Browns Range Heavy Rare Earths Project - Heavy Rare Earth Bagging Facility and Concentrate Storage Area

Application Number: **02869** Commencement Date: **09/04/2025** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Browns Range Heavy Rare Earths Project - Heavy Rare Earth Bagging Facility and Concentrate

1.1.2 Project industry type *

Mining

1.1.3 Project industry sub-type

Other

1.1.4 Estimated start date *

01/09/2025

1.1.4 Estimated end date *

30/09/2038

1.2 Proposed Action details

1.2.1 Provide an overview of the proposed action, including all proposed activities. *

Northern Minerals Limited (NTU) is seeking to develop a heavy rare earth (HRE) concentrate bagging and storage facility (Proposed Action) at the Browns Range Project (Broader Project) located approximately 160 kilometres (km) southeast of Halls Creek, in the Kimberley region of Western Australia (WA) (Att_1A_Figure 1 - Regional Location). The Proposed Action covers an area of approximately 4.5 ha located within the boundary of the process plant (Att_1B_Figure 2 - Project Area).

The Proposed Action in this referral is a small component of the Broader Project, which was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth; EPBC Act) and was determined to be "not a controlled action" (EPBC 2014/7253 and EPBC 2019/8446).

NTU has recently entered into a partnership with Iluka Resources (Iluka), resulting in a change to the mineral processing method to be employed at the Project. The processing plant will no longer include a hydrometallurgical component (this will be undertaken at Iluka's Eneabba facility), which means that more of the material with higher radioactivity remains in the ore, resulting in increased radioactivity of the HRE concentrate product to be stored onsite. The radioactivity of the tailings discharged to the onsite tailings storage facility (TSF) is subsequently reduced. All other aspects of the Project are unchanged from that determined not to be a controlled action under the EPBC Act and are described here to provide context only.

Mineral Processing

The ore will be mined using a combination of open pit and underground mining methods and processed on site. The process plant will process up to 700,000 tonnes per annum (tpa) of ore via a combination of crushing, ore sorting, magnetic separation and flotation, producing approximately 17,500 tpa of concentrate at an average grade of 25% Total Rare Earths Oxide (TREO) over the 10 year (approximate) mine life. The HRE concentrate will be dried and packaged onsite and transported to Eneabba for downstream processing (Att_1C_Figure 3 - Project Process flow diagram).

HRE Concentrate Storage and Bagging Facility

The bagging facility (Att_1D_Figure 4 - Concentrate Drying Bagging Facility) is enclosed. The floor is concrete with self-contained drainage. To ensure satisfactory material flow of the HRE concentrate, it will be dried using a direct diesel heated spiral flash dryer to achieve an approximate 10% weight per weight (% w/w) moisture. The dryer discharge stream will exit the top of the dryer and will be pneumatically conveyed to the dryer baghouse filter to separate the dried solids and gas stream. The solids free gas stream will be drawn into the dryer exhaust stack and safely vented to atmosphere.

A semi-automated bagging system will deposit the dried HRE concentrate into lined 1.5 tonne (t) Flexible Intermediate Bulk Container (FIBC) bags. The FIBC bags will be sampled for quality control assays, sealed and stored prior to shipment.

FIBC bags will be placed onto specialised pallets (Att_1E_Figure 5 - Pallet Example) allowing the bags to be safely moved using a forklift.

The storage area will be constructed with compacted locally sourced gravel material and will have clear boundary demarcation and signage for restricted access for workers and mobile equipment. Palleted bags will be stacked, with stacks being limited to 2-bags high.

Bagged product will be exported offsite via double road train to Eneabba.

Radioactive Material

Project ore contains naturally occurring radioactive material (NORM) associated with the Uranium (U) and Thorium (Th) decay chains. A radionuclide deportment assessment conducted by the Australian Nuclear Science and Technology Organisation (ANSTO) in 2014 (Att_2_Radionuclide Deportment Assessment, Section 4.1, pages 4-7) and assays completed during Pilot Plant operations determined secular equilibrium

of U and Th decay chains in all process streams. Tailings from the magnetic separation and flotation circuits are not considered radioactive as the activities of U and Th (and decay progeny) measure less than 1 becquerels per gram (Bq/g).

The HRE concentrate product is considered a radioactive material and will be subject to regulatory control in terms of material handling, storage and disposal as defined by the National Directory for Radiation Protection due to the activities of U and Th (and decay progeny) measuring approximately 14.8 Bq/g and 1.2 Bq/g respectively (Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), 2021).

Approvals for the Pilot Plant required the Broader Project site to be registered under the *Radiation Safety Act 1975* (WA; RS Act) with the Government of Western Australia Radiological Council (Radiological Council) as a premises in which radioactive substances are used, stored or manufactured (registration number RS 73/2012 22222 and RX 76/2018 29487).

Two management plans were developed by NTU and approved by the WA Department of Energy, Mines, Industry Regulation and Safety (DEMIRS):

1. Radioactive Waste Management Plan (RWMP) approved on 19 December 2019 and remains current. The RWMP details how radioactive waste generated by the Pilot Plant will be managed during all phases of the Project (Att_3_Radioactive Waste Management Plan); and
2. Radiation Management Plan (RMP) version 5 approved by DEMIRS in 23 November 2022. The RMP establishes the systems for the management, measurement and control of radiation impacts to workers, the public and dispersion to the environment (Att_4_Radiation Management Plan). Version 5 of the RMP addressed management of the pilot plant including the ore sorter which was the subject of EPBC 2019/8446.

NTU is currently revising the above plans to reflect the changed processing method and resultant changes in the radiological risk profile for tailings and HRE concentrate product.

Product transport will be contracted to a third-party transport company that is appropriately licenced by DEMIRS and the Radiological Council. The transport company will be required to implement their approved Transport Management Plan to identify and manage the risks during HRE concentrate transport from the Broader Project to Eneabba using public road networks.

1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

Yes

1.2.3 Is the proposed action the first stage of a staged development (or a larger project)?

No

1.2.4 Related referral(s)

EPBC Number	Project Title
2014/7253	Browns Range rare earths mine and processing operation project, WA
2019/8446	Browns Range Rare Earths Project, 160km SE of Halls Creek, WA

1.2.5 Provide information about the staged development (or relevant larger project).

The Proposed Action in this referral is a small component of the Broader Project, a heavy rare earth elements (HREE) mine and ore processing facility located approximately 160 km southeast of Halls Creek, WA near the WA / Northern Territory (NT) border. The Broader Project was referred to DCCEEW in 2014 (EPBC 2014/7253) and again in 2019 (EPBC 2019/8446) to determine whether it would be a Controlled Action under the EPBC Act. It was determined in August 2014 and again in February 2020 to be "not a controlled action".

To date, a significantly scaled-down version of the Broader Project has been implemented, commencing operations in 2018. The scaled-down Broader Project was designed as a pilot project involving a six month open cut mining operation, followed by construction, commissioning and operation of a Pilot Plant ore processing facility. The Pilot Plant was approximately 10% of the scale of the proposed full-scale process plant and was operated on and off for four years through to 2022 before being placed into care and maintenance while a definitive feasibility study was conducted on the full scale facility.

The Proposed Action is proposed to be constructed concurrently to the full-scale process plant, following final investment decision targeted during 2025. Current scheduling estimates that the process plant will commence operations in 2027, producing HRE concentrate to be bagged and stored at the Proposed Action.

1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

Commonwealth Government

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The Proposed Action is being referred under the EPBC Act (this application), given potential for impacts to Matters of National Environmental Significance (MNES). The *MNES impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (DCCEEW, 2013) states:

"All nuclear actions, as detailed in section 22 of the Act, should be referred to the Department of the Environment (now DCCEEW) for a decision on whether approval is required."

DCCEEW advised that the calculated radioactivity of HRE Concentrate of 14 Bq/g (Att_24_Aurora Environmental 2023) coupled with the amount of HRE concentrate (worst-case up to 10,000 tonnes for up to five months) proposed to be stored on site trigger the mandatory requirement for referral under the EPBC Act.

Australian Radiation Protection and Nuclear Safety Agency

ARPANSA is the Federal Government agency responsible for protecting the health and safety of people, and the environment, from the harmful effects of ionising and non-ionising radiation.

Whilst radiation safety is a State and Territory function, promotion of uniformity between all Australian jurisdictions is a key Federal objective. The mechanism for this is the Radiation Health Committee (RHC), on which each jurisdiction is represented. The outcome is a range of Codes of Practice (CoP) and Standards for radiation protection developed by ARPANSA, a number of which have been adopted by the Radiological Council.

State Government

Radiation Safety Act 1975 and Radiation Safety (General) Regulations 1983

Responsibility for the RS Act lies with the Radiological Council, the independent statutory authority appointed under section 13 of the Act. The Council advises, and is responsible to, the Minister for Health.

The Project is registered under the RS Act. Registration requires:

- Preparation and approval of a RMP; and
- Appointment of a radiation safety officer.

An RMP details the procedures and practices to be employed by responsible roles and personnel to ensure safety in all dealings with radioactive substances. An RMP has been developed for the Project (Att_4_Radiation Management Plan) and has been in place since 2015. It has been amended for significant changes to infrastructure or operations, such as adding the Pilot Plant, changes to gauges and material processing. Version 6 is the current approved version and accounts for the Pilot Plant being in care and maintenance whilst exploration activities continue.

The Registration and RMP will be amended in the near future to reflect the changed processing method, reduced radioactivity in tailings and increased radioactivity in product (HRE concentrate).

Work Health and Safety Act 2020 and Work Health and Safety (Mines) Regulations 2022

Administered by DEMIRS and supported by a series of radiation protection guidelines "Managing naturally occurring radioactive material (NORM) in mining and mineral processing: Guides" (NORM Guides).

Potential radiation associated with HREE mining will be managed in accordance with relevant guidelines and codes of practice published by the ARPANSA and is subject to control under Chapter 10, Part 10.2, Division 3, Subdivision 3B of the Work Health and Safety (Mines) Regulations 2022 (Mines Regulations).

Mines Regulations: 641L and 641N specify that an RMP is required for processing operations where minerals or radioactive materials having an activity concentration of 1 Bq/g or more are mined at the site and workers at the site are likely to receive doses of radiation in excess of 1 millisieverts (mSv) