($CaCO_3$), Total Hardness ($mgCaCO_3$), Calcium (Ca), Chloride (Cl), Sulfate (SO_4), Bicarbonate (HCO_3), Carbonate (CO_3), Aluminium (Al), Silver (Ag), Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), ~~Ca, Cl,~~ Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Iron (Fe), Mercury (Hg), Potassium (K), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Sodium (Na), Nickel (Ni), Lead (Pb), Sulfur (S), Selenium (Se), Silicon (Si), Tin (Sn), Strontium (Sr), Titanium (Ti), Thallium (Tl), Uranium (U), V (Vanadium), Zinc (Zn), Nitrite as NO_2, Nitrate as NO_3,* Ammonium (NH_4)*, Total Nitrogen, Total Phosphorus and Total Suspended Solids.*	*mg/L*	*Spot Sample*	*Once, at the commencement of each discharge event*
Groundwater monitoring bores	***Standing Water Level[1]***	***m(AHD)***	***Spot sample***	***Monthly for the first twelve***
	pH[1]	***pH units***		

regional	***Electrical Conductivity***	***µS/cm***		***months, then Quarterly***
Installed RHPZ0186s, RHPZ0083, RHPZ0088, RHPZ0075, RHPZ0184, RHPZ0185	***Oxidation-reduction potential (calibrated using Zobell's solution)***	***millivolts (mV)***		
Proposed RHPZ0285, RHPZ0288, RHPZ0289, RHPZ0287[1], RHPZ0283, RHPZ0293[1], RHPZ0292[1], RHPZ0286[1], RHPZ0294, RHPZ0281[1], RHPZ0299, RHPZ0300, RHPZ0301, RHPZ0312	***Total Dissolved Solids***	***mg/L***		***Quarterly***
	Total Hardness			
	Nitrite as NO_2			
	Nitrate as NO_3			
	Aluminium (Al), Arsenic (As), Barium (Ba), Bicarbonate (HCO_3^-), Boron (B), Cadmium (Cd), Calcium (Ca), Chloride (Cl), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Magnesium (M), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Potassium (K), Selenium (Se), Silver (Ag), Silica, (SiO_2) Sodium (Na), Sulfate (SO_4^{2-}), Thallium (Tl), Uranium (U), Vanadium(V) and Zinc (Zn)			
Groundwater monitoring bores adjacent to injection bores				
Installed RHPZ0139s, RHPZ0140s, RHPZ0141s, RHPZ0142s, RHPZ0216, RHPZ0128, RHPZ0222, RHPZ0223, RHPZ0240, RHPZ0238, RHPZ0239, RHPZ0217, RHPZ0032, RHPZ0255, RHPZ0256, RHPZ0262, RHPZ0259, RHPZ0264, RHPZ0263, RHPZ0260, RHPZ0277, RHPZ0278, RHPZ0280A				

Proposed RHPZ0225, RHPZ0226, RHPZ0229, RHPZ0241, RPHZ0265, RHPZ0266, RHPZ0276, RHPZ0267, RHPZ0268, RHPZ0269, RHPZ0270, RHPZ0271, RHPZ0272, RHPZ0273, RHPZ0219, RHPZ0221, RHPZ0274, RHPZ0218, RHPZ0288, RHPZ0275, RHPZ0306, RHPZ0307, RHPZ0308, RHPZ0309, RHPZ0310, RHPZ0279				

Note 1: In field non-NATA accredited analysis permitted.
Note 2: Sampling and analysis of RHPZ0281, RHPZ0286, RHPZ0287, RHPZ0292 and RHPZ0293 to commence immediately following installation.

12. Condition 4.1.2 of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

*4.1.2 The Licensee **must submit to the CEO within 90 days after the anniversary date,** ~~shall complete~~ an Annual Audit Compliance Report indicating the extent to which the Licensee has complied with the ~~c~~**C**onditions ~~of the~~ **in this** Licence~~, and any previous licence issued under Part V of the Act for the Premises~~ for the ~~previous~~ annual period.*

13. Table 4.2.1 of the Licence is amended by the deletion of text shown in strikethrough and the insertion of text shown in bold underlined below:

*4.2.1 The Licensee shall submit to the CEO an Annual Environmental Report within 90 calendar days after the end of the ~~annual period~~ **anniversary date**. The report shall contain the information listed in Table 4.2.1 in the format or form specified in that table.*

Table 4.2.1: Annual Environmental Report		
Condition or Table (if relevant)	***Parameter***	***Format or Form[1]***
-	*Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have*	*None specified*

	occurred during the annual period and any action taken	
-	*Summary of results from the TSF evaporator vegetation health/soil monitoring program for that annual period, including any exceedance of triggers and management responses, as described within RHIO's Saline Water Disposal Vegetation Management Plan (OP-PLN-00072)*	*None specified*
*Tables 1.**2**~~3~~.1 and 1.**2**~~3~~.7*	*Actual throughput for the reporting period for approved categories under Schedule 1 of the Environmental Protection Regulations 1987**, including individual throughput values for the MSP***	*None specified*
*Condition 1.**2**~~3~~.12*	*Summary of any failure or malfunction of any infrastructure listed in Table 1.**2**~~3~~.5 and any action taken post inspection.*	*None specified*
Table 2.3.1	*An updated description of the irrigation area(s) reporting any decline in health, against previous years, and corrective actions*	*None specified*
Condition 2.4.1	*Compliance*	*TSF evaporator hours of use*
Condition 2.5.3	*Summary of reports detailing the reason for discharge – timing of discharge, volume discharged, water quality and comparison to the **Australian and New Zealand Guidelines for Fresh and Marine Water Quality** ~~ANZECC / ARMCANZ (2000) Freshwater Guidelines~~ with discussion on elevated results*	*None specified*
Table 2.5.2	*Compliance*	*Table demonstrating daily averaged TDS values (using the hourly data) as recorded during creek discharge events*
Table 3.2.1	*Volumetric flow rate and Duration of discharge~~, Electrical Conductivity, Total Dissolved Solids~~*	*GR1*
	*Electrical Conductivity **(24 hour average) and** Total Dissolved Solids*	***Tabular format with graphs, including when injection in that area is occurring***
Table 3.3.1	*Monthly records and cumulative volume for each WWTP*	*None specified*
	Biochemical Oxygen Demand, Total Suspended Solids, pH, Total Nitrogen, Total Phosphorus, E.coli, Total Dissolved Solids, Total Recoverable Hydrocarbons	*LR1*
Table 3.5.1	*Process monitoring*	*None specified*
Condition 3.5.2	*Annual water balance of TSF*	*None specified*
Table 3.6.1	***RHPZ0092, RHPZ0091 for the following parameters:*** *Standing Water Level, pH, Electrical Conductivity, Total Dissolved Solids,*	*AGW1*

	Aluminium (Al), Arsenic (As), Barium (Ba), Boron (B), Cadmium (Cd, Chromium (Cr), Chloride (Cl), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Selenium (Se), Silver (Ag), Sodium (Na), Zinc (Zn), ~~and Total Recoverable Hydrocarbons~~	
	Total Recoverable Hydrocarbons for RHPZ0092, RHPZ0091 and RHPZ0035	
	TSFMW01, TSFMW02, TSFMW03, TSFMW04, TSFMW05, TSFMW06, TSFMW07 and TSFMW08 Standing Water Level data	*Table format providing: monthly Standing Water Level data*
Tables 3.6.1 and 3.7.1	***Monitoring associated with the Bores providing water to the creek discharge points from the Zulu, Bravo and Delta Dewatering Bore Areas; and Monitoring of point source emissions to surface water*** ~~-~~	~~*Table format*~~ ***Report*** *providing****:*** *Dates of creek discharge duration, results and comparison of results between groundwater samples from Bores providing water to the discharge points from the Zulu, Bravo and Delta Dewatering Bore Areas (data required in Table 3.6.1) and results from Table 3.7.1*
Table 3.6.1	***Monitoring of the groundwater monitoring bores regional and groundwater monitoring bores adjacent to the production injection wells***	***All data provided in a tabular format within a report***
Table 3.6.2	*Demonstration of vegetation and stream ecosystem condition*	*Report providing:* • *GPS location, photographic information and comparison of vegetation and stream ecosystem condition between established photographic points* • *Information on annual assessment of vegetation health as per the Roy Hill Vegetation Health Monitoring Program Specifically:* - *General site condition* - *Soil surface states* - *Projected Foliar Cover (PFC), stratum cover dominance and weeds* - *Recruitment* - *Sample plants* - *Quantitative parameters* • *Discussion on the findings of the vegetation assessment in comparison with the Management objectives and*

		strategies found in EPA, 2013 (for 'Zone 3a – Kulbee Alluvial Flank – Natural water regimes)
Table 3.6.2 and Table 3.7.1	*Record of flow distance*	*Table providing comparison of flow volumes and maximum distance flow has travelled down each creek line for each discharge event*
4.1.2	*Compliance*	*None Specified*
4.1.3	*Complaints summary*	*None specified*
4.1.4	*Records of waste types and quantities received at the site and disposed of at the site*	*None specified*

14. Condition 4.3.1 of the Licence is amended by the insertion of text shown in bold underlined below:

4.3.1 The Licensee shall ensure that the parameters listed in Table 4.3.1 are notified to the CEO and in accordance with the notification requirements of the table.

Table 4.3.1: Notification requirements			
Condition or table (if relevant)	***Parameter***	***Notification requirement[1]***	***Format or form[2]***
Conditions *1.**2**~~3~~.1 and 2.1.1*	*Breach of any limit specified in the Licence*	*Part A: As soon as practicable, but no later than 5pm of the next usual working day from the incident being identified.* *~~Part B: As soon as practicable~~*	*N1*
Condition *3.1.4*	*Calibration report*	*As soon as practicable.*	*None specified*
Table 3.6.1	***The Licensee shall submit to the CEO the monthly results for Standing Water Level, pH, Electrical Conductivity and Oxidation-reduction potential for the groundwater monitoring bores (regional and adjacent to the injection bores)***	***Within 60 days of the final monthly sample of the MAR program (the 12th sample)***	***None specified***
Tables 2.2.1 and 3.6.1	***The Licensee shall submit to the CEO bore logs for each of the proposed bores***	***Within 30 days of installation***	***None specified***
3.6.2	*Unscheduled release of water to*	*No later than 5pm of the next usual working day from the*	*Email to CEO including:*

	Zulu Dewatering Creek Discharge location	*cessation of Unscheduled discharge event*	• *Date and time of commencement and cessation;* • *Flow rate and flow volume (tonnes);* • *Maximum distance of flow down the creek;* • *General weather conditions; and* • *Other site-specific observations of note*

Note 1: Notification requirements in the Licence shall not negate the requirement to comply with s72 of the Act.
Note 2: Forms are in Schedule 2

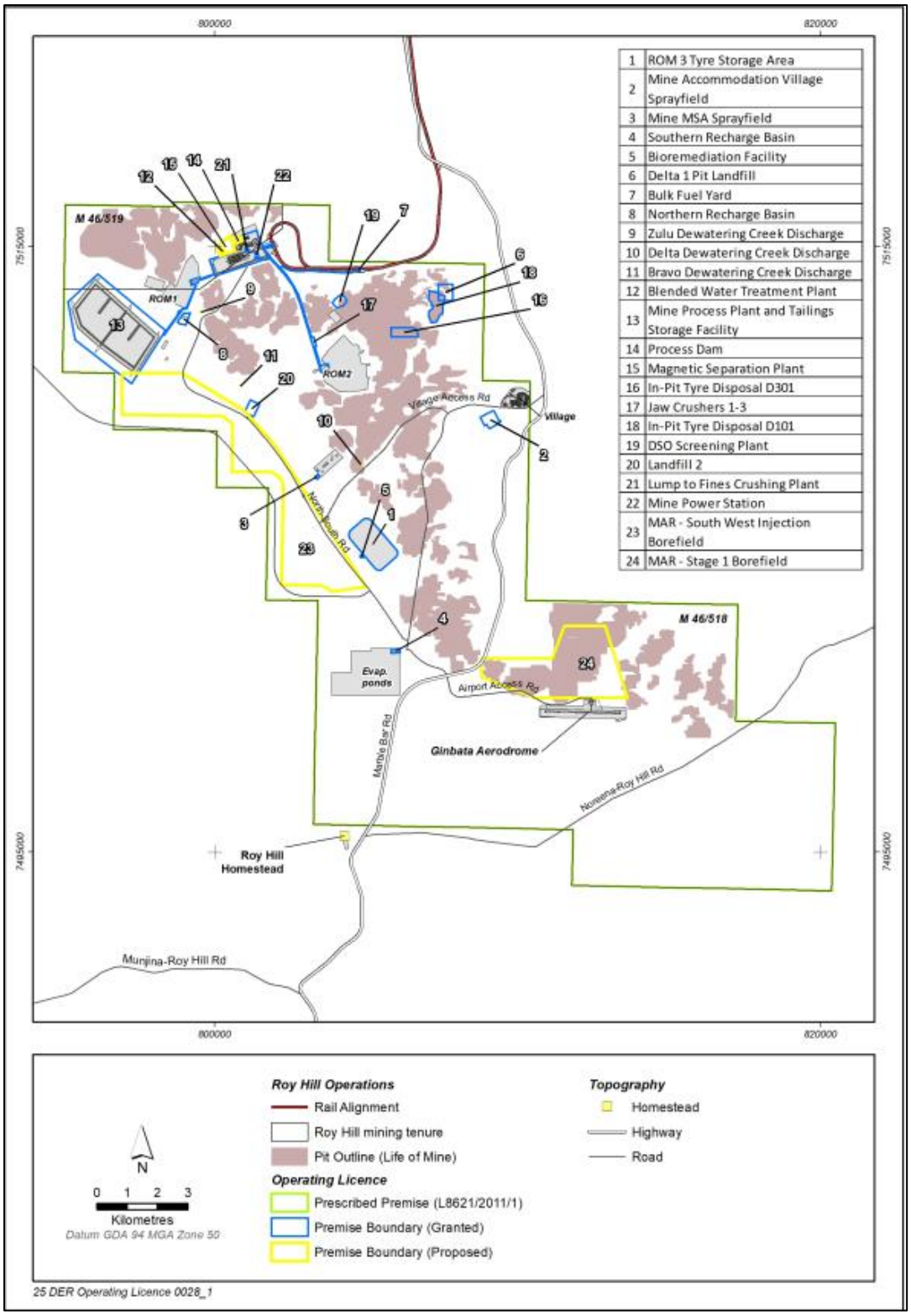
15. The maps in Schedule 1 of the existing licence and Amendment Notices 1 to 5 are deleted and replaced with the maps shown in Attachment 1 of this Amendment Notice.

16. The GR1 Form and AGW1 Form in Schedule 2 of the Licence have been replaced by the updated forms shown in Attachment 2 of this Amendment Notice.

Attachment 1

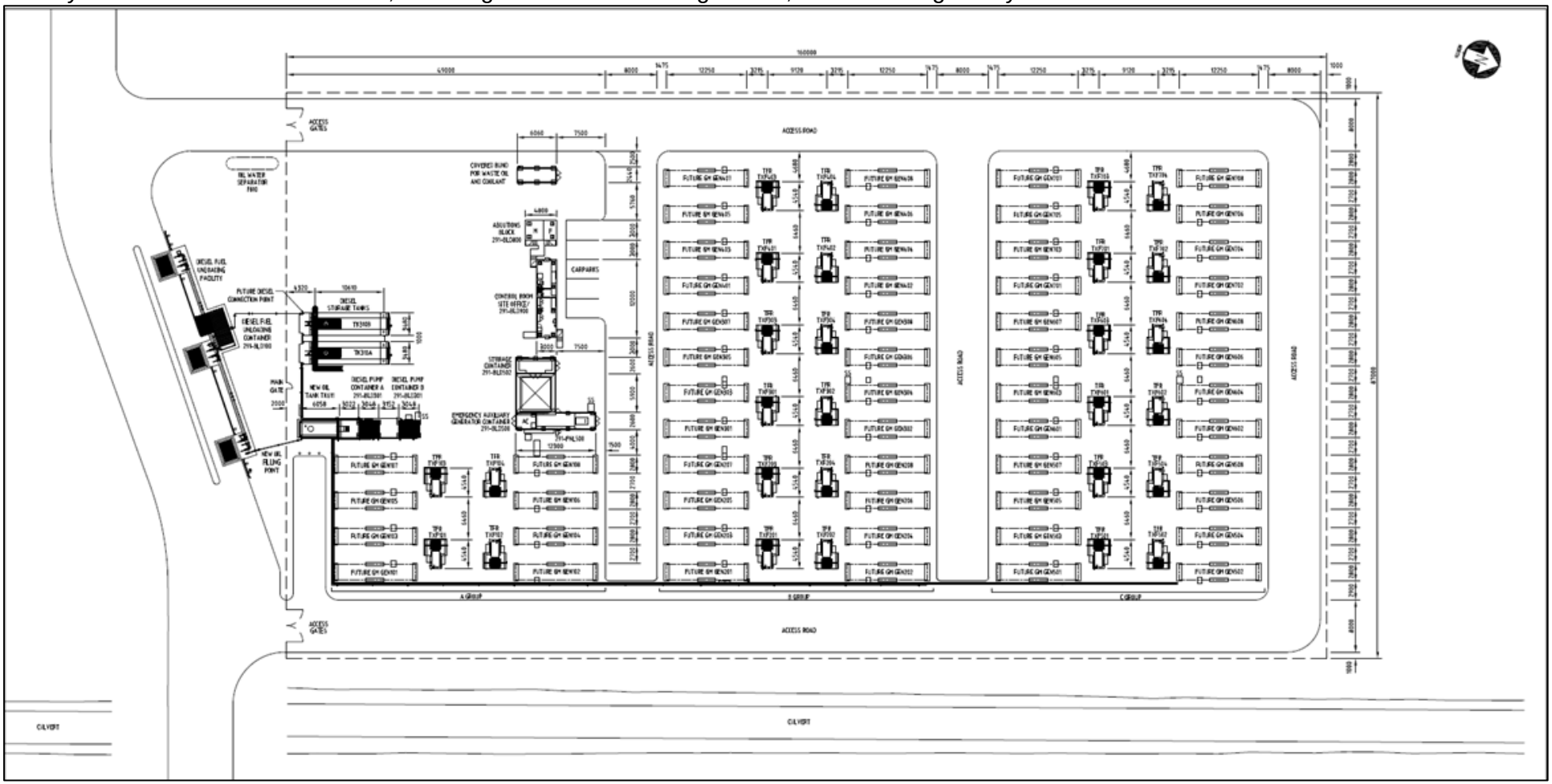
Premises map including waste processing locations, containment infrastructure, emission and monitoring points

The Premises is shown in the map below. The green line depicts the Premises boundary. The locations of the waste processing areas referred to in Table 1.2.2; and containment infrastructure defined in Table 1.2.4 are shown below.
The locations of the emission points defined in Tables 2.2.1, 2.3.1, 2.5.1 are shown below.
The locations of the monitoring points defined in Table 3.2.1 is shown below.



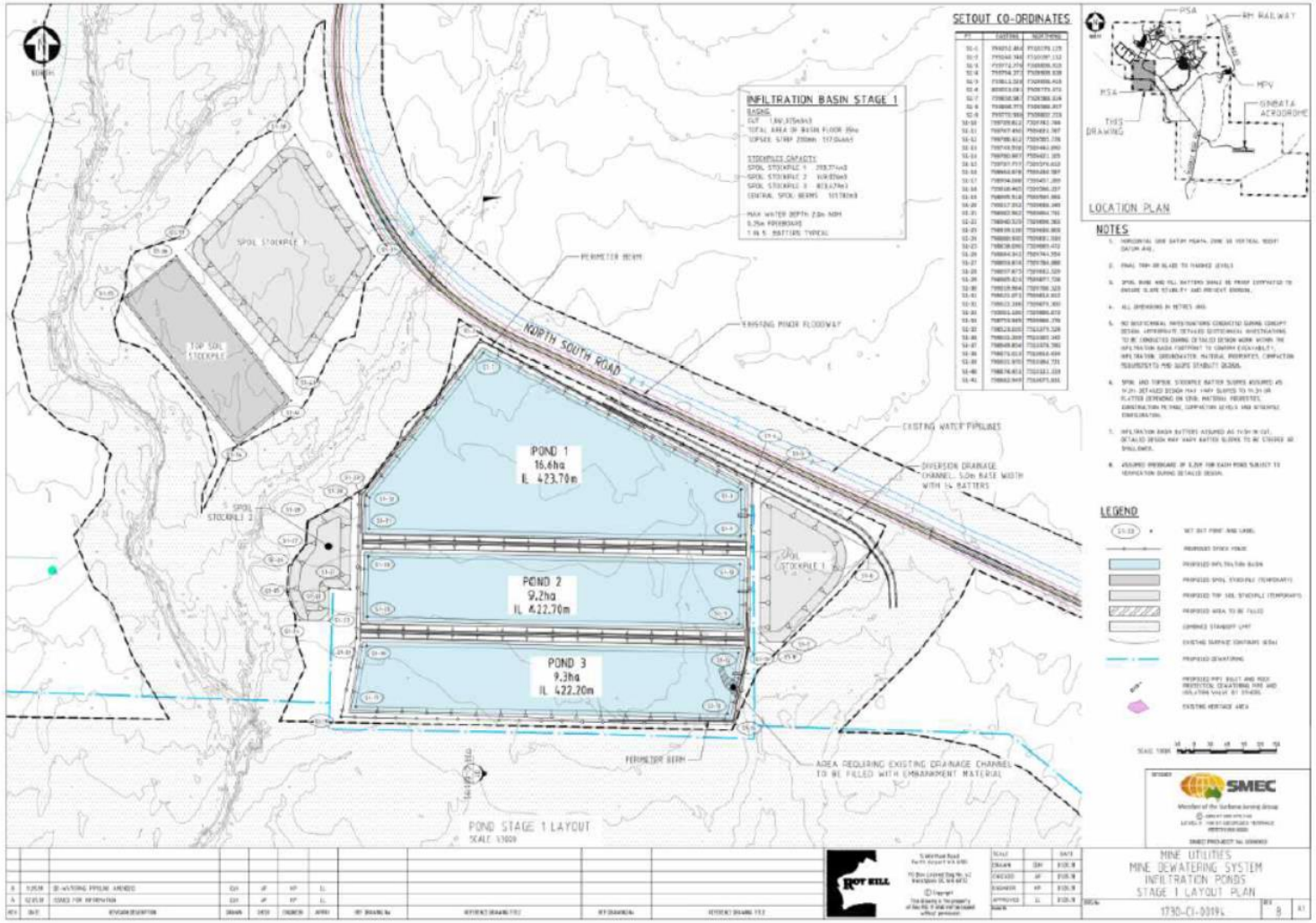
Map of the Mine Power Station

The layout of the Mine Power Station, including diesel and oil storage tanks, fuel unloading facility and OWS is shown below.

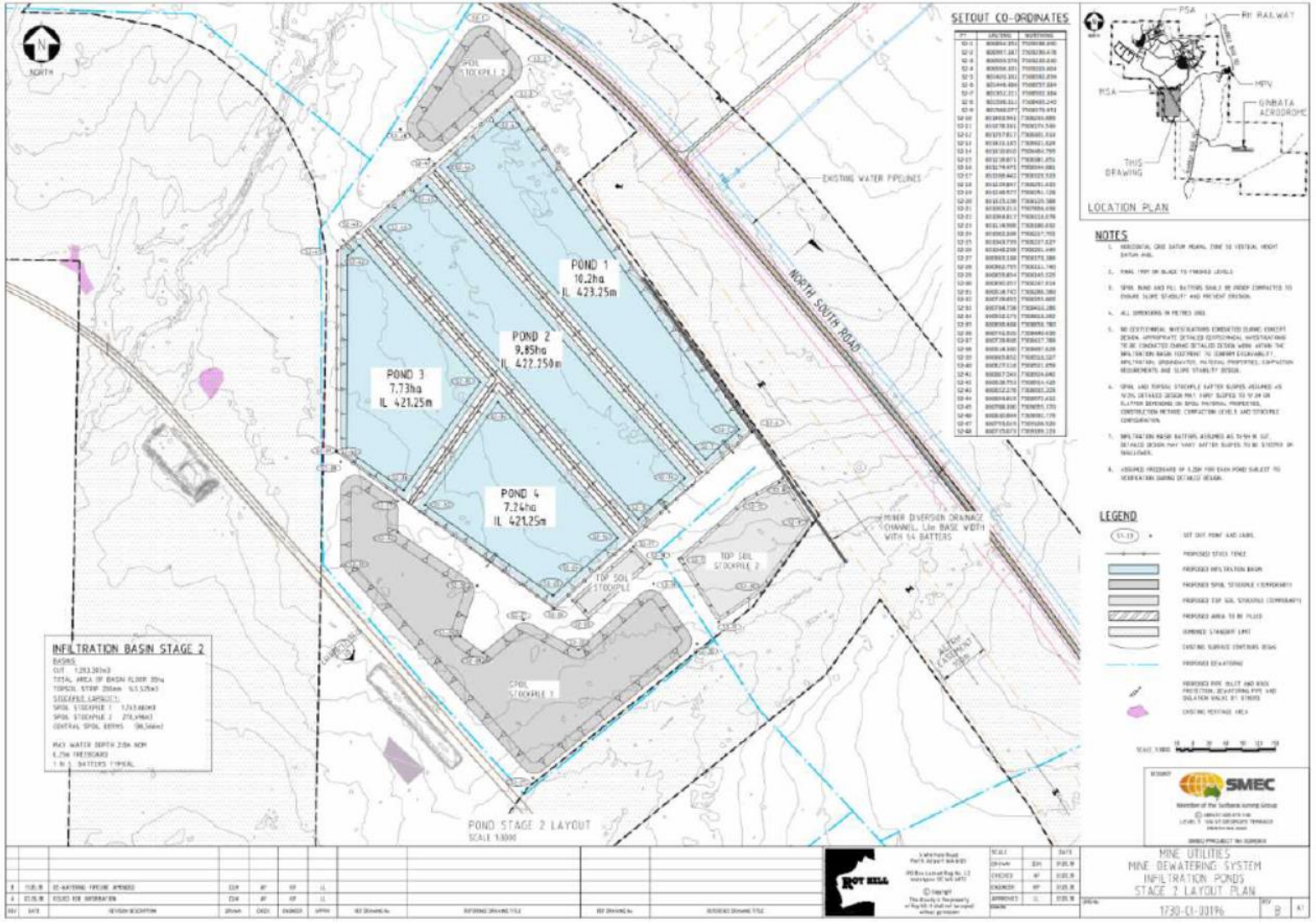


Stage 1 and Stage 2 Basin Layout Plan
The layout of the Stage 1 and Stage 2 Basins as defined in Table 1.2.6 is shown in the two maps below.

Stage 1 Basin

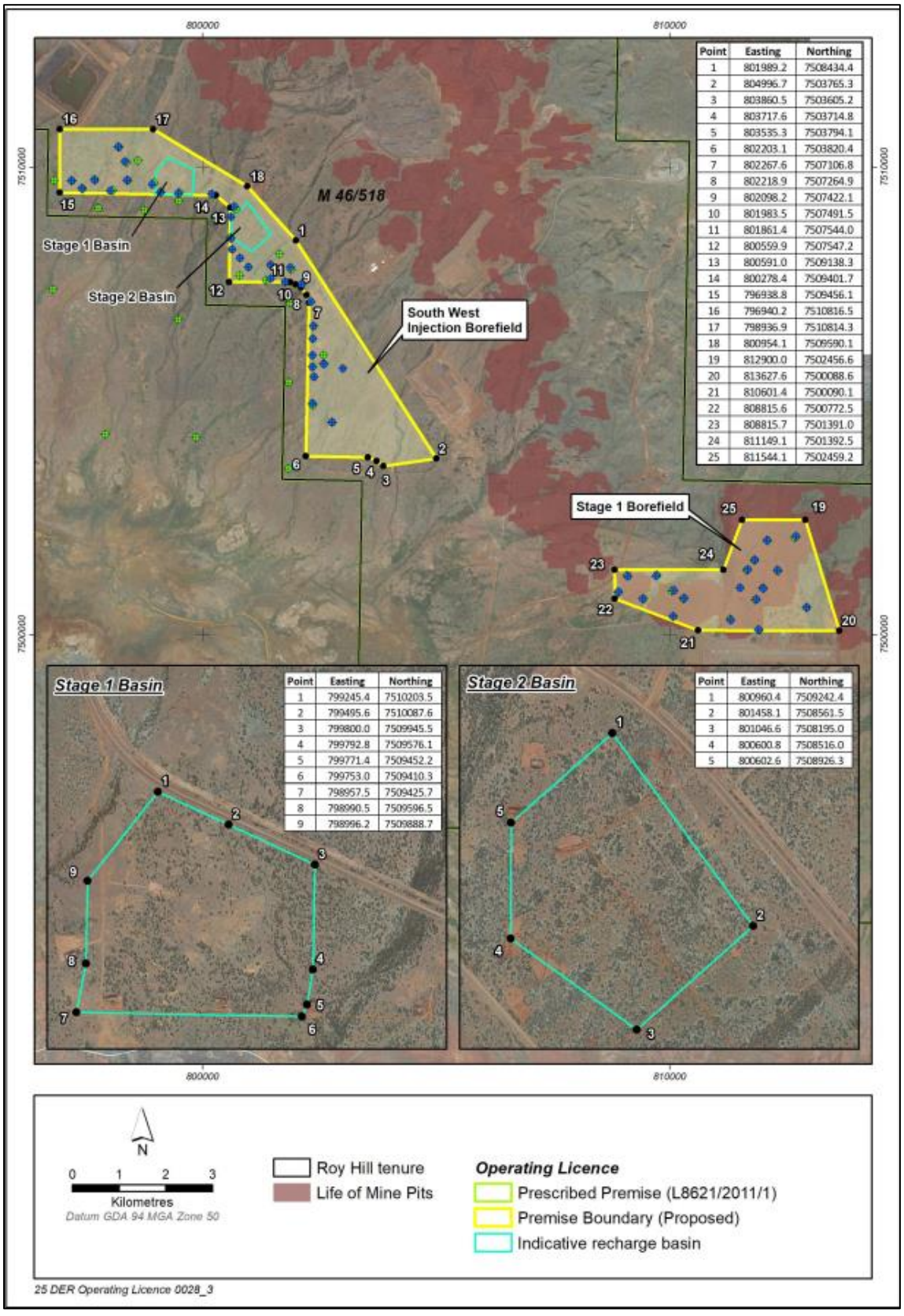


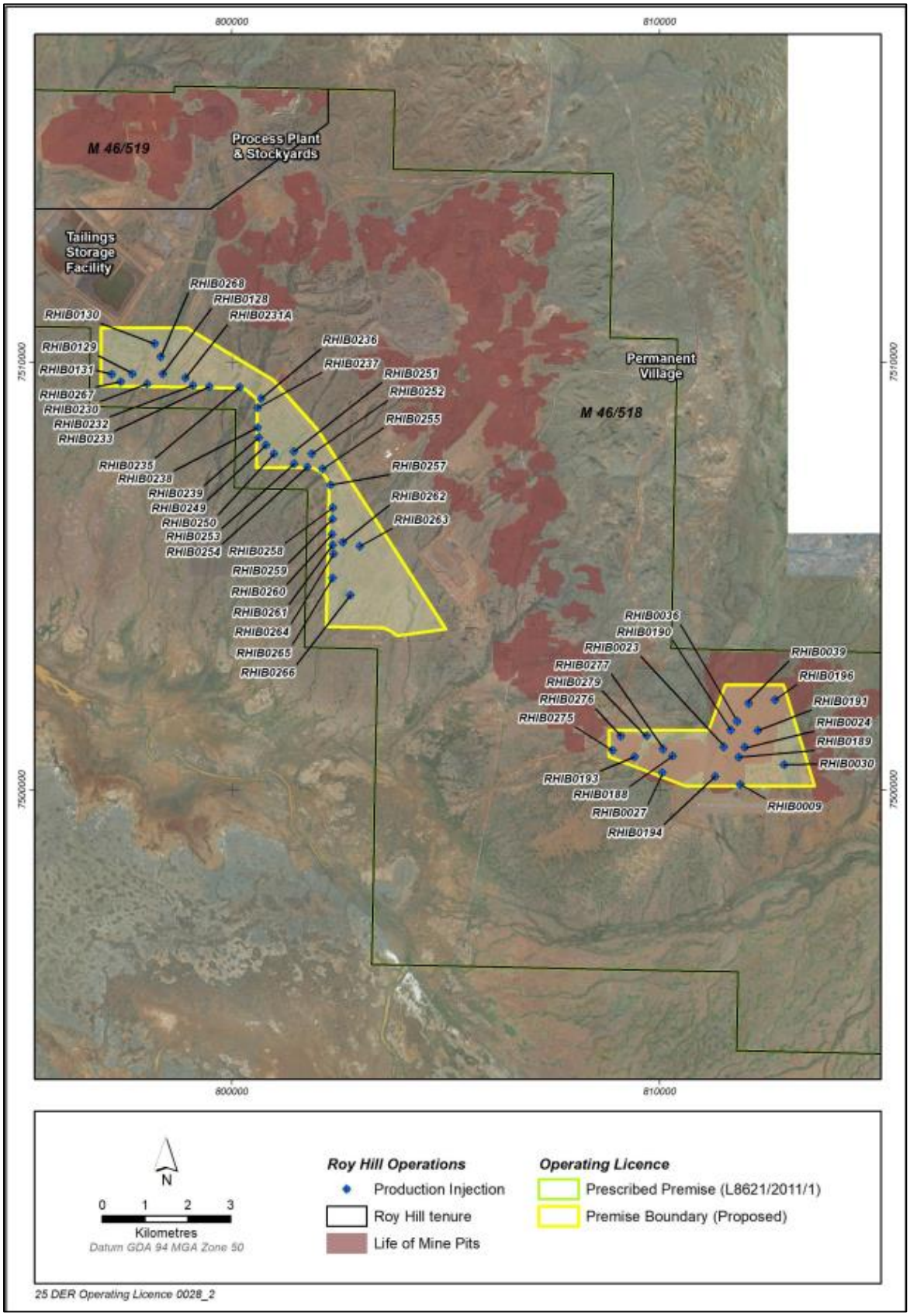
Stage 2 Basin



Maps of emission and monitoring points for the MAR Trial area

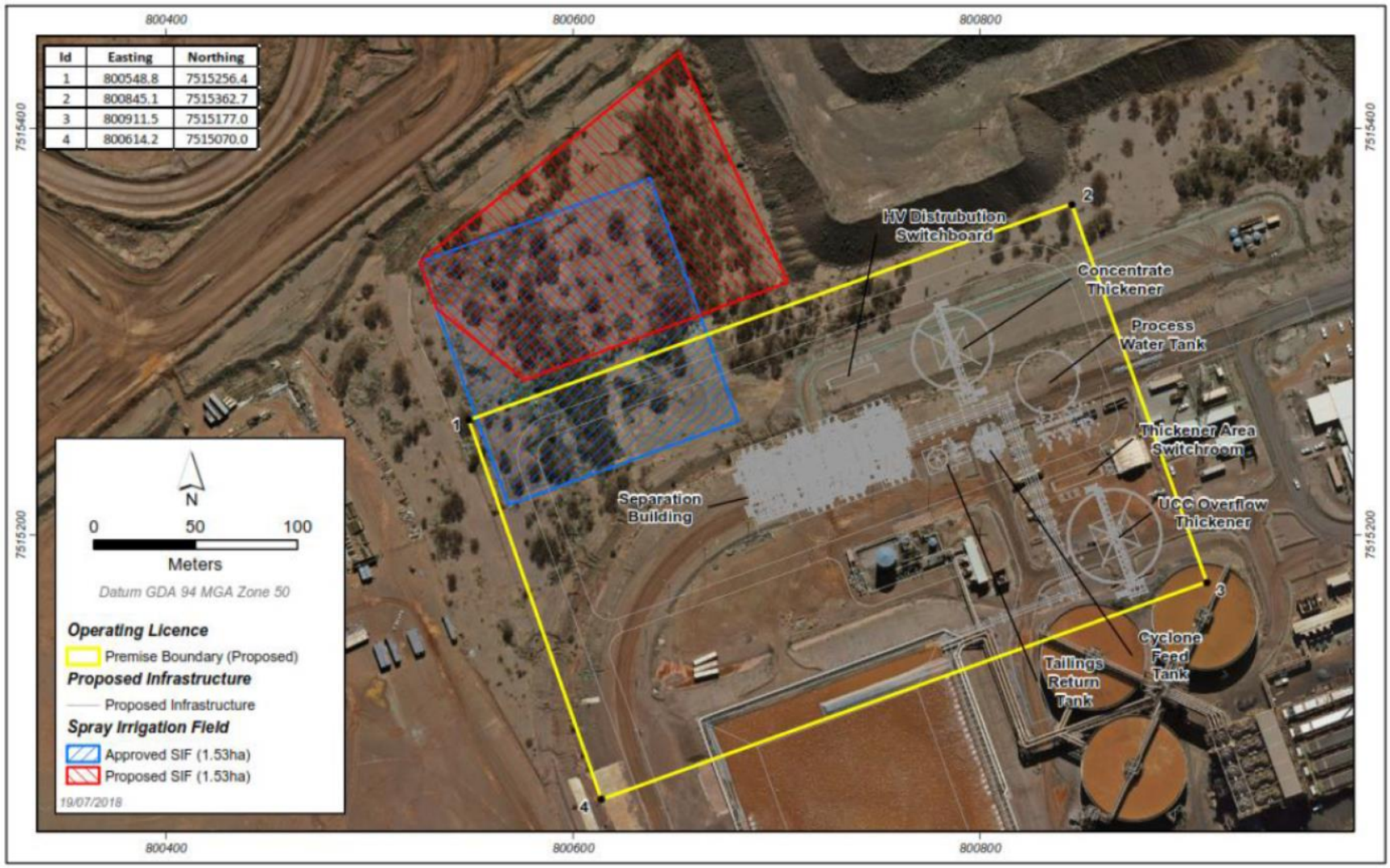
The locations of the emission points and monitoring points defined in Tables 2.2.1 and 3.2.1 are shown in the two maps below.




800000
810000
7510000
7500000
M 46/519
Process Plant & Stockyards
Tailings Storage Facility
Permanent Village
M 46/518
RHIB0268
RHIB0128
RHIB0231A
RHIB0130
RHIB0129
RHIB0131
RHIB0267
RHIB0230
RHIB0232
RHIB0233
RHIB0236
RHIB0237
RHIB0251
RHIB0252
RHIB0255
RHIB0257
RHIB0262
RHIB0263
RHIB0235
RHIB0238
RHIB0239
RHIB0249
RHIB0250
RHIB0253
RHIB0254
RHIB0258
RHIB0259
RHIB0260
RHIB0261
RHIB0264
RHIB0265
RHIB0266
RHIB0036
RHIB0190
RHIB0023
RHIB0277
RHIB0279
RHIB0276
RHIB0275
RHIB0039
RHIB0196
RHIB0191
RHIB0024
RHIB0189
RHIB0030
RHIB0193
RHIB0188
RHIB0027
RHIB0194
RHIB0009
N
0 1 2 3
Kilometres
Datum GDA 94 MGA Zone 50
Roy Hill Operations
Production Injection
Roy Hill tenure
Life of Mine Pits
Operating Licence
Prescribed Premise (L8621/2011/1)
Premise Boundary (Proposed)
25 DER Operating Licence 0028_2

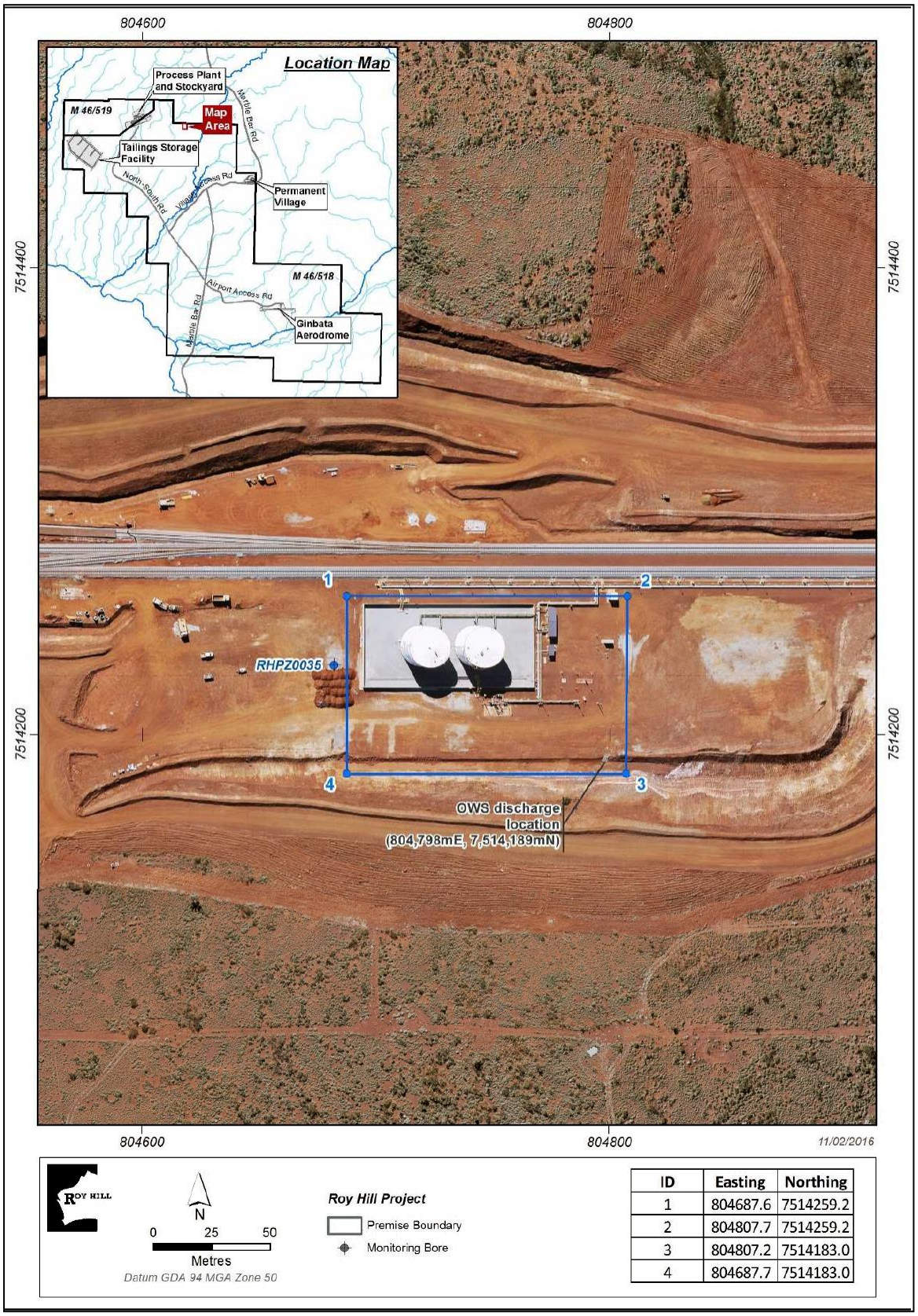
Map of the Mine Process Plant Sprayfield

The location of the Mine Process Plant Sprayfield defined in Table 2.3.1 is shown below.

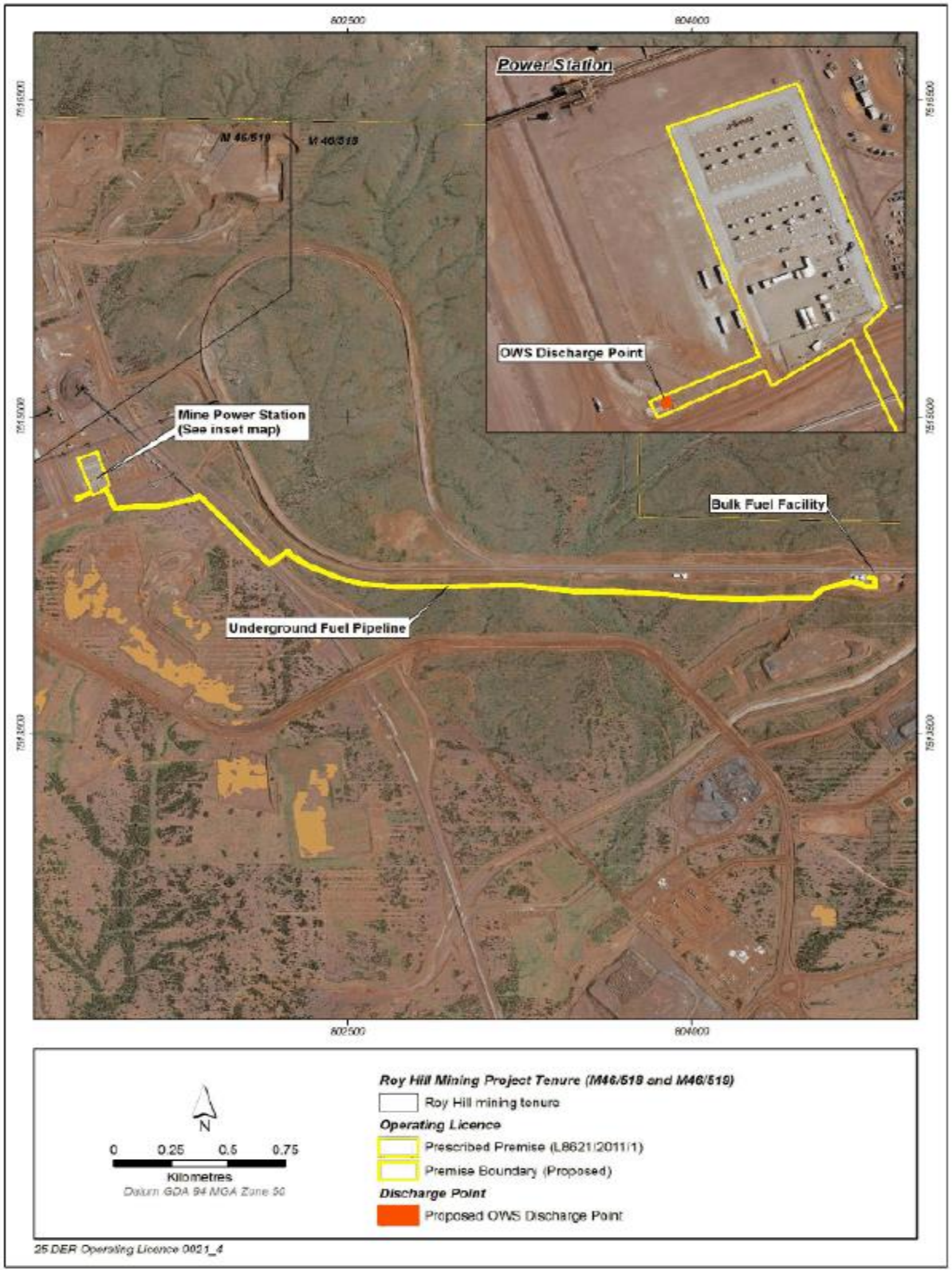


Map of emission and monitoring points for the OWS discharge locations at the Bulk Fuel Yard and Mine Power Station

The location of the OWS emission and monitoring points at the Bulk Fuel Yard and Mine Power Station as defined in Tables 2.3.1 and 3.3.1 are shown in the two maps below.

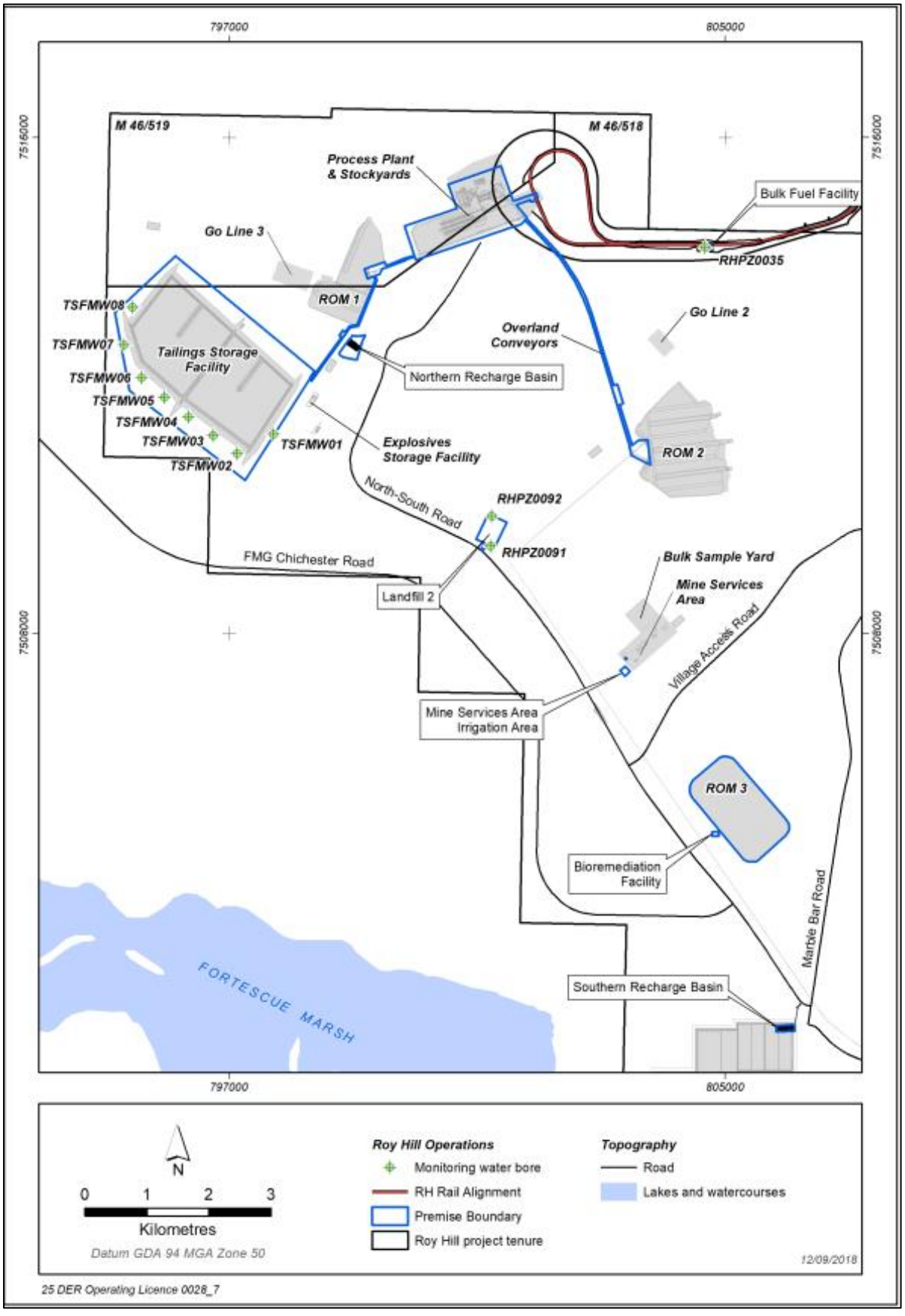


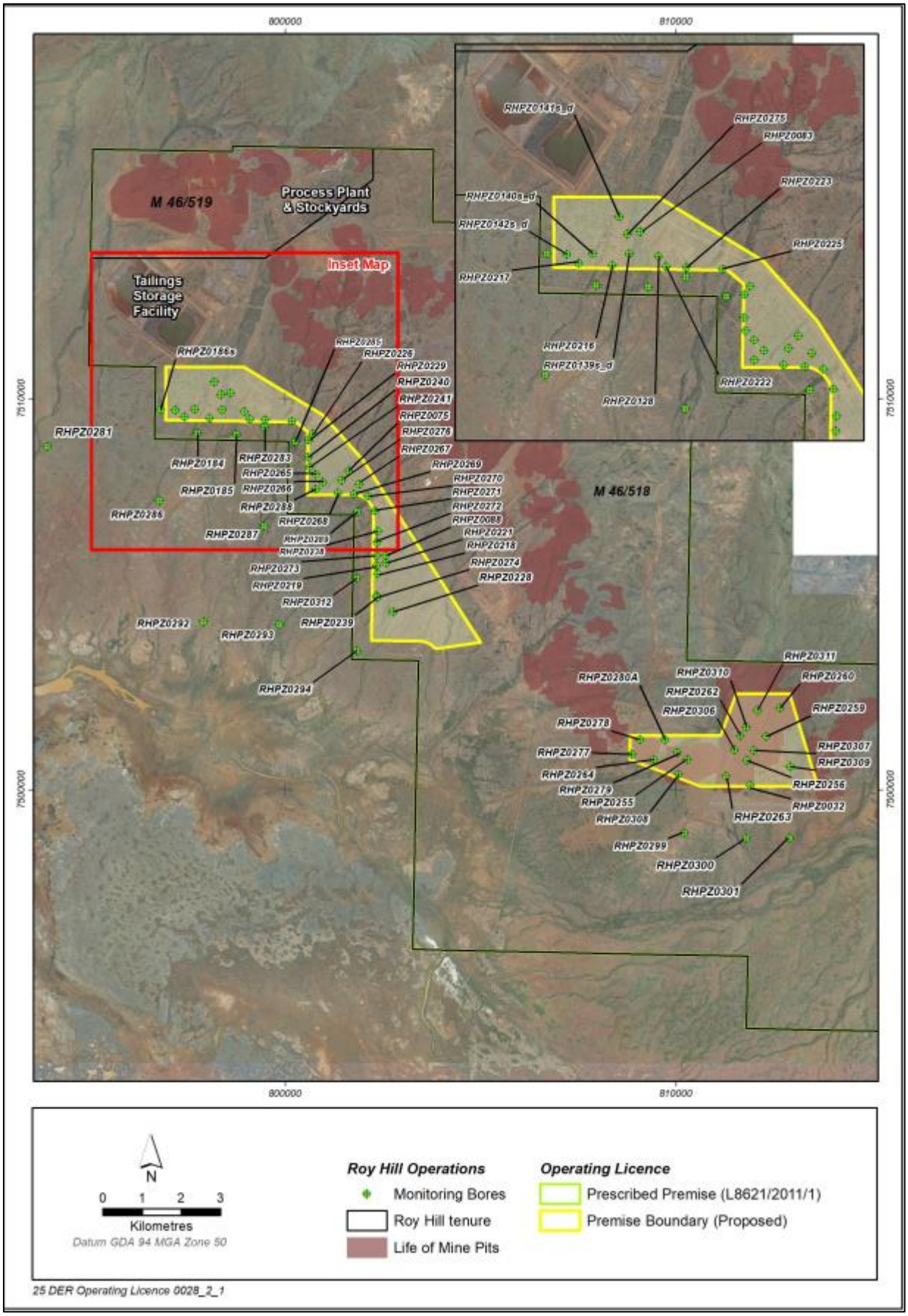
ID	Easting	Northing
1	804687.6	7514259.2
2	804807.7	7514259.2
3	804807.2	7514183.0
4	804687.7	7514183.0


602500
604000
7516500
7515000
7513500
Power Station
M 46/519
M 46/518
OWS Discharge Point
Mine Power Station
(See inset map)
Bulk Fuel Facility
Underground Fuel Pipeline
N
0 0.25 0.5 0.75
Kilometres
Datum GDA 94 MGA Zone 50
Roy Hill Mining Project Tenure (M46/518 and M46/519)
Roy Hill mining tenure
Operating Licence
Prescribed Premise (L8621/2011/1)
Premise Boundary (Proposed)
Discharge Point
Proposed OWS Discharge Point
25 DER Operating Licence 0021_4

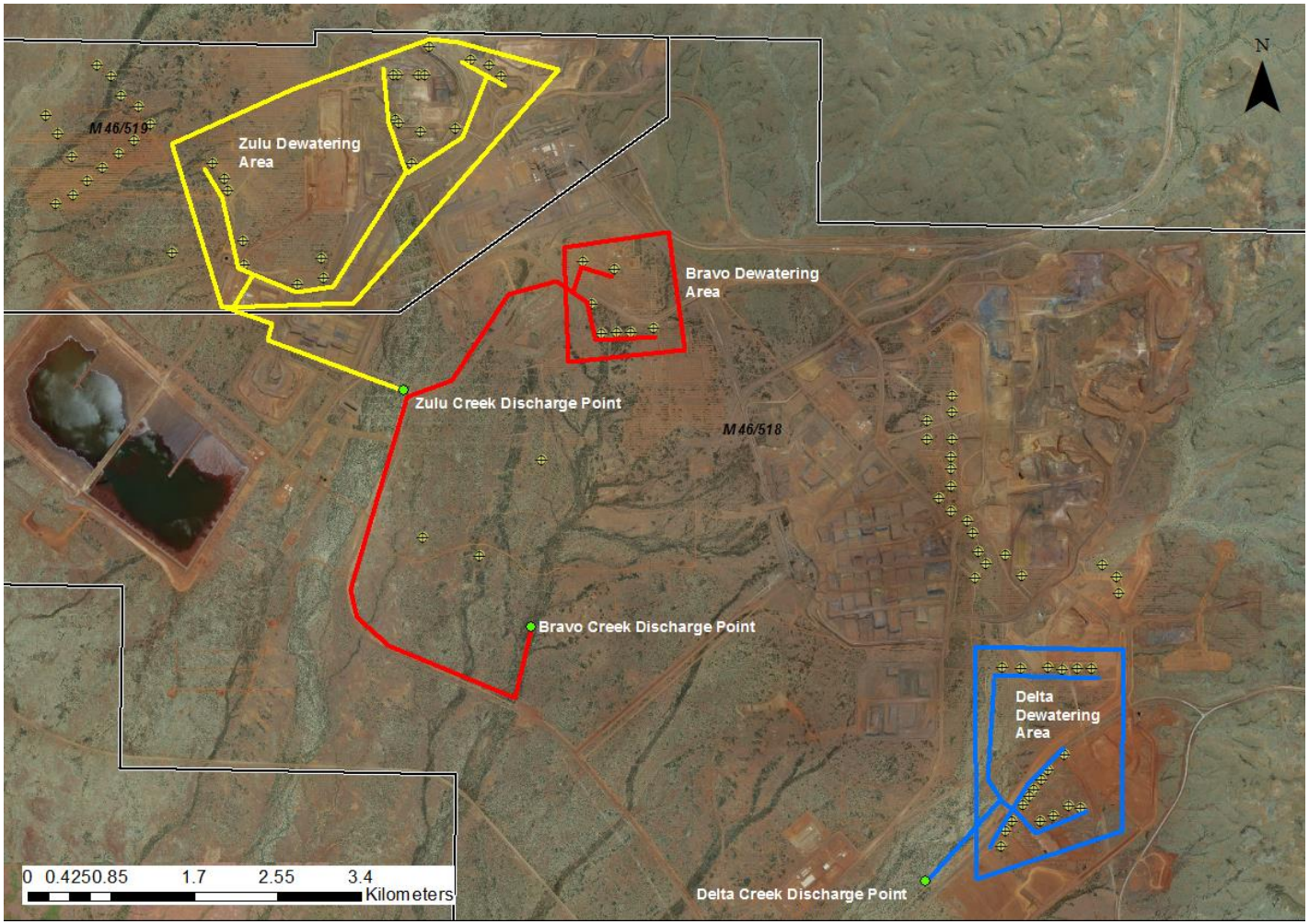
Map of monitoring locations

The monitoring locations defined in Tables 3.6.1 and 3.6.2 are shown in the two maps below.




800000
810000
7510000
7500000
M 46/519
Process Plant & Stockyards
Tailings Storage Facility
Inset Map
M 46/518
RHPZ0141s_d
RHPZ0275
RHPZ0083
RHPZ0223
RHPZ0140s_d
RHPZ0142s_d
RHPZ0225
RHPZ0217
RHPZ0216
RHPZ0139s_d
RHPZ0222
RHPZ0128
RHPZ0186s
RHPZ0281
RHPZ0226
RHPZ0229
RHPZ0240
RHPZ0241
RHPZ0075
RHPZ0276
RHPZ0267
RHPZ0269
RHPZ0270
RHPZ0271
RHPZ0272
RHPZ0088
RHPZ0221
RHPZ0218
RHPZ0274
RHPZ0228
RHPZ0281
RHPZ0184
RHPZ0283
RHPZ0265
RHPZ0185
RHPZ0266
RHPZ0286
RHPZ0283
RHPZ0268
RHPZ0287
RHPZ0268
RHPZ0273
RHPZ0273
RHPZ0219
RHPZ0312
RHPZ0292
RHPZ0293
RHPZ0239
RHPZ0294
RHPZ0311
RHPZ0310
RHPZ0260
RHPZ0280A
RHPZ0262
RHPZ0259
RHPZ0306
RHPZ0278
RHPZ0307
RHPZ0277
RHPZ0309
RHPZ0264
RHPZ0256
RHPZ0279
RHPZ0255
RHPZ0032
RHPZ0308
RHPZ0263
RHPZ0299
RHPZ0300
RHPZ0301
N
0 1 2 3
Kilometres
Datum GDA 94 MGA Zone 50
Roy Hill Operations
Monitoring Bores
Roy Hill tenure
Life of Mine Pits
Operating Licence
Prescribed Premise (L8621/2011/1)
Premise Boundary (Proposed)
25 DER Operating Licence 0028_2_1

The dewatering bores, pipeline corridors and creek discharge points defined in Tables 3.6.1, 3.6.2 and 3.7.1 are shown in the map below. All areas on this map are within the Premises boundary. The bores within the polygons will feed the three corresponding discharge points located within this Map.



Attachment 2

Licence: L8621/2011/1 Licensee: Roy Hill Iron Ore Pty Ltd
Form: GR1 Period:
Name: Monitoring of point source emissions to groundwater

Form GR1: Monitoring of point source emissions to groundwater					
Emission point	**Parameter**	**Result**	**Averaging Period**	**Method**	**Sample date & Times**
Southern Recharge Basin and Northern Recharge Basin	Volumetric flow rate		Continuous		
	Duration of discharge		Days		
	Electrical Conductivity		Spot Sample		
	Total Dissolved Solids				
Stage 1 Recharge Basin	Volumetric flow rate		Continuous (cumulative)		
	Duration of discharge		Daily		
	Total Dissolved Solids		Spot Sample		
Stage 2 Recharge Basin	Volumetric flow rate		Continuous (cumulative)		
	Duration of discharge		Daily		
	Total Dissolved Solids		Spot Sample		
SWIB Injection Bores <u>Installed</u> RHIB0128, RHIB0129, RHIB0130, RHIB0131, RHIB0230, RHIB0232, RHIB0233, RHIB0235, RHIB0252, RHIB0253, RHIB0265, RHIB0267, RHIB0268	Volumetric flow rate		Continuous (cumulative)		
	Duration of discharge		Daily		
	Total Dissolved Solids		Spot Sample		

Form GR1: Monitoring of point source emissions to groundwater					
Emission point	**Parameter**	**Result**	**Averaging Period**	**Method**	**Sample date & Times**
<u>Proposed</u> RHIB0231A, RHIB0233, RHIB0236, RHIB0237, RHIB0238, RHIB0239, RHIB0249, RHIB0250, RHIB0251, RHIB0254, RHIB0255, RHIB0257, RHIB0258, RHIB0259, RHIB0260, RHIB0261, RHIB0262, RHIB0263, RHIB0264, RHIB0266					
Stage 1 Borefield Injection Bores <u>Installed</u> RHIB0188, RHIB0189, RHIB0190, RHIB0191, RHIB0193, RHIB0194, RHIB0196, RHIB009, RHIB0023, RHIB0024,	Volumetric flow rate		Continuous (cumulative)		
	Duration of discharge		Daily		
	Total Dissolved Solids		Spot Sample		

Form GR1: Monitoring of point source emissions to groundwater					
Emission point	**Parameter**	**Result**	**Averaging Period**	**Method**	**Sample date & Times**
RHIB0027, RHIB0030, RHIB0036, RHIB0039, RHIB0275, RHIB0276, RHIB0277, RHIB0279					

Note: all monitoring units are as per Table 3.2.1 of L8621/2011/1

Signed on behalf of Roy Hill Iron Ore Pty Ltd: …….. Date: …….

Licence: L8621/2011/1 Licensee: Roy Hill Iron Ore Pty Ltd
Form: AGW1 Period:
Name: Monitoring of ambient groundwater quality

Form AGW1: Monitoring of ambient groundwater quality						
Emission point	**Parameter**	**Unit**	**Result**	**Averaging Period**	**Method**	**Sample date & Times**
RHPZ0092 and RHPZ0091	Standing Water Level	m(AHD)		Spot Sample		
	pH	pH units				
	Electrical Conductivity	µS/cm				
	Total Dissolved Solids	mg/L				
	Chloride	mg/L				
	Sodium	mg/L				
	Aluminium (Al)	mg/L				
	Arsenic (As)	mg/L				
	Barium (Ba)	mg/L				
	Boron (B)	mg/L				
	Cadmium (Cd)	mg/L				
	Chromium (Cr)	mg/L				
	Copper (Cu)	mg/L				
	Iron (Fe)	mg/L				
	Lead (Pb)	mg/L				
	Manganese (Mn)	mg/L				
	Mercury (Hg)	mg/L				
	Molybdenum (Mo)	mg/L				
	Nickel (Ni)	mg/L				
	Selenium (Se)	mg/L				
	Silver (Ag)	mg/L				
	Zinc (Zn)	mg/L				
RHPZ0092, RHPZ0091 and RHPZ0035	Total Recoverable Hydrocarbons	mg/L				

Signed on behalf of Roy Hill Iron Ore Pty Ltd: …….. Date: …….

Appendix 1: Injection and MAR Area Groundwater Monitoring Bore details

Completed and proposed injection bores located in the SWIB and Stage 1 Borefield (ie. Sierra Mine Pit) are presented in the following Table. 50 injection bores in total; comprising 13 already installed and 19 within the SWIB; and 19 already installed within the Stage 1 Borefield.

The coordinates in the (RiWI Act) GWOS will also be amended in the next update to the document.

Injection Bore details (RHIO, 2018b)

Injection Bore ID	Easting (MGA94)	Northing (MGA94)	Status	Electrical Conductivity (µS/cm)
SWIB				
RHIB0128	798380.379	7509732.687	Installed	153,000
RHIB0129	797680.448	7509733.509	Installed	176,000
RHIB0130	798194.822	7510439.086	Installed	181,000
RHIB0131	797188.968	7509723.938	Installed	133,000
RHIB0230	798024.888	7509501.465	Installed	178,000
RHIB0231A	798917	7509640	Proposed	~100,000
RHIB0232	799094.053	7509458.989	Installed	131,000
RHIB0233	799476.268	7509447.363	Installed	142,000
RHIB0235	800190	7509430	Installed	113,000
RHIB0236	800681.683	7509158.069	Proposed	~100,000
RHIB0237	800606	7508941	Proposed	~100,000
RHIB0238	800603	7508479	Proposed	~100,000
RHIB0239	800629	7508245	Proposed	~100,000
RHIB0249	800795	7508065	Proposed	~100,000
RHIB0250	800980	7507865	Proposed	~100,000
RHIB0251	801450	7507915	Proposed	~100,000
RHIB0252	801870.111	7507858.621	Installed	137,000
RHIB0253	801457.251	7507624.594	Installed	~100,000
RHIB0254	801765	7507555	Proposed	~100,000
RHIB0255	802120	7507505	Proposed	~100,000
RHIB0257	802310	7507130	Proposed	~100,000
RHIB0258	802365	7506605	Proposed	~100,000
RHIB0259	802355	7506330	Proposed	~100,000
RHIB0260	802345	7505980	Proposed	~100,000
RHIB0261	802350	7505730	Proposed	~100,000
RHIB0262	802595	7505795	Proposed	~100,000

Injection Bore ID	Easting (MGA94)	Northing (MGA94)	Status	Electrical Conductivity (µS/cm)
RHIB0263	803000	7505700	Proposed	~100,000
RHIB0264	802380	7505520	Proposed	~100,000
RHIB0265	802350	7504955	Installed	82,000
RHIB0266	802770	7504555	Proposed	~100,000
RHIB0267	797409.751	7509549.255	Installed	80,000
RHIB0268	798335.795	7510131.081	Installed	37,000
Stage 1 Borefield				
RHIB0009	811897.966	7500114.250	Installed	15,000
RHIB0023	811503.140	7501004.840	Installed	2,000
RHIB0024	811999.090	7500990.410	Installed	2,500
RHIB0027	810068.680	7500396.350	Installed	2,000
RHIB0030	812921.340	7500587.340	Installed	2,000
RHIB0036	811818.580	7501601.910	Installed	2,500
RHIB0039	812084.940	7502019.570	Installed	2,500
RHIB0188	810310.316	7500787.167	Installed	1,700
RHIB0189	811852.746	7500764.617	Installed	1,900
RHIB0190	811673.081	7501394.223	Installed	1,900
RHIB0191	812300.969	7501388.639	Installed	1,700
RHIB0193	809421.768	7500767.324	Installed	80,000
RHIB0194	811303.485	7500311.817	Installed	4,000
RHIB0196	812702.598	7502105.498	Installed	1,500
RHIB0275	808898.689	7500919.475	Installed	10,000
RHIB0276	809100.635	7501251.744	Installed	5,000
RHIB0277	810086.401	7500951.408	Installed	2,100
RHIB0279	809708.697	7501260.023	Installed	1,700

MAR Area Groundwater Monitoring Bore details (RHIO, 2018b)

Bore ID	Status	Easting (MGA94)	Northing (MGA94)	Elevation (mAHD)	Monitoring Method
Groundwater Monitoring Bores Regional					
RHPZ0186s	Installed	796822.503	7509721.393	423.48	Telemetry WL
RHPZ0083	Installed	798611.017	7510142.088	426.336	Telemetry WL
RHPZ0088	Installed	802582.659	7505989.174	423.111	Telemetry proposed
RHPZ0075	Installed	801641.141	7508144.520	425.260	Telemetry proposed
RHPZ0184	Installed	797764.505	7509123.971	422.609	Telemetry WL
RHPZ0285	Proposed	800263.1554	7508900.252	423	Telemetry proposed
RHPZ0288	Proposed	800792.3231	7507684.49	422	Telemetry proposed
RHPZ0289	Proposed	801863.8878	7507107.697	422	Telemetry proposed
RHPZ0185	Installed	798760.281	7509211.138	425	Telemetry proposed
RHPZ0287	Proposed	799476.0184	7506743.894	417	Telemetry proposed
RHPZ0283	Proposed	799482.633	7509277.284	425	Telemetry proposed
RHPZ0293	Proposed	799858.3421	7504223.733	410	Telemetry proposed
RHPZ0292	Proposed	797921.5882	7504295.17	410	Telemetry proposed
RHPZ0286	Proposed	796791.8151	7507390.801	416	Telemetry proposed
RHPZ0294	Proposed	801840.0752	7503554.335	413	Telemetry proposed
RHPZ0281	Proposed	793928.2466	7508779.789	417	Telemetry proposed
RHPZ0299	Proposed	810215.2785	7498890.796	425	Telemetry proposed
RHPZ0300	Proposed	811994.605	7498004.44	422	Telemetry proposed
RHPZ0301	Proposed	813509.3476	7498646.056	424	Telemetry proposed
RHPZ0312	Proposed	801841	7505402	425	Telemetry proposed
Groundwater Monitoring Bores adjacent to Injection Bores					
RHPZ0139s	Installed	798393.156	7509723.949	425.637	Telemetry proposed
RHPZ0140s	Installed	797692.658	7509727.156	424.417	Telemetry proposed
RHPZ0141s	Installed	798206.041	7510431.519	427.576	Telemetry proposed
RHPZ0142s	Installed	797198.057	7509712.072	423.950	Telemetry proposed
RHPZ0216	Installed	798071.093	7509504.815	424.574	Telemetry proposed
RHPZ0128	Installed	798963.291	7509673.224	426.181	Telemetry proposed
RHPZ0222	Installed	799104.998	7509471.544	425.401	Telemetry proposed
RHPZ0223	Installed	799491.832	7509456.000	426.434	Telemetry proposed
RHPZ0225	Proposed	800185	7509430	423	Telemetry proposed
RHPZ0226	Proposed	800710	7509100	426	Telemetry proposed
RHPZ0229	Proposed	800606	7508941	423	Telemetry proposed
RHPZ0240	Installed	800597.885	7508499.876	424.122	Telemetry proposed
RHPZ0241	Proposed	800629	7508245	423	Telemetry proposed
RHPZ0265	Proposed	800795	7508065	425	Telemetry proposed

Bore ID	Status	Easting (MGA94)	Northing (MGA94)	Elevation (mAHD)	Monitoring Method
RHPZ0266	Proposed	800980	7507865	423	Telemetry proposed
RHPZ0276	Proposed	801450	7507915	424	Telemetry proposed
RHPZ0267	Proposed	801900	7507814	426	Telemetry proposed
RHPZ0268	Proposed	801360	7507590	424	Telemetry proposed
RHPZ0269	Proposed	801765	7507555	424	Telemetry proposed
RHPZ0270	Proposed	802120	7507505	423	Telemetry proposed
RHPZ0271	Proposed	802310	7507130	421	Telemetry proposed
RHPZ0238	Installed	802374.082	7506607.273	423.774	Telemetry proposed
RHPZ0272	Proposed	802355	7506330	422	Telemetry proposed
RHPZ0273	Proposed	802345	7505980	422	Telemetry proposed
RHPZ0219	Proposed	802350	7505730	421	Telemetry proposed
RHPZ0221	Proposed	802594	7505799	418	Telemetry proposed
RHPZ0274	Proposed	802350	7504955	418	Telemetry proposed
RHPZ0218	Proposed	802380	7505520	424	Telemetry proposed
RHPZ0239	Installed	802359.029	7504915.082	419.145	Telemetry proposed
RHPZ0288	Proposed	800792	7507684	424	Telemetry proposed
RHPZ0217	Installed	797429.054	7509541.036	424.259	Telemetry proposed
RHPZ0275	Proposed	798368	7510101	426	Telemetry proposed
RHPZ0032	Installed	811905.700	7500106.513	430.676	Telemetry proposed
RHPZ0306	Proposed	811498	7501009	433	Telemetry proposed
RHPZ0307	Proposed	811993	7500999	434	Telemetry proposed
RHPZ0308	Proposed	810669	7500388	430	Telemetry proposed
RHPZ0309	Proposed	812928	7500589	431	Telemetry proposed
RHPZ0310	Proposed	811809	7501603	436	Telemetry proposed
RHPZ0311	Proposed	812085	7502027	438	Telemetry proposed
RHPZ0255	Installed	810288.552	7500773.340	432.418	Telemetry proposed
RHPZ0256	Installed	811827.895	7500751.394	433.492	Telemetry proposed
RHPZ0262	Installed	811648.548	7501377.714	435.138	Telemetry proposed
RHPZ0259	Installed	812312.130	7501363.458	436.211	Telemetry proposed
RHPZ0264	Installed	809442.406	7500770.113	428.812	Telemetry proposed
RHPZ0263	Installed	811288.116	7500340.313	431.964	Telemetry proposed
RHPZ0260	Installed	812672.918	7502085.974	441.029	Telemetry proposed
RHPZ0277	Installed	808882.008	7500906.259	426.908	Telemetry proposed
RHPZ0278	Installed	809079.224	7501272.741	428.068	Telemetry proposed

Bore ID	Status	Easting (MGA94)	Northing (MGA94)	Elevation (mAHD)	Monitoring Method
RHPZ0279	Proposed	810042	7500942	428	Telemetry proposed
RHPZ0280A	Installed	809726.601	7501276.138	430.801	Telemetry proposed

Appendix 2: MAR Groundwater Monitoring Trigger Levels

As per the MAR Triger Level Framework within MAR Vegetation Monitoring Zones in Table 7, above, trigger levels have been set at 5 m or less from the ground surface for areas identified by the Licensee to have GDV and 3 m or less from the ground surface for areas where non-GDV has been identified.

Bore ID	Easting (MGA94)	Northing (MGA94)	Elevation (mAHD)	Trigger Level Depth to Water (mbgl)
RHPZ0186s	796822.503	7509721.393	423.48	3
RHPZ0083	798611.017	7510142.088	426.336	5
RHPZ0088	802582.659	7505989.174	423.111	3
RHPZ0075	801641.141	7508144.520	425.260	3
RHPZ0184	797764.505	7509123.971	422.609	3
RHPZ0285	800263.1554	7508900.252	423	5
RHPZ0288	800792.3231	7507684.49	422	3
RHPZ0289	801863.8878	7507107.697	422	3
RHPZ0185	798760.281	7509085.768	425	3
RHPZ0287	799476.0184	7506743.894	417	5
RHPZ0283	799482.633	7509277.284	425	3
RHPZ0293	799858.3421	7504223.733	410	TBC
RHPZ0292	797921.5882	7504295.17	410	TBC
RHPZ0286	796791.8151	7507390.801	416	5
RHPZ0294	801840.0752	7503554.335	413	TBC
RHPZ0281	793928.2466	7508779.789	417	5
RHPZ0299	810215.2785	7498890.796	425	3
RHPZ0300	811994.605	7498004.44	422	5
RHPZ0301	813509.3476	7498646.056	424	5
RHPZ0312	801841	7505402	425	3

Note: TBC – to be confirmed once installed and existing groundwater levels are determined.

Appendix 3: Key Documents

	Document title	In text ref	Availability
1	Application for amendment to L8621/2011/1 – Assessment of alternative locations for Magnetic Separation Plant and Mine Services Spray Irrigation Field, 19 July 2018	-	DWER records (A1704427)
2	Application for amendment to L8621/2011/1 – Increased Production Capacity and Magnetic Separation Plant, November 2017 including Supporting Document (OP-APP-00054)	-	DWER records (A1565548 and A1583107)
3	Application for amendment to L8621/2011/1 – Managed Aquifer Recharge, May 2018 including Supporting Document (OP-APP-00056) 15 May 2018	-	DWER records (A1674863)
4	Ecohydrological Conceptualisation of the Fortescue Marsh Region Report Prepared for BHP Billiton Iron Ore September 2015	MWH, 2015	Available at: http://www.bhp.com/-/media/bhp/regulatory-information-media/iron-ore/western-australia-iron-ore/0000/report-appendices/160316_ironore_waio_pilbarastrategicassessment_state_appendix7_appendixe_report.pdf
5	Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh management area, Report 1484, July 2013. Advice of the Environmental Protection Authority to the Minister for Environment under Section 16(e) of the *Environmental Protection Act 1986*.	EPA, 2013	http://www.epa.wa.gov.au/sites/default/files/Publications/Rep1484%20Fortescue%20Marsh%20s16e%20010713.pdf
6	Groundwater Operating Strategy OP-REP-00512, 11 June 2018	RHIO GWOS 2018	DWER records (A1708310)
7	*Guidance Statement: Regulatory principles,* Department of Environment Regulation, July 2015	*Guidance Statement: Regulatory principles*	accessed at www.dwer.wa.gov.au
8	*Guidance Statement: Setting conditions,* Department of Environment Regulation, October 2015	*Guidance Statement: Setting conditions*	
9	*Guidance Statement: Licence duration,* Department of Environment Regulation, August 2016	*Guidance Statement: Licence duration*	
10	*Guidance Statement: Risk Assessments*, Department of Environment Regulation, February 2017	*Guidance Statement: Risk Assessments*	
11	*Guidance Statement: Decision Making*, Department of Environment Regulation, February 2017	*Guidance Statement: Decision Making*	
12	Hydrogeological Assessment for Roy Hill Managed Aquifer Recharge System	-	DWER records (A1675107)

	Document title	In text ref	Availability
	(OP-REP-00510) 27 March 2018		
13	Licence L8621/2011/1 – Roy Hill Iron Ore Mine	L8621/2011/1	accessed at www.dwer.wa.gov.au
14	L8621/2011/1 – Submission of Compliance Documentation – Delta and Zulu Dewatering Creek Discharge Locations, received from Ben Kraft (Roy Hill), 16 July 2018	Delta and Zula Compliance Report	DWER records (A1703793)
15	Ministerial Statement 824 Ministerial Statement 829	MS 824 MS 829	accessed at www.epa.wa.gov.au/
16	Online Water Application for increase water abstraction allocation under GWL172642 - Phase 2 of operations. (includes updated Groundwater Operating Strategy OP-REP-00512)	RHIO, 2018a	DWER records (DWERDT67880, DWERDT42135, DWERDT67879, DWERDT71038, DWERDT71519).
17	RE: L8621 draft amendment notice # 6, received from Sarah Blake (Roy Hill), dated 22 August 2018	RHIO, 2018b	DWER records (A1713267)
18	RE: An#6 – second draft for comment, received from Sarah Blake (Roy Hill), dated 19 September 2018	RHIO, 2018c	DWER records (A1721645)
19	Roy Hill Iron Ore (Mine) November 2017 MAR Trial Progress Report, Hydrogeology (OP-REP-00511, also referenced as 1700-Cl-00019, Rev 0) 28 March 2018	OP-REP-00511	DWER records (A1675109)
20	Roy Hill Iron Ore Project Report for Water Management Strategy Review COPP15045-REP-G-001, Rev0. 4 September 2015	Calibre, 2015	DWER records (A1675109)
21	Roy Hill Iron Ore Part IV – s45C/ Part V Operating Licence Initial 24 month Managed Aquifer Recharge Strategy, presentation dated 10 April 2018	RHIO Presentation, 2018	DWER records (A1709851)
22	Roy Hill Iron Ore Pty Ltd – Application For Amendment to Licence (L8621/2011/1) – Response to Request for Further Information For Managed Aquifer Recharge (OP-LET-00627), 13 July 2018	-	DWER records (A1703007)
23	Roy Hill Iron Ore Pty Ltd –Response to RE: MAR Response 13/7/18 - queries, 1 August 2018	-	DWER records (A1709853)
24	Roy Hill Iron Ore Mining Project – Bankable Feasibility Study. Mine site water supply, hydrology and dewatering. Prepared for Roy Hill Iron Ore Pty Ltd, September 2010	MWH, 2010	Available from Licensee
25	Roy Hill 1 Vegetation and Flora Assessment. Report produced for Hancock Prospecting Pty Ltd, Western Australia. (April, 2009). Ecologia	Ecologia, 2009	ments/Appendix%204%20%20Roy%20Hill%201%20Vegetation%20%20Flora%20Assessment.pdf
26	Works Approval W5732/2014/1 Roy Hill Wastewater Treatment Plant – Compliance Document (WWTP	-	DWER records (A941886)

	Document title	In text ref	Availability
	Compliance Report_Rev0_28072015, RHHP1-SCT-2000-EN-REP-1001, 27 July 2015)		

Appendix 4: Summary of Licensee's comments

The Licensee was provided with the draft Amendment Notice on 10 August 2018 and 11 September 2018 for review and comment. The Licensee responded on 22 August 2018 (RHIO, 2018b) and 19 September 2018 (RHIO, 2018c). The following comments were received on the draft Amendment Notice.

Condition	Summary of Licensee's comment	DWER response
Table 2 for Category 6	Under description of proposed amendment it is stated "*Approval to discharge up to 55,000,000 tonnes per annum until 11 May 2020. Thereafter, until such time that an amendment has been issued, the discharge throughput will revert to 843,000 tonnes per annum*". The Licensee has stated that "*Roy Hill require this part V approval to commence utilisation of the MAR, hence two years should be from the date of the submission of the construction compliance report required under condition 1.2.16*".	MS 824 and MS 829 approve "*up to 55 GL per annum for a period of up to 2 years*" for dewatered saline groundwater (up to 30,000 mg/L TDS) and RO Plant reject water to be disposed to recharge basins and/or reinjection bores. DWER has updated this to read "*Approval to discharge up to 55 Mtpa for a period of up to two years, following submission of the construction compliance report. Thereafter, the discharge throughput will revert to 843,000 tonnes per annum*".
First paragraph under Increased production capacity – dot point 3	DWER has asked the Licensee to advise if any of the proposed maintenance requirements that have been forwarded in previous applications will be modified and as such, increasing potential environmental risks by not carrying out maintenance requirements that may have been previously assessed to mitigate environmental impacts e.g. dust management infrastructure. Will the current maintenance requirements be reduced as a result of the proposed efficiency measures? What maintenance requirements will be reduced? The Licensee has stated "*Maintenance requirements have been reduced overall due to the use of improved wear materials and understanding of the required maintenance of the plant. The improvement in maintenance cycles (i.e. moved from a 10.5 week maintenance schedule to a 12 week maintenance schedule) allows for increased operating time with less downtime for maintenance purposes*".	DWER notes the Licensee's comments. No changes have been made to the Amendment Notice.
Water Balance section under Management and	It is stated "Lab Water Quality for injection bores (full analysis): Nil.	DWER has removed this dot point.

Condition	Summary of Licensee's comment	DWER response
monitoring – Injection Bores monitoring – dot point 3	The Licensee has asked why this dot point is listed if it is not going to be undertaken?	
Table 14 under Waste: Tailings disposal	The Licensee has questioned whether the statement "Outside the scope: regulated under Part IV of the EP Act", should in fact be Part V?	The groundwater quality from the TSF is regulated under Part IV of the EP Act through MS 824 and MS 829.
Amendment section		
#2.	The Licensee as asked whether Condition 1.3.11 should also be amended.	Previous condition 1.3.11 (now condition 1.2.11) has been amended via this Amendment Notice to include the dewatering containment infrastructure (Southern and Northern Recharge Basins and Stage 1 and Stage 2 Recharge Basins).
#2. Table 1.2.6	The Licensee has requested that construction requirements for the Zulu Dewatering Creek Discharge location and Delta Dewatering Creek Discharge location be removed as compliance documentation was submitted on 16 July 2018.	DWER has removed the construction requirements for the Zulu Dewatering Creek Discharge location and Delta Dewatering Creek Discharge location from Table 1.2.6 (previously Table 1.3.6).
#3. Table 1.2.7 for category 6	The Licensee has asked whether the figure of 54,157,000 can be reviewed in line with the next dot point outlining 378,000 to recharge basins. The Licensee has also stated that "*The start of MAR approval should be the date of the submission of construction compliance document required by this licence for this infrastructure*".	DWER has incorporated the 378,000 tonnes per annual period discharged to the recharge basins into the 54,157,000 into reinjection bores and recharge basin. So the total to reinjection bores and recharge basins is 54,535,000. DWER has updated Table 1.2.7 to stipulate that 55 Mtpa period can be discharged for a period of up to two years, following the submission of the construction compliance report required under condition 1.2.16 for the MAR System.
#6. Table 3.2.1 under SWIB Production Injection Bores	The Licensee has stated that "*Reinjection bore meter measures EC. TDS will be a calculation from EC*".	DWER acknowledges that the most commonly used method for determining TDS is measuring specific conductivity to detect the present of ions in water (EC). Once the EC is determined, a conversion factor is ran (generally by the meter performing the measurement) to determine the TDS. This method, however, only estimates TDS levels. For a true TDS measurement, the sample needs to be taken back to a laboratory and an evaporating and weighing procedure carried out. Based on this, DWER has retained the monitoring of TDS continuously during discharge, but has also

Condition	Summary of Licensee's comment	DWER response
	The Licensee has stated that the continuous TDS reading should have a footnote outlining that this is a calculation from EC.	included the requirement to monitor TDS quarterly with samples submitted to a NATA accredited laboratory for analysis. DWER has included footnote 2, which stipulates that the continuous TDS reading is a calculation from EC.
#7. Table 3.6.1	The Licensee has stated that bores RHPZ0026S and RHPZ0034 have been decommissioned and that RHPZ0092 and RHPZ0091 should be added instead.	DWER have removed bores RHPZ0026S and RHPZ0034 and replaced them with RHPZ0092 and RHPZ0091.
	For the bores providing water to the creek discharge points from the Zulu, Bravo and Delta Dewatering Bore Area, it is a requirement for TDS to be measured daily (continuous during discharge. The Licensee has stated that only EC can be done on a daily basis and that TDS should be included below in the spot sample.	DWER has added TDS to the spot sample requirement.
	The Licensee has stated that "*monitoring bores associated with an injection bore will only be monitored if operated during the quarter*".	-
	The Licensee has requested that the parameters standing water level, pH, EC, Oxidation –reduction potential (calibrated using Zobell's solution) for the SWIB and Stage 1 Borefield monitoring bores be changed from monthly to quarterly. The Licensee has stated that monthly monitoring of so many bores is a significant amount of monitoring work and well in excess of the requirements of other similar sites. Over two years if the frequency was changed to quarterly this would provide 8 data sets.	DWER has changed the monitoring requirement to monthly for the first twelve months and then quarterly sampling after this time. Under Part IV of the EP Act the option for reinjection is only for a period of up to 2 years. This two year period begins once the construction compliance document for the MAR Systems has been submitted to DWER. DWER has also included the requirement (condition 4.3.1) for the monthly data set from the first twelve months of sampling be provided outside the Annual Environmental Report. This will enable baseline data to be established prior to the Licensee undertaking quarterly monitoring.
	The Licensee has asked what the objective is for the measuring of redox?	The inclusion of oxidation-reduction potential (calibrated using Zobell's solution) was a recommendation for inclusion in the monitoring

Condition	Summary of Licensee's comment	DWER response
		program for the MAR Trial by DWER's Principal Hydrogeologist.
	The Licensee has stated that they will "*require at least a 3 month period to install monitoring bores RHPZ0281, RHPZ0286, RHPZ0287, RHPZ0292 and RHPZ0293 from the start of the licence, as currently our proposed tenement for these locations is pendin*g".	DWER has updated the Table to include Note 2, which states sampling and analysis of RHPZ0281, RHPZ0286, RHPZ0287, RHPZ0292 and RHPZ0293 to commence immediately following installation. A notification requirement has been added to condition 4.3.1 for the submission of bore logs for all proposed bores once installed.
#8 Table 4.2.1 for Table 3.6.1 and Form AWG1 for the MAR Trial monitoring	The Licensee has stated that "*this is going to become a massive form – With regional monitoring bores, plus reinjection monitoring bores sampled quarterly with 30+ records each = 8000 records. Can this form be removed from MAR trial data and instead addressed in tabular format in the report as outlined below?*"	DWER has retained the Landfill and TSF bores monitoring data to be recorded within AWG1. All other monitoring associated with condition 3.6.1 can be provided within a report with requirements set out in condition 4.2.1.
Form GR1	The Licensee has asked "*for continuous monitoring, what frequency does DWER want this reported within this form? Dependent on the number of records required, can the RHIO request flexibility in the format of this form? i.e. so we can export data directly out of our data management system, rather than risk errors in translating data into this form?*" The Licensee has requested that the requirement to report the continuous monitoring of EC and TDS in Form GR1 be removed to allow data to be exported directly out of the data management system, rather than risking errors in translating data into this form.	Flexibility in the format of this form can be provided. Ideally, DWER requires tables of data from the Licensee's systems, which will need to be updated every time to allow for a comparison to previous data. DWER has removed EC and TDS (continuous during discharge) from Form GR1. This information should be presented in a tabular format with graphs, including when injection in that area is occurring.
#13 and #14. Stage 1 and Stage 2 Basin cross sectional design detail figures	The Licensee has asked whether these designs need to be included as they may change.	DWER has removed the Stages 1 and 2 cross sectional design detail figures. These designs are provided within the Amendment Notice decision section and the Licensee will be required to report against these design in the construction compliance document.