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Revised Proposal for the Roy Hill Iron Ore Mine Environmental Scoping Document

Environment

EPA Assessment Number: 2214

OP-APP-00066

Rev	Author	Approver / BFO	Signature	Endorsed Date
6	Melissa Hobson Senior Advisor Approvals & Compliance	Sarah Blake Manager, Environment & Approvals		13/01/2020

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Proposal name:	Revised Proposal for Roy Hill Iron Ore Mine
Proponent:	Roy Hill Iron Ore Pty Ltd
Assessment number:	2214
Location:	110 kilometres north of Newman
Local Government Area:	Shire of East Pilbara
Public review period:	Environmental Review Document – 2 weeks
EPBC Reference Number	2018/8330

1 Introduction

The Environmental Protection Authority (EPA) has determined that the above proposal is to be assessed under Part IV of the *Environmental Protection Act 1986* (EP Act).

The purpose of the Environmental Scoping Document (ESD) is to define the form, content, timing and procedure of the environmental review, required by s. 40(3) of the EP Act. Roy Hill Iron Ore Pty Ltd (RHIO) has prepared this draft ESD in accordance with the EPA's Procedures Manual.

1.1 Form

The EPA requires that the form of the report on the environmental review required under s. 40 (Environmental Review Document, ERD) is according to the Environmental Review Document template.

1.2 Content

The EPA requires that the environmental review includes the content outlined in sections 2 to 6 of this ESD.

1.3 Timing

Table 1 sets out the timeline for the assessment of the proposal agreed between the EPA and the proponent.

Table 1 – Assessment Timeline

Key Assessment Milestones	Completion Date
EPA approves Environmental Scoping Document	January 2020
Proponent submits first draft ERD	May 2020
EPA provides comment on first draft ERD *(6 weeks from receipt of ERD)*	June 2020
Proponent submits revised draft ERD	July 2020
EPA authorises release of ERD for public review *(2 weeks from EPA approval of ERD)*	August 2020
Proponent releases ERD for public review for 2 weeks	August 2020
Close of public review period	August 2020
EPA provides Summary of Submissions *(3 weeks from close of public review period)*	September 2020
Proponent provides Response to Submissions	October 2020

Key Assessment Milestones	Completion Date
EPA reviews the Response to Submissions *(4 weeks from receipt of Response to Submissions)*	November 2020
EPA prepares draft assessment report and completes assessment *(7 weeks from EPA accepting Response to Submissions)*	January 2021
EPA finalises assessment report (including two weeks consultation on draft conditions) and gives report to Minister *(6 weeks from completion of assessment)*	February 2021

1.4 Procedure

The EPA requires the proponent to undertake the environmental review according to the procedures in the Administrative Procedures and the Procedures Manual.

This ESD has not been released for public review. The ESD will be available on the EPA website (www.epa.wa.gov.au) upon endorsement and will be appended to the ERD.

1.5 Assessment as an Accredited Assessment

The Revised Proposal has been referred and determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is being assessed as an accredited assessment. The relevant matters of national environmental significance (MNES) for this proposal are:

- Threatened Species and Communities (section 18 and 18A of the EPBC Act);
  - Greater Bilby (*Macrotis lagotis*) – vulnerable;
  - Northern Quoll (*Dasvurus hallucatus*) – endangered;
  - Ghost Bat (*Macroderma gigas*) – vulnerable;
  - Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) – vulnerable;
  - Olive Python (Pilbara subspecies) (*Liasis olivaceus barroni*) – vulnerable;
  - Night Parrot (*Pezopous occidentalis*) – endangered; and
  - Princess Parrot (*Polvtelis alexandrae*) – vulnerable.
- Migratory species (section 20 and 20A of the EPBC Act);
  - Sharp-tailed Sandpiper (*Caldris acuminata*)
  - Oriental Plover (*Charadrius veredus*)
  - Gull-billed Tern (*Gelochelidon nilotica*)
  - Caspian Tern (*Hydroprogne caspia*)
  - Glossy Ibis (*Plegadis falcinellus*)
  - Wood Sandpiper (*Tringa galareola*)
  - Common Greenshank (*Tringa nebularia*)

This ESD includes work required to be carried out and reported on in the ERD in relation to MNES. The ERD will also address the matters in Schedule 4 of the *Environmental Protection and Biodiversity Conservation*

Regulations 2000. MNES that may be impacted by the Revised Proposal will be identified and the potential impacts on these matters addressed within each relevant preliminary environmental factor identified in Table 4. The ERD will include a separate section which summarises the potential impacts on MNES and describes, to the extent practicable, any feasible alternatives to the proposed action and possible mitigation measures. Any proposed offsets to address significant residual impacts on MNES will also be discussed in the ERD.

2 The Proposal

The subject of this ESD is the Revised Proposal for Roy Hill Iron Ore Mine by Roy Hill Iron Ore Pty Ltd (RHIO) which is to expand the existing operations at the Roy Hill Mine. The regional location of the Revised Proposal is shown in Figure 1.

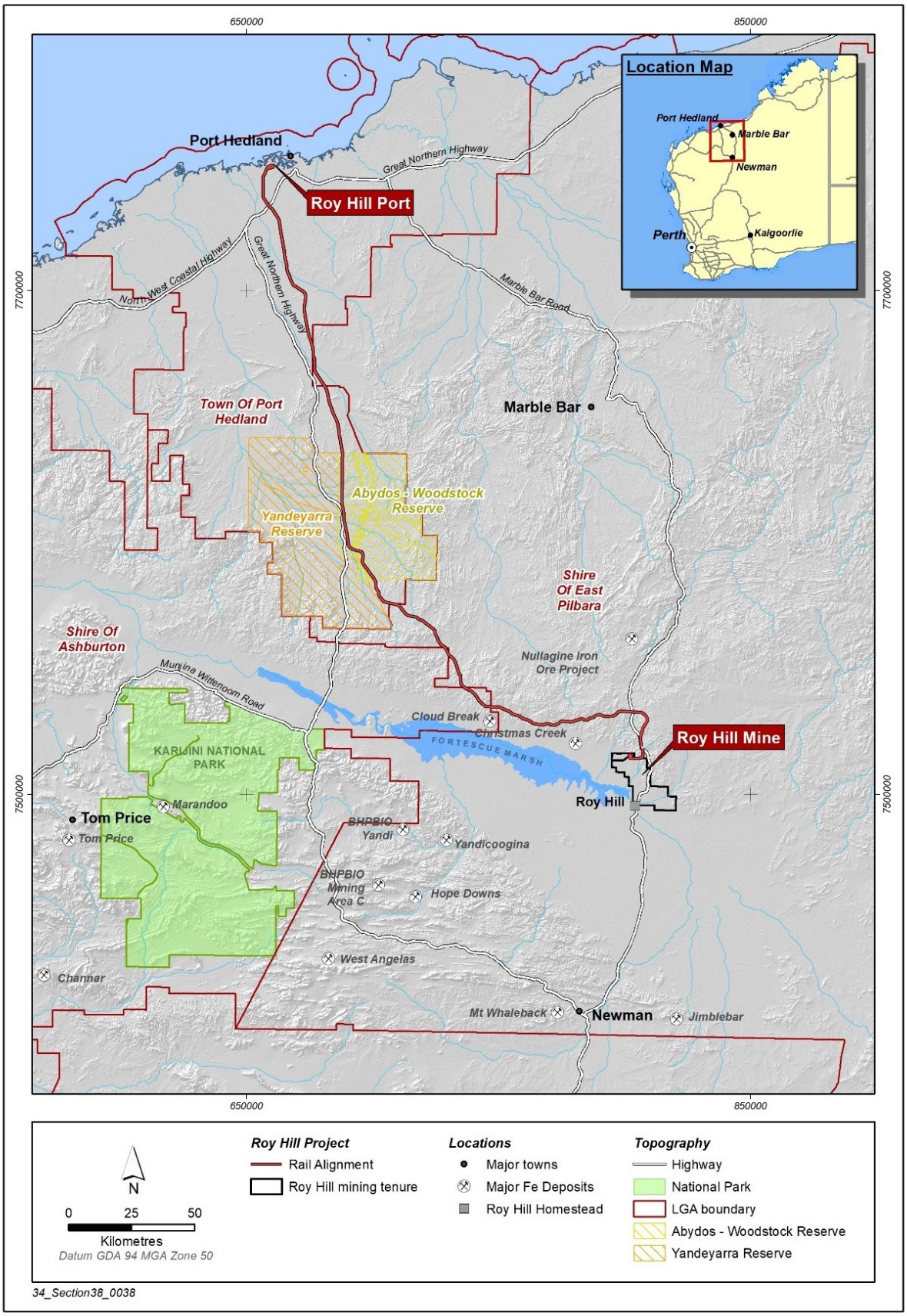

Figure 1 – Regional Location of Roy Hill Mine

2.1 Background information – Original Proposal

The Roy Hill Mine is located 80km south of Port Hedland and 110km north of Newman in the Pilbara Region of Western Australia.

The Original Proposal was assessed in two stages, with subsequent approvals under s45C and s46 of the EP Act. The Roy Hill Iron Ore Stage 1 was assessed as a Public Environmental Review with the EPA report (Report 1342) regarding Stage 1 of the mine being published in November 2009. The Roy Hill Stage 1 of the mine was approved with the issuing of Ministerial Statement (MS) 824 in December 2009. Stage 2 of the Mine was assessed at the level of Assessment on Referral Information. The EPA published the Report and Recommendations of the EPA in December 2009 (Report 1345). Stage 2 was granted approval through the publication of MS 829 on 31 March 2010. The existing approved Development Envelope and Conceptual Mine and Borefield Layouts, as previously approved, are outlined in Figure 2 and Figure 3.

Since approval of MS 824 and MS 829, seven amendments to MS 824 or MS 829 have been approved by the EPA, under s45C of the EP Act being:

- To change the route of the realignment of Marble Bar Road. The request was approved in December 2010.
- To undertake the MS 824 and MS 829 activities concurrently. The application was approved in February 2012.
- To amend the dewatering volumes and allow the use of saline mine dewater for dust suppression. Approval was received in February 2016.
- To discharge excess water of (<6,000mg/L Total Dissolved Solids (TDS)) resulting from mine dewatering into recharge basins and creek lines within the mine tenement. Approval was received in June 2017.
- To implement a short term Managed Aquifer Recharge (MAR) strategy for the management of surplus saline water through recharge basins, re-injection bores and evaporation pond for a period of 24 months. Approval was received in May 2018.
- To increase the processing rate to 65 million tonnes per annum (mtpa) (wet) exportable ore product. Approval was received in May 2018.
- Disposal of tailings into Zulu 5 mine pit void.

Several s46 applications to amend the conditions of MS 824 or MS 829 have been approved by the EPA being;

- Condition 9 of MS824 deleted and replaced with Change to the avoidance areas for the recognised Short-Range Endemic species, with the issuing of MS 902 in July 2012.
- Removal of the location defined alignment of surface water diversions, approved by the publishing of MS 979 and 980 in August 2014.

Change to MS 824 Condition 10 regarding weeds to be consistent with MS 829, approved with the issuing of Attachment 3 to MS 824 in June 2015. No additional clearing has been sought under any s45C or s46 application. Clearing currently approved under Part IV of the EP Act is up to 11,993 hectares.

Roy Hill referred the Roy Hill Iron Ore Mining Project to the Department of Environment, Water, Heritage and the Arts now Department of Environment and Energy (DoEE) under the EPBC Act in 2008. This was assessed as 'not a controlled action' under EBPC assessment number 2008/4624. The application outlined that an area of disturbance of 12,540 ha would be required.

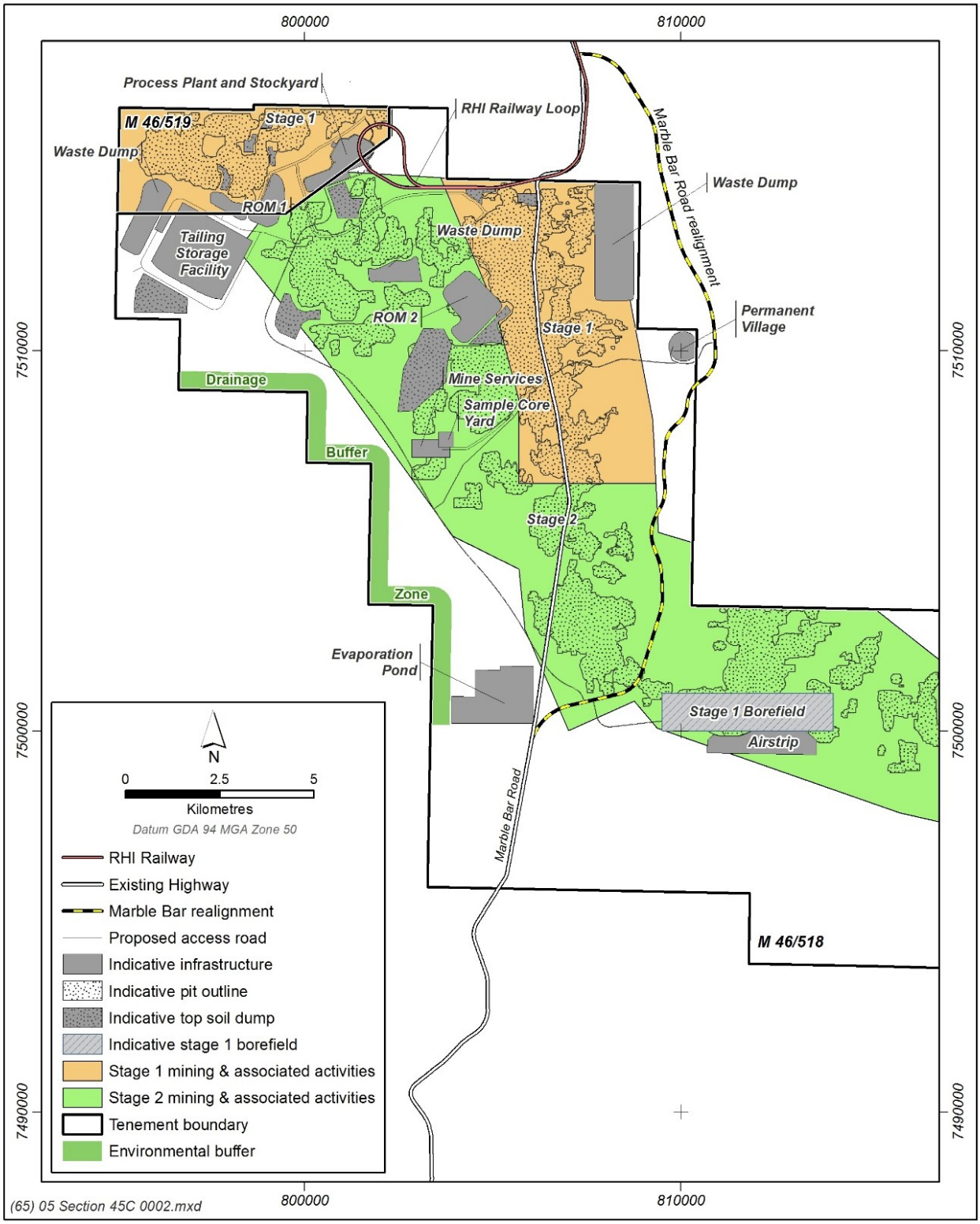

Figure 2 – Existing Approved Development Envelope and Conceptual Mine Layout

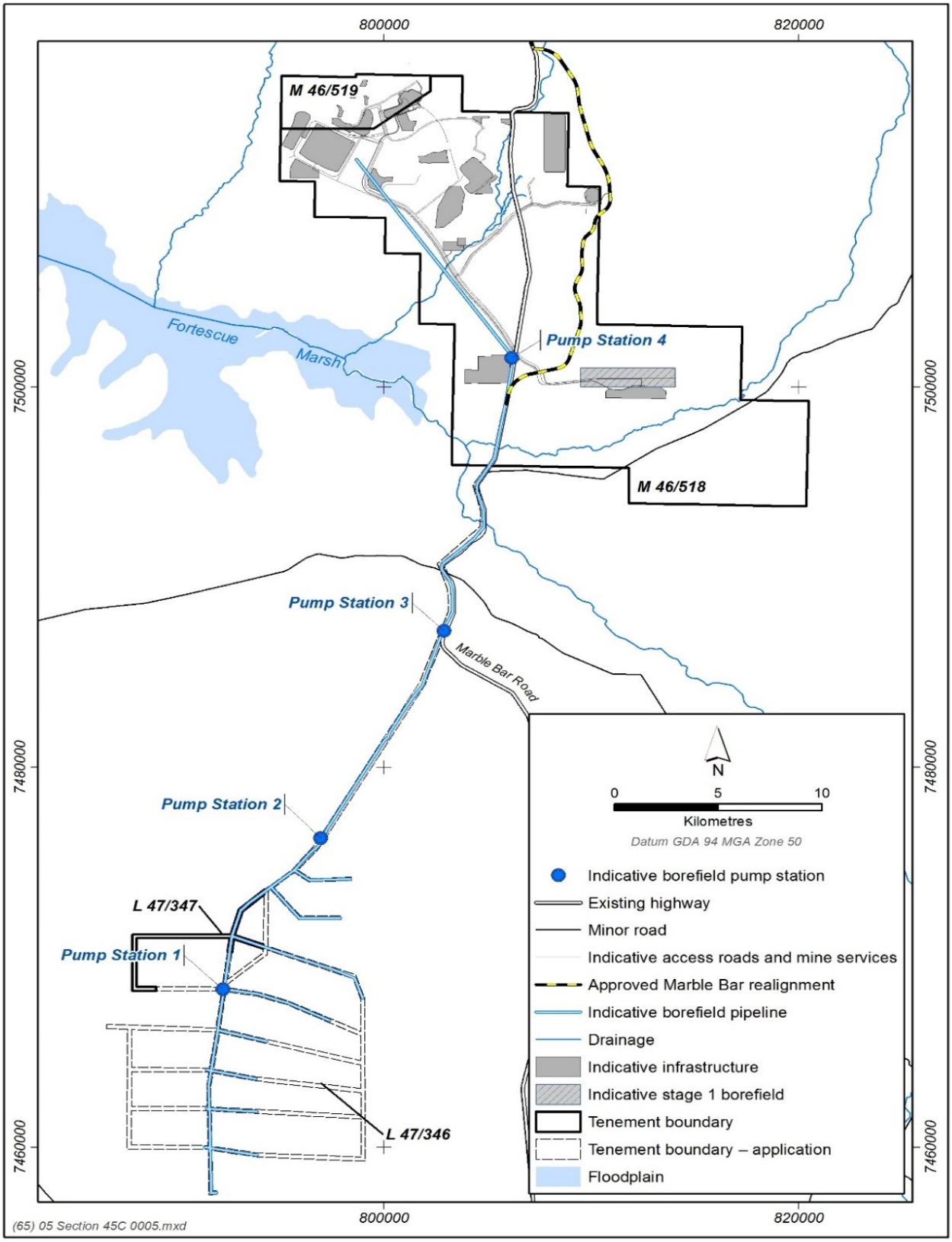

Figure 3 – Existing Conceptual Borefield Layout

2.2 Revised Proposal

Since the commencement of the Original Proposal, RHIO has developed a significantly better understanding of its orebody, specifically relating to ore quality in various locations within the mining tenements. This increased knowledge has resulted in changes to the life of mine (LOM) plan resulting in flow-on impacts to management of water, materials and tailings.

The development envelope and mining tenure of the Revised Proposal is delineated in Figure 4. The Revised Conceptual Mine and Borefield Layout are outlined in Figure 5 and Figure 6. A summary of the Revised Proposal is provided in Table 2.

The key characteristics of the Revised Proposal are set out in Table 3. The key proposal characteristics may change as a result of the findings of studies and investigations conducted and the application of the mitigation hierarchy.

Roy Hill Mine is predominately located on Mining Tenements M46/518 and M46/519. Full details of the relevant tenements are outlined on Figure 4.

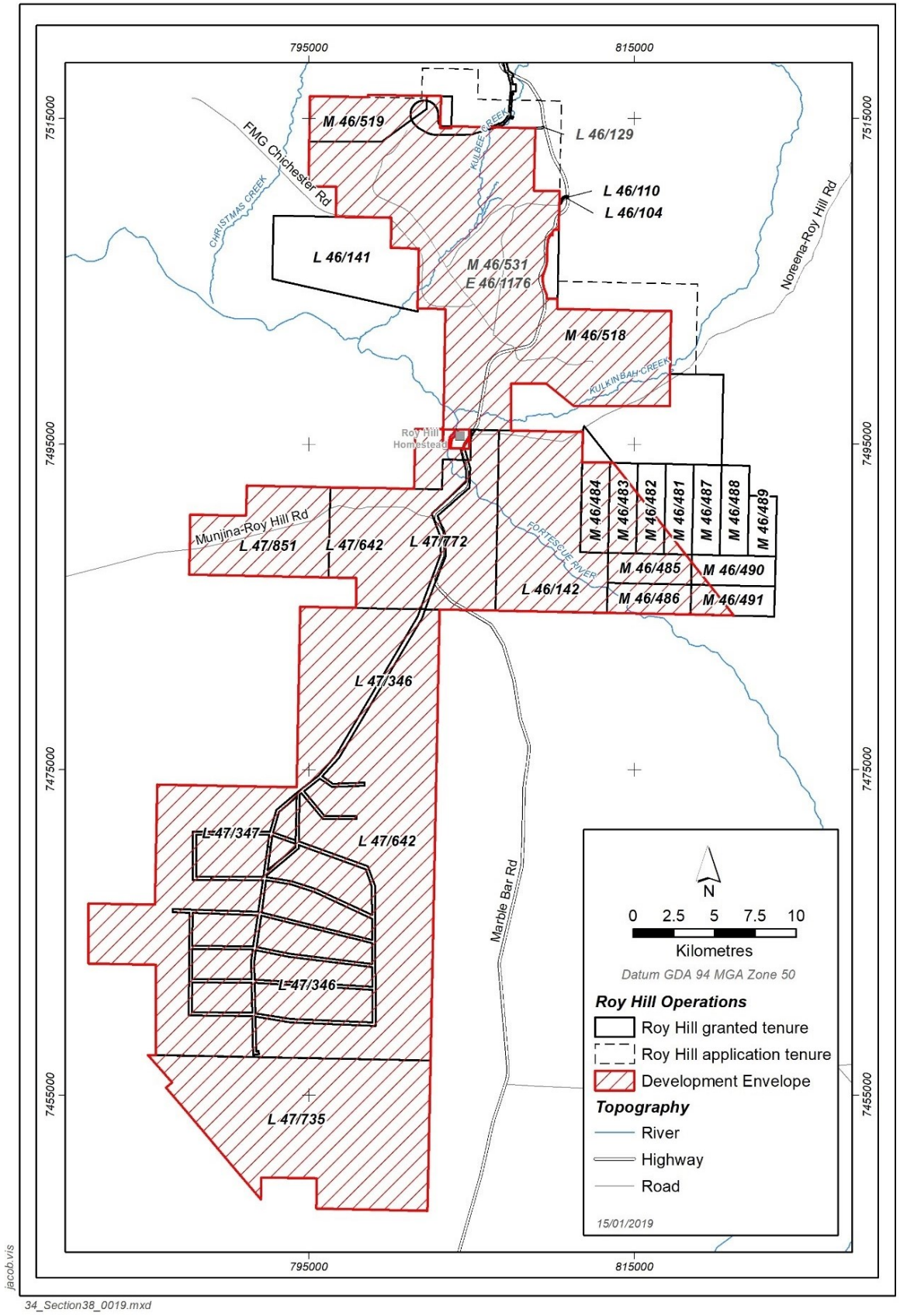

Figure 4 – Roy Hill Mine Tenure and proposed Revised Development Envelope

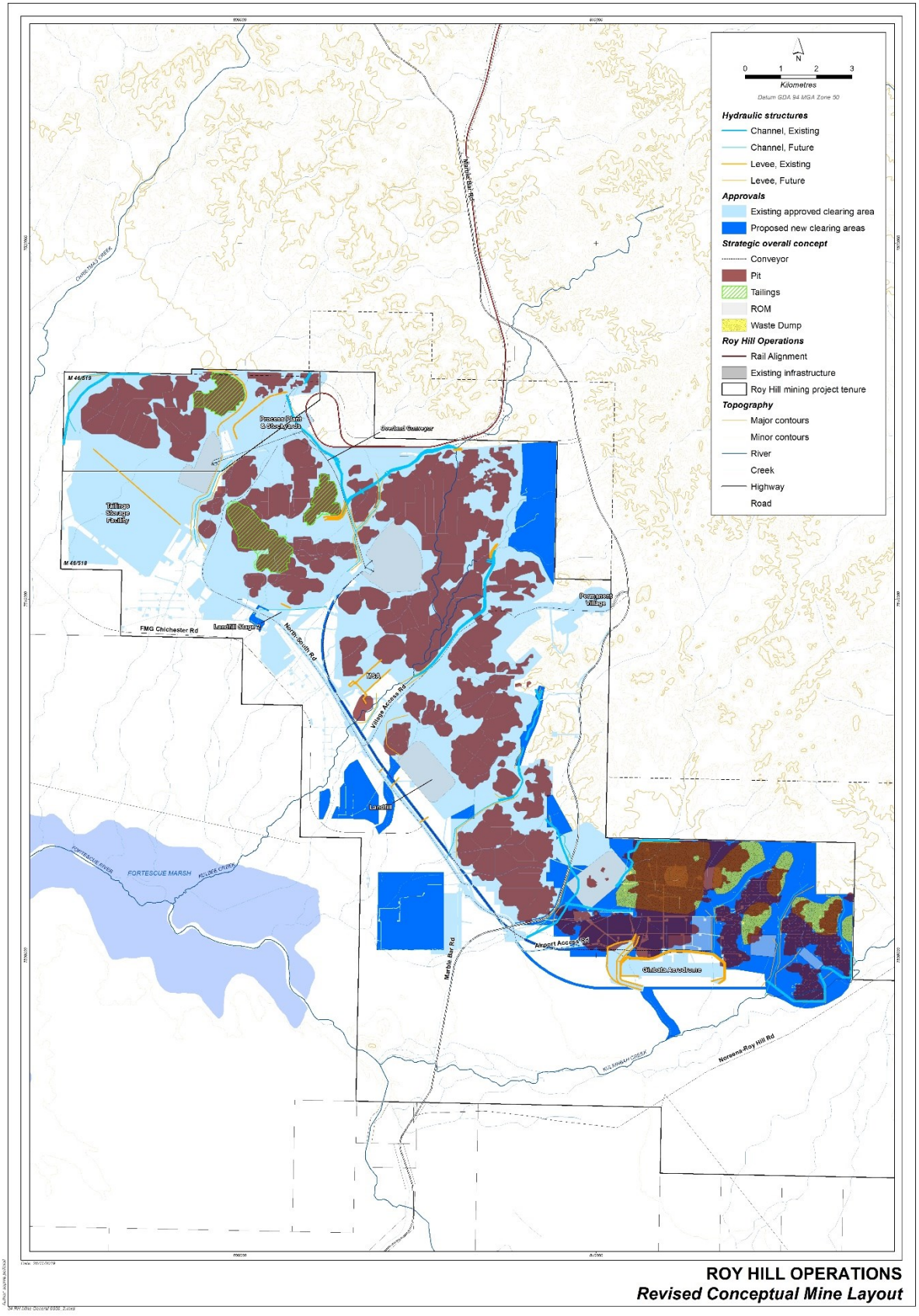

Figure 5 – Revised Conceptual Mine Layout

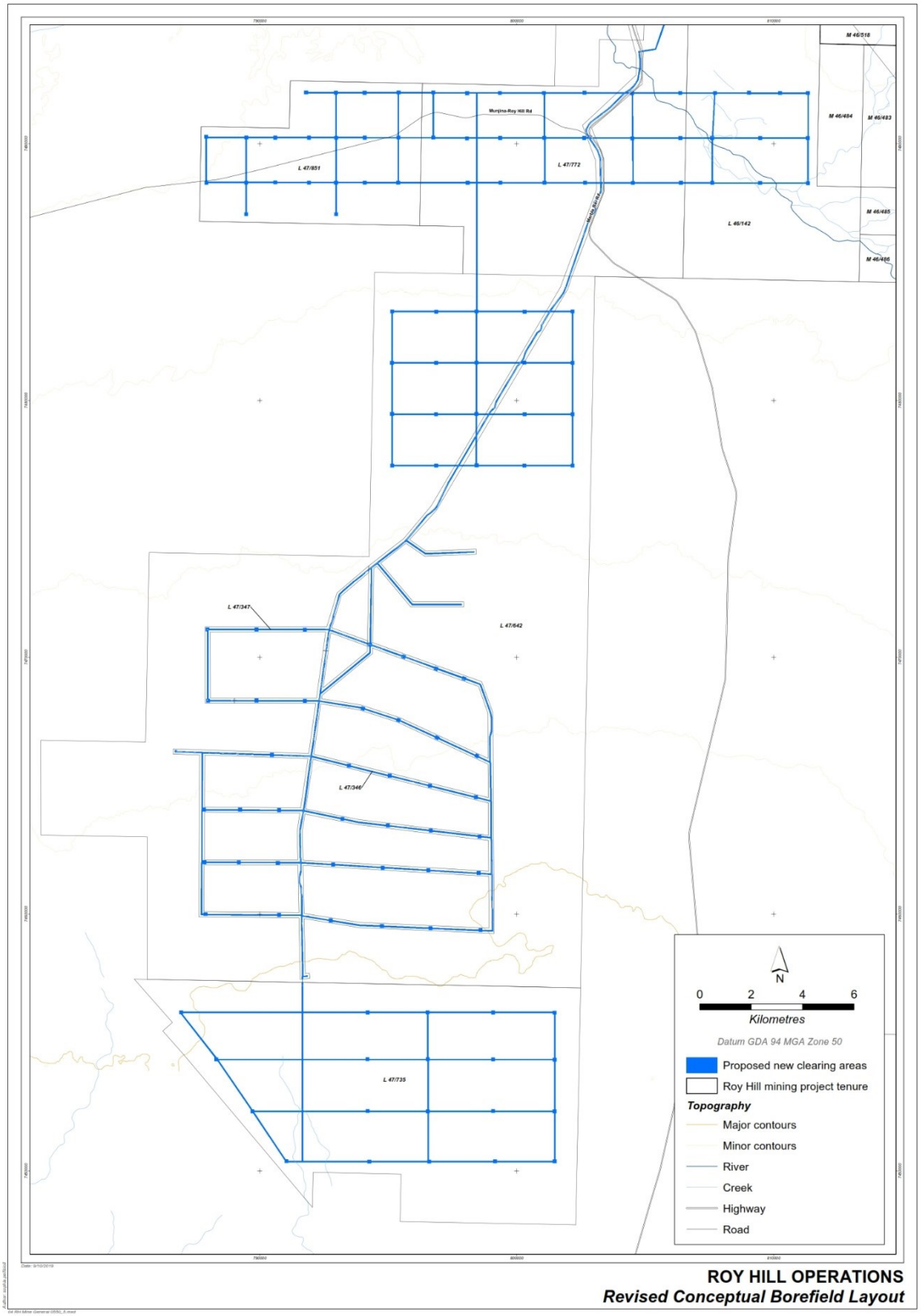

Figure 6 – Revised Conceptual Borefield Layout

Table 2 – Summary of the Proposal

Proposal Title	Revised Proposal for Roy Hill Iron Ore Mine
Proponent Name	Roy Hill Iron Ore Pty Ltd
Short Description	The Revised Proposal is to amend the existing Roy Hill Iron Ore Mine located 110km north of Newman in the Pilbara region of Western Australia. The Revised Proposal includes an increase in the ground disturbance footprint by 5,995 hectares, LOM water management strategy (including water abstraction, dewatering and MAR), revised waste material management strategy including changes to backfilling of pits and waste rock dump locations, development of permanent surface water structures and an increase to greenhouse gas emissions. In addition, this provides an opportunity to amalgamate existing Ministerial Statements and update key characteristics of the Original Proposal.

Table 3 – Location and proposed extent of physical and operational elements

Element	Location	Approved extent (under MS 824 and MS 829)	Proposed change (this Proposal)	Proposed Extent (revised Proposal)
Physical elements				
Mine and associated infrastructure Mine Pits Waste Rock Landforms (WRL) Tailings Storage Facility (TSF) Processing Plant ROMs Evaporation Pond Other infrastructure	Figure 5	Up to 11,993ha	Increase of 5,995ha to 17,988ha in a development envelope of 97,946ha	Up to 17,988ha
Overburden	Figure 5	2,060Mt overburden would be used as pit infill with some stored in out of pit dump	Increase of 1,270Mt for a proposed total of up to 3,330Mt of overburden to be used as pit infill, for construction of infrastructure and stored in out of pit dumps.	3,330Mt overburden to be used as pit infill, used for construction of infrastructure and stored in out of pit dumps.
In-pit TSF	Figure 5	N/A	Bravo and Zulu pits utilised for in-pit tailings disposal	Bravo and Zulu pits utilised for in-pit tailings disposal
Borefields	Figure 5 and Figure 6	South West Injection Borefield (SWIB), Stage 1 Borefield, Stage 2 Southern Borefield	Increase in borefield areas, including development of the Mine Borefield and Remote MAR Borefield and extension to Southern Borefield (formerly Stage 2 Southern Borefield). Use of all borefields for remaining LOM.	Increase in borefield areas and operation of SWIB, Mine Borefield, Stage 1 Borefield, Remote MAR Borefield and Southern Borefield

Element	Location	Approved extent (under MS 824 and MS 829)	Proposed change (this Proposal)	Proposed Extent (revised Proposal)
Surface Water Diversion structures	Figure 5	Temporary surface water diversion structures to be reinstated following backfilling of mine pits except Kulbee Creek, which was to be permanently diverted into West Kulbee Creek	Allow for permanent surface water diversion structures around pits and infrastructure where reinstatement of creeks over backfilled pits is deemed inappropriate.	Permanent surface water diversion structures, rather than reinstatement of creeks following backfill of mine pits and decommissioning of mine infrastructure.
Operational elements				
Mineral Resources	Figure 5	Up to 600Mt from Bedded Marra Mamba Ore	Increase of 405Mt of ore up to 1,005Mt	Up to 1,005Mt Ore
Depth of pit	Figure 5	100m nominal	Increase by 20m for a total up to 120m nominal depth	120m nominal depth
Dewatering volumes[2]	Figure 5	Up to 396GL for Stage 1 and Stage 2 mine dewatering (peak rate of 37GL/a)	Increase of 230GL over life of mine for total of up to 626GL for the Life of Mine dewatering (increase of 28GL/a for a peak rate of 65GL/a)	Up to 626GL for the Life of Mine dewatering (peak rate of 65GL/a)
Saline water sources[1] to be disposed to Evaporation Ponds	Figure 5	36GL total for Stage 1 and Stage 2	Surplus saline water to be disposed to Evaporation Ponds (proposed up to 540ha)	Surplus saline water to be disposed to Evaporation Ponds (proposed up to 540ha)
Saline water sources[1] to be used for dust suppression	Figure 5	Up to 3.7GL/a for Stage 1 and Stage 2	Increase of 3.7GL for a total of up to 7.4GL/a of surplus water to be used for dust suppression (up to 50,000mg/L total dissolved solids (TDS)).	Up to 7.4GL/a of surplus water to be used for dust suppression (up to 50,000mg/L TDS).
Saline water sources[1] (up to – 30,000mg/L TDS to be disposed to recharge basins and/or re-Injection Volumes	Figure 5 and Figure 6	Up to 55GL/a for a period of up to 2 years	Increase of 453GL for a total of up to 508GL surplus water (up to – 50,000mg/L TDS) to be disposed of to re-injection bores (MAR) for remaining LOM. Locations for re-injection are to include SWIB, Mine Borefield, Remote MAR Borefield and Southern Borefield	508GL surplus water (up to – 50,000mg/L TDS) to be disposed of to re-injection bores (MAR) for remaining LOM.
Water Supply[2]	Figure 5 and Figure 6	Water from the mine and advanced dewatering would be used under MS 824 150GL from the remote borefield	Water from mine and advanced dewatering would be used. Up to 150GL from the Southern Borefield	Water from mine and advanced dewatering would be used. Up to 150GL from the Southern Borefield

Element	Location	Approved extent (under MS 824 and MS 829)	Proposed change (this Proposal)	Proposed Extent (revised Proposal)
		48GL from mine dewatering under MS 829		
Emissions	Figure 5 and Figure 6	280,000tCO_2 equivalent per annum	Increase of 170,000tCO_2 equivalent per annum for a total of 450,000tCO_2 equivalent per annum	450,000tCO_2 equivalent per annum

Notes:

1. Saline water sources include dewatering, reverse osmosis plant/s and decant from tailings storage facility.
2. Waters licences have been issued on an annualised volume whilst this table references LOM volumes.

3 Preliminary Key Environmental Factors and Required Work

The preliminary key environmental factors for the environmental review are:

- Flora and Vegetation;
- Subterranean Fauna;
- Terrestrial Fauna;
- Inland Waters; and
- Air Quality

Table 4 outlines the work required for each preliminary key environmental factor and contains the following elements for each factor:

- EPA factor and EPA objective for that factor.
- Relevant activities – the proposal activities that may have a significant impact on that factor.
- Potential impacts and risks to that factor.
- Required work for that factor.
- Relevant policy and guidance – EPA (and other) guidance and policy relevant to the assessment.

Table 4 – Preliminary key environmental factors and required work

Flora and Vegetation	
EPA Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Relevant Activities	Clearing of native vegetation, groundwater abstraction, saline water or decant water use for dust suppression disposal and groundwater reinjection
Potential impacts and risks	Direct clearing of 5,995ha of vegetation. Indirect impacts from: • Decline in health or change in vegetation composition; • Fragmentation of vegetation; • Introduction and spread of weeds; and • Changes to groundwater flows or quality.
Required work	1. A Vegetation Condition Mapping survey within M46/518 and M46519 will be conducted to determine Areas of Good to Very Good vegetation to be affected by the Revised Proposal in accordance with the requirements of Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment, December 2016. 2. Identify and characterise the flora and vegetation in accordance with the requirements of Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment, December 2016. Survey should be designed to inform local and regional context. 3. For surveys previously undertaken of the Revised Proposal and adjacent areas, demonstrate how these surveys are relevant and representative of the development envelope and if they are consistent with EPA policy and guidance, and summarise their information (including but not limited to, year of survey (eg quadrats, relevees, transects, targeted flora and fauna searches), type of survey effort, time and seasonally constraints) in a consolidated report. All conservation significant flora and vegetation will be mapped and provided in shapefile format with relevant information included in the attribute tables. Any survey reports provided will be accompanied by IBSA Data packages prepared in accordance with EPA guidance where the guidelines apply. Ensure database searches and taxonomic identifications are up-to-date. All surveys will be appended to the environmental review documentation. 4. Provide a map of the survey effort applied in relation to the study area and development envelope, identifying the direct and indirect impact areas. Survey polygons will be provided in shapefile format with relevant information included in the attribute tables. 5. Provide a map displaying the current and proposed conservation areas nearby (including but not limited to the areas identified for consideration for the proposed Fortescue Marsh National Park as identified under the State Government's Plan for our Park initiative). 6. Identify and describe the vegetation and significant flora species including groundwater dependent ecosystems that are likely to be present within the development envelope. Include an analysis of the significance of flora and vegetation in local, regional and State contexts as appropriate in accordance with the relevant guidance. 7. Determine whether any flora species or vegetation identified is consistent with the classification of any Western Australian *Biodiversity Conservation Act 2016* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* listed ecological community, including vegetation listed as priority or threatened by DBCA. 8. Provide maps depicting the recorded locations of flora and vegetation in relation to the development envelope in accordance with the EPA guidelines. 9. Undertake an assessment of specific impacts from the proposal on conservation significant values. 10. Provide a quantitative assessment of impact: • For significant flora, this includes; o number of individuals and populations in a local and regional context' o numbers and proportions of individuals and populations directly or potentially indirectly impacted, and

- numbers/proportions/populations currently protected within the conservation estate (where known).

- For all vegetation units (noting threatened and priority ecological communities and significant vegetation) this includes;
  - area (in hectares) and proportions directly or potentially indirectly impacted, and
  - proportions/hectares of the vegetation unit currently protected within conservation estate (where known).

11. Outline any potential impacts to Fortescue Marsh.
12. Review and revise the current Roy Hill Iron Ore Vegetation Management Plan (OP-REP-00363) in relation to the requirements of condition 6 of MS 824 and 829 and condition 7 of MS 979 and condition 9 of MS 980 to apply to the whole proposal. This Management Plan will be prepared in accordance with the Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2016) and will outline the approach to monitoring and managing vegetation health at the Roy Hill Mine.
13. Provide a report that details the likely success of future rehabilitation activities in establishing self-sustaining areas of rehabilitation, taking into account:
    - evidence of success of rehabilitation undertaken to date in the region;
    - relevant contemporary scientific evidence;
    - the types of area to be rehabilitated; and
    - the scale of rehabilitation activities.
14. Provide a detailed description of the cumulative impacts associated with the Revised Proposal, including direct impacts from clearing, and indirect impacts from resulting from Proposal activities such as groundwater mounding, saline water for dust suppression, changes in water quality, spread of weeds, fragmentation of vegetation, altered fire regime, and dust.
15. Discuss, and determine significance of, potential direct, indirect (such as dust, downstream impacts, saline water for dust suppression, weed invasion, etc) and cumulative impacts (including in relation to the existing project) to flora and vegetation as a result of the Revised Proposal at a local and regional level.
16. Prepare a Mine Closure Plan, consistent with DMP and EPA Guidelines for Preparing Mine Closure Plans (2015), which includes methodologies to ensure progressive rehabilitation of disturbed land meets closure objectives, including vegetation composed of native species of local provenance.
17. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to flora and vegetation during and post mining.
18. Discuss management measures, outcomes/objectives sought to ensure residual impacts (direct and indirect) are not greater than predicted.
19. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and the WA Environmental Offsets Guidelines (2014, or any subsequent revisions).
20. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines (or any subsequent revisions).
21. Where a contribution to the Pilbara Environmental Offsets Fund is proposed to offset the significant residual impacts, provide an impact reconciliation procedure prepared in accordance with the Instruction on how to prepare *Environmental Protection Act 1986* Part IV Reconciliation Procedures and Impact Reconciliation Reports and the Template for *Environmental Protection Act 1986* Part IV Reconciliation Procedure (or any subsequent revisions).
22. Maps and spatial data should be provided which defines the following areas across the entire development envelope for the revised proposal and any other areas where impacts (direct and indirect) are predicted to occur:

- Existing and/or already approved clearing (attributed with the relevant approval, such as the Ministerial Statement number or Native Vegetation Permit reference)
- Vegetation condition (e.g. completely degraded, degraded, poor, good, very good, excellent)
- Specific flora types proposed to be offset (e.g. riparian vegetation, priority ecological community etc)

	• Previous or existing offsets, if relevant. 23. Demonstrate and document in the ERD how the EPA's objective for this factor can be met.
Relevant Policy and Guidance	EPA • 2013 *Environmental and Water assessments relating to mining and mining related activities in the Fortescue Marsh Management Area* • 2016 *Environmental Factor Guideline – Flora and Vegetation* • 2016 *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* • *2016 Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans*. • 2016 *Statement of Environmental Principles, Factors and Objectives* • 2016 *Instructions on how to prepare an Environmental Review Document* • 2014 *Cumulative environmental impacts of development in the Pilbara region* (Advice under s16e of the EP Act) Other policy and guidance • 2011 WA Environmental Offsets Policy, Government of Western Australia • 2014 WA Environmental Offsets Guidelines, Government of Western Australia • 2017 *Pilbara Conservation Strategy,* Government of Western Australia • 2015 Guidelines for Preparing Mine Closure Plans, EPA and DMIRS
Subterranean Fauna	
EPA Objective	To protect subterranean fauna so that biological diversity and ecological integrity are maintained
Relevant Activities	Groundwater abstraction and groundwater reinjection
Potential impacts and risks	Direct loss of stygofauna through: • removal of habitat as a result of dewatering during operations; and • changes in salinity of the existing groundwater aquifers as a result of abstraction and re-injection Direct loss of troglofauna habitat via flooding due to rising groundwater levels resulting from re-injection
Required work	24. Complete a troglofauna survey of the SWIB due to expected groundwater mounding and the presence of suitable habitat for troglofauna in accordance with EPA guidelines. Any survey reports provided will be accompanied by IBSA Data packages prepared in accordance with EPA guidance. 25. Update subterranean fauna desktop assessment to include life of mine water management strategy. 26. Describe the characteristics of subterranean fauna habitat that may be impacted directly and indirectly by implementation of the proposal during both construction and operations, and describe the significance of these values in a local and regional context. Include relevant geological and hydrological information to determine habitat suitability and connectivity, including inside and outside the impact areas. 27. Undertake an assessment of specific impacts from the proposal on conservation significant values, if identified. 28. Provide figure(s) and maps showing the extent of subterranean fauna habitat in relation to the proposal and species distributions. 29. For species which are likely to be impacted, provide information, including maps of habitat extent and an appropriate explanation of the likely distribution of species within those habitats including evidence to demonstrate whether there is habitat connectivity. 30. If found, provide a detailed description of the potential direct, indirect and cumulative impacts to conservation significant subterranean fauna within the Revised Proposal area and on a regional scale. 31. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to subterranean fauna.

	32. Discuss management measures, outcomes/objectives sought to ensure residual impacts (direct and indirect) are not greater than predicted. 33. Describe the residual impacts for the proposal and analyse these impacts to identify and detail any that are significant. Quantify the extent of direct, indirect and cumulative impacts, including percentages, of habitat types to be disturbed or otherwise impacted. 34. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and the WA Environmental Offsets Guidelines (2014, or any subsequent revisions).) 35. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines (or subsequent revisions). 36. Where a contribution to the Pilbara Environmental Offsets Fund is proposed to offset the significant residual impacts, provide an impact reconciliation procedure prepared in accordance with the Instruction on how to prepare *Environmental Protection Act 1986* Part IV Reconciliation Procedures and Impact Reconciliation Reports and the Template for *Environmental Protection Act 1986* Part IV Reconciliation Procedure (or any subsequent revisions). 37. Maps and spatial data should be provided which defines the following areas across the entire development envelope for the revised proposal and any other areas where impacts (direct and indirect) are predicted to occur: • Existing and/or already approved clearing (attributed with the relevant approval, such as the Ministerial Statement number or Native Vegetation Permit reference) • Specific fauna habitats of the species proposed to be offset (attributed with the habitat type) • Previous or existing offsets, if relevant. 38. Demonstrate and document in the ERD how the EPA's objective for this factor can be met.
Relevant Policy and Guidance	EPA • 2016 *Environmental Factor Guideline – Subterranean Fauna* • 2016 *Technical Guidance - Subterranean Fauna Survey* • 2016 *Technical Guidance - Sampling Methods for Subterranean Fauna* • 2016 *Statement of Environmental Principles, Factors and Objectives* • 2016 *Instructions on how to prepare an Environmental Review Document* • 2014 *Cumulative environmental impacts of development in the Pilbara region* (Advice under s16e of the EP Act) • 2018 *Instructions for preparing data packages for the Index of Biodiversity Surveys for Assessments* Other policy and guidance • 2011 WA *Environmental Offsets Policy*, Government of Western Australia • 2014 WA *Environmental Offsets Guidelines*, Government of Western Australia • 2017 *Pilbara Conservation Strategy,* Government of Western Australia • 2015 Guidelines for Preparing Mine Closure Plans, EPA and DMIRS
Terrestrial Fauna	
EPA Objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Relevant Activities	Clearing of native vegetation, groundwater abstraction, saline water or decant water use for dust suppression disposal, groundwater reinjection, altered fire regimes and loss from vehicle strikes.
Potential impacts and risks	Direct loss of fauna individuals through impacts resulting from ground disturbance machinery or vehicle movements Direct impact on habitat resulting from clearing activities Indirect impacts, including a decline in health and/or change in habitat composition, arising from: • dust deposition • saline water disposal for dust suppression; • groundwater abstraction or re-injection; • alteration of surface water flows;

	• introduction and spread of weeds; and • altered fire regimes. Direct loss of, or injury to, individual fauna due to presence of water storage facilities and trenching for burial of pipelines Direct loss of SRE habitat as a result of reduced habitat, caused by clearing and ground disturbance activities Indirect loss of fauna as a result of increased feral cat activity, which can arise from • the permanent presence of infrastructure (providing shade, water and food source); • an increase in vermin prey (which accesses food waste) for feral cats; • decrease in wild dog numbers arising from onsite dog control activities; and • easier access to remote areas such as the mine via linear infrastructure (provides easier travel corridors).
Required work	39. Provide a desktop review and analysis of all surveys of the Revised Proposal area including maps of all the survey areas, the year, type of survey (quadrats, releves, transects, targeted flora and fauna searches), effort, timing, seasonal conditions) undertaken in accordance with EPA Policy and Assessment, Survey guidelines for Australia's threatened mammals. EPBC Act survey guidelines 6.5 (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2011), Survey Guidelines for Australia's Threatened Bats. EPBC Act survey guidelines 6.1 (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2010); and Survey guidelines for Australia's threatened reptiles. EPBC Act survey guidelines 6.6 (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2011). The study should include: • a justification of how those surveys are relevant and representative of the development envelope and if they were carried out using methods consistent with the EPA policy; and • a comprehensive listing of vertebrate fauna and short-range endemic (SRE) invertebrate fauna known or likely to occur in the habitats present, and identification of conservation significant fauna species likely to occur in the area. 40. Provide a map of the survey effort applied in relation to the study area and development envelope, identifying the direct and indirect impact areas. Survey polygons will be provided as in shapefiles format with relevant information included in the attribute tables. Any survey reports provided will be accompanied by IBSA Data packages prepared in accordance with EPA guidance where the guidelines apply. 41. Specify any MNES being assessed as part of the accredited assessment as likely or known to occur within a 5-kilometre radius surrounding the revised development envelope. This includes the location of the nearest known roosting sites for Ghost Bat and Pilbara leaf-nosed bat. 42. For each relevant conservation significant species, identified as likely to occur within the Revised Proposal area, provide: • baseline information on distribution (including known occurrences), ecology, and habitat preferences at both the site and regional levels; • information on the conservation value of each habitat type from a local and regional perspective, including the percentage representation of each habitat type on site in relation to its local and regional extent; • size and the importance of the population from a local and regional perspective and potential percentage loss of the conservation significant species locally due to loss of habitat; • maps illustrating the known recorded locations of conservation significant species in relation to fauna habitat and the proposed disturbance and areas to be impacted. 43. Prepare a Mine Closure Plan, consistent with DMP and EPA Guidelines for Preparing Mine Closure Plans (2015) which includes methodologies to ensure progressive rehabilitation of disturbed land meets closure objectives. 44. Undertake an assessment of specific impacts from the proposal on conservation significant values. 45. Identify the fauna habitat types within and outside the areas of impact. Consider habitat types that provide important ecological function within the proposal area (e.g. geological features

	which may support unique ecosystems). Maps of fauna habitat types and habitat types with important ecological function will be included. 46. Discuss known existing threats to the species, with reference to relevant impacts from the proposed action (including taking into consideration any relevant guidelines, policies, plans and statutory provisions). 47. Identify, describe and quantify the potential residual impacts (direct, indirect and cumulative) to fauna assemblages, habitats, significant species, that may occur following implementation of the proposal after considering and applying avoidance and minimisation measures, in a local and regional context. Provide a table of the proportional extents of each habitat within the study area and Development Envelope, and the predicted amount to be directly and indirectly impacted. This assessment will outline if any MNES listed bat roosting sites may be impacted and include an assessment of any impacts to terrestrial fauna at Fortescue Marsh. 48. Develop a fauna management plan to apply to the Revised Proposal. This Management Plan will be prepared in accordance with the Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2016) and Environmental Management Plan Guidelines (DoEE, 2014) and will outline the approach to monitoring and managing vegetation health at the Roy Hill Mine. This Management Plan will outline Roy Hill's approach to managing environmental impacts on conservation significant fauna at the Roy Hill Mine. This will include management and monitoring of MNES species. 49. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to terrestrial fauna. 50. Demonstrate that the proposed action is not inconsistent with any relevant policy and guidance the proposed action is not inconsistent with any relevant Recovery Plan, Threat Abatement Plan and conservation advices. 51. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and WA Environmental Offset Guidelines (2014, or any subsequent revisions) and the EPBC Environmental Offsets Policy for MNES. 52. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines (or any subsequent revisions) and the EPBC Act Environmental Offsets Policy for MNES. 53. Where a contribution to the Pilbara Environmental Offsets Fund is proposed to offset the significant residual impacts, provide an impact reconciliation procedure prepared in accordance with the Instruction on how to prepare *Environmental Protection Act 1986* Part IV Reconciliation Procedures and Impact Reconciliation Reports and the Template for *Environmental Protection Act 1986* Part IV Reconciliation Procedure (or any subsequent revisions). 54. Maps and spatial data should be provided which defines the following areas across the entire development envelope for the revised proposal and any other areas where impacts (direct and indirect) are predicted to occur: • Existing and/or already approved clearing (attributed with the relevant approval, such as the Ministerial Statement number or Native Vegetation Permit reference) • Vegetation condition (e.g. completely degraded, degraded, poor, good, very good, excellent) • Specific fauna habitats of the species proposed to be offset (attributed with the habitat type e.g. denning, roosting, foraging etc) • Specific flora types proposed to be offset (e.g. riparian vegetation, priority ecological community etc) • Previous or existing offsets, if relevant. 55. Demonstrate and document in the ERD how the EPA's objective for this factor can be met.
Relevant Policy and Guidance	EPA • 2016 *Environmental Factor Guideline – Terrestrial Fauna* • 2016 *Technical Guidance Terrestrial Fauna Surveys Vegetation* • 2016 *Technical Guidance Sampling Methods for Terrestrial Vertebrate Fauna* • 2016 *Statement of Environmental Principles, Factors and Objectives* • 2016 *Instructions on how to prepare an Environmental Review Document*

	• 2014 *Cumulative environmental impacts of development in the Pilbara region* (Advice under s16e of the EP Act) • *2016 Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EPA, 2016). Other policy and guidance • 2011 WA *Environmental Offsets Policy*, Government of Western Australia • 2014 WA *Environmental Offsets Guidelines*, Government of Western Australia • 2017 *Pilbara Conservation Strategy,* Government of Western Australia • 2015 Guidelines for Preparing Mine Closure Plans, EPA and DMIRS DoEE • Threatened Species Scientific Committee (2016). Conservation Advice *Pezoporus occidentalis* night parrot. Canberra: Department of the Environment. • Threatened Species Scientific Committee (2018). Conservation Advice *Polytelis alexandrae* princess parrot. Canberra: Department of the Environment and Energy. • Department of Sustainability, Environment, Water, Population and Communities (2013). Approved Conservation Advice for *Rostratula australis* (Australian painted snipe) Canberra: Department of Sustainability, Environment, Water, Population and Communities. • Threatened Species Scientific Committee (2016). Conservation Advice *Macrotis lagotis* greater bilby. Canberra: Department of the Environment. • Pavey, C. (2006). National Recovery Plan for the Greater Bilby *Macrotis lagotis*. Northern Territory Department of Natural Resources, Environment and the Arts. • Threatened Species Scientific Committee (2005). Commonwealth Listing Advice on Northern Quoll (*Dasyurus hallucatus*). • Hill, B.M. & S.J. Ward (2010). National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*. Department of Natural Resources, Environment, The Arts and Sport, Darwin. • Threatened Species Scientific Committee (2016). Conservation Advice *Macroderma gigas* ghost bat. Canberra: Department of the Environment. • Threatened Species Scientific Committee (2016). Conservation Advice *Rhinonicteris aurantia* (Pilbara form) (Pilbara Leaf-nosed Bat). Canberra: Department of the Environment. • Department of the Environment, Water, Heritage and the Arts (2008). Approved Conservation Advice for *Liasis olivaceus barroni* (Olive Python- Pilbara subspecies) Canberra: Department of the Environment, Water, Heritage and the Arts • Department of the Environment (2015). Conservation Advice *Calidris ferruginea* curlew sandpiper. Canberra: Department of the Environment. • Commonwealth of Australia (2015). Wildlife Conservation Plan for Migratory Shorebirds Canberra, ACT: Department of the Environment. • Department of the Environment (2015). Threat abatement plan for predation by feral cats. Canberra, ACT • Department of the Environment and Energy (2016). Threat abatement plan for competition and land degradation by rabbits. Canberra, ACT. • Department of Sustainability, Environment, Water, Population and Communities (2011). Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads. Canberra, ACT: Commonwealth of Australia. • 2014 *Environmental Management Plan Guidelines*
Inland Waters	
EPA Objective	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Relevant Activities	Groundwater abstraction, saline water or decant water use for dust suppression disposal, groundwater reinjection, alteration to surface water flows, landforms leaching.

Potential impacts and risks	The following potential impacts to Inland Waters from the implementation of the Revised Proposal have been identified: • Unacceptable erosion of WRL leading to increased sediment in surface waters • Changes to surface water flows and erosion • Contamination of surface and groundwater resulting from mining and associated activities • Contamination of surface and groundwater from leaching of waste rock landforms • Contamination of groundwater from leaching of in-pit tailings storage facility • Groundwater abstraction for water supply and mine dewatering resulting in groundwater drawdown leading to modifications to groundwater flows • Mounding of groundwater from recharge, re-injection of excess water and in-pit TSF leading to modification to groundwater and surface water flows • Changes in the quality of the groundwater from re-injection
Required work	56. Characterise the baseline hydrology and hydrogeological regimes and water quality, both in a local and regional context, including but not limited to, water levels, water chemistry, stream flows, flood patterns, and water quantity and quality. 57. Provide a detailed description of the design and location of the Revised Proposal with the potential to impact surface water or groundwater. 58. Provide an update of the conceptual model of the surface and groundwater systems incorporating the results of monitoring conducted subsequent to the short term approval for Managed Aquifer Reinjection. 59. Provide a conceptual mine water balance over the life of the proposal to discuss the capacity to reuse surplus mine dewater. 60. Discuss the potential environmental impacts and benefits of identified surplus water management options (i.e. discharge of excess mine dewater, reuse on site, local water supply, aquifer recharge etc.) and discuss the most appropriate water management strategy for the proposal. 61. Analyse, discuss and assess surface water and groundwater impacts. The analysis should include but not be limited to: • changes in groundwater levels and changes to surface water flows associated with the proposal; • the nature, extent, and duration of impacts and potential direct and indirect impacts on the environment including impacts to MNES or MNES habitat and Fortescue Marsh and • cumulative impacts with other projects and referred proposals, for which relevant information is publicly available. 62. Undertake an assessment of specific impacts from the proposal on conservation significant values. 63. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to Inland Waters Environmental Quality. 64. Undertake an decant water disposal risk assessment to assess risks of reinjection to MAR and dust suppression. 65. Undertake an assessment of likelihood of encountering Potentially Acid Forming (PAF) materials through mining or dewatering and outline direct or indirect impacts to water quality. 66. Outline proposed management strategies to manage Acid Mine Drainage (AMD) risk. 67. Prepare a Closure Plan consistent with DMP and EPA Guidelines for Preparing Mine Closure Plans (2015), which includes criteria to ensure hydrological regimes and the quality of groundwater and surface water resources are suitable so that any dependant environmental values are maintained post closure. 68. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and the WA Environmental Offsets Guidelines (2014, or any subsequent revisions). 69. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines (or subsequent revisions).

	70. Where a contribution to the Pilbara Environmental Offsets Fund is proposed to offset the significant residual impacts, provide an impact reconciliation procedure prepared in accordance with the Instruction on how to prepare *Environmental Protection Act 1986* Part IV Reconciliation Procedures and Impact Reconciliation Reports and the Template for *Environmental Protection Act 1986* Part IV Reconciliation Procedure (or any subsequent revisions). 71. Maps and spatial data should be provided which defines the following areas across the entire development envelope for the revised proposal and any other areas where impacts (direct and indirect) are predicted to occur: • Existing and/or already approved clearing (attributed with the relevant approval, such as the Ministerial Statement number or Native Vegetation Permit reference) • Vegetation condition (e.g. completely degraded, degraded, poor, good, very good, excellent) • Specific flora types proposed to be offset (e.g. riparian vegetation, priority ecological community etc) • Previous or existing offsets, if relevant. 72. Demonstrate and document in the ERD how the EPA's objective for this factor can be met.
Relevant Policy and Guidance	EPA • 2013 *Environmental and Water assessments relating to mining and mining related activities in the Fortescue Marsh* • 2018 *Environmental Factor Guideline – Inland Waters* • 2016 *Instructions on how to prepare an Environmental Review Document* • 2014 *Cumulative environmental impacts of development in the Pilbara region* (Advice under s16e of the EP Act) DoW • 2010 Pilbara - *Regional Water Plan 2010* - 2030 • 2013 *Western Australian Water in Mining Guideline* ANZECC/ARMCANZ • 2000 *National Water Quality Management Strategy* State Government • 2001 *State Water Quality Management Strategy* • 2017 *Pilbara Conservation Strategy* EPA/DMIRS • 2015 Guidelines for Preparing Mine Closure Plans, EPA and DMIRS
Air Quality	
EPA Objective	To maintain air quality and minimise emissions so that environmental values are protected.
Relevant Activities	Operation of machinery and plant and power generation
Potential impacts and risks	Generation of greenhouse gases through power generation or combustion of fossil fuels.
Required work	73. Estimate greenhouse gas emissions direct and indirect from the Revised Proposal for the Roy Hill Iron Ore Mine and assess the relative contribution to regional, state, national and international greenhouse gas emissions. 74. Based on the greenhouse gas emission emissions estimates, benchmark the emissions from the Revised Proposal for the Roy Hill Iron Ore Mine against comparable iron ore developments. 75. Identify and justify contemporary best practice management and mitigation measures that will be implemented to reduce greenhouse gas emissions and improve operational efficiency, including: • Summarising how the mitigation hierarchy will be addressed including benchmarking against other facilities where appropriate and where public information is available; • Identifying existing greenhouse gas management and mitigation mechanisms that have been successfully implemented for current operations and that will be continued; and

	• Identifying relevant contemporary best practice management and mitigation measures, including all reasonable and practicable emission reduction equipment and technologies, that can be implemented over time. 76. Demonstrate application of the mitigation hierarchy to avoid and minimise impacts to Air Quality. 77. Demonstrate and document in the ERD how the EPA's objective for this factor can be met.
Relevant Policy and Guidance	EPA • 2016 *Environmental Factor Guideline – Air Quality* • 2016 *Instructions on how to prepare an Environmental Review Document* • 2016 *Statement of Environmental Principles, Factors and Objectives* • 2014 *Cumulative environmental impacts of development in the Pilbara region* (Advice under s16e of the EP Act) Other Policy and Guidance • 2007 *National Greenhouse and Energy Reporting Act* • 2017 *Pilbara Conservation Strategy* • 2019 *Greenhouse Gas Emissions Policy for Major Projects (State Emissions Policy), Government of Western Australia*

4 Other Environmental Factors or Matters

The EPA has identified the following other environmental factors or matters relevant to the proposal that must be addressed during the environmental review and discussed in the ERD.

1) Social Surroundings

- Characterise the heritage and cultural values of the development envelopes and any other areas that may be indirectly impacted to identify sites of significance and their relevance within a wider regional context;
- Provide detail on any consultation undertaken with Traditional Owners and incorporate feedback on management and mitigation measures that could be implemented over time to reduce impacts to Aboriginal heritage; and
- Assess the impacts of the proposal on heritage sites and/or cultural associations as a result of implementation of the proposal, including those arising from changes to the environment which may impact on ethnographic and archaeological heritage significance.
- Any archaeological and ethnographic heritage surveys of the development envelope will be provided to DPLH, once the finalised reports have been approved by the Traditional Owners.

RHIO is aware that other factors or matters may be identified during the course of the Public Environmental Review that were not apparent when this draft ESD was prepared. If this situation arises, RHIO will consult with the EPA to determine whether these factors and/or matters are to be addressed in the ERD and if so, to what extent.

5 Stakeholder Consultation

RHIO will consult with stakeholders who are affected by, or are interested in the Revised Proposal, including the decision-making authorities (see section 6), other relevant state (and Commonwealth) government agencies and local government authorities, the local community and environmental non-government organisations.

RHIO will document the following in the Environment Review Document:

- identified stakeholders
- the stakeholder consultation undertaken and the outcomes, including decision-making authorities' specific regulatory approvals and any adjustments to the proposal as a result of consultation
- any future plans for consultation.

6 Decision-making authorities

At this stage, the EPA has identified the decision-making authorities for the Revised Proposal as outlined in Table 5. Additional decision-making authorities may be identified during the assessment.

Table 5 - Decision-making authorities

Decision-making authority	Relevant legislation
Minister for Environment	*Environmental Protection Act 1986*
Minister for Water	*Rights in Water and Irrigation Act 1914*
Minister for Mines and Petroleum	*Mining Act 1978*
Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972*
Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	*Biodiversity Conservation Act 2016*
Chief Executive Officer, Department of Water and Environmental Regulation	*Environmental Protection Act 1986*
A/Executive Director: Resource and Environmental Compliance Division Department of Mines, Industry Regulation and Safety	*Environmental Protection Act 1986*
Chief Dangerous Goods Officer, Department of Mines, Industry Regulation and Safety	*Dangerous Goods Safety Act 2004*
State Mining Engineer, Department of Mines, Industry Regulation and Safety	*Mines Safety and Inspection Act 1994*

7 Abbreviations

Table 6 – Abbreviations

Abbreviation	Definition
AMD	Acid Mine Drainage
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERD	Environmental Review Document
ESD	Environmental Scoping Document
LOM	Life of Mine
MAR	Managed Aquifer Recharge
MNES	Matters of National Environmental Significance
MS	Ministerial Statement
mtpa	million tonnes per annum
PAF	Potentially Acid Forming
RHIO	Roy Hill Iron Ore Pty Ltd
RO	reverse osmosis
SWIB	South West Injection Borefield
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility
WRL	Waste Rock Landforms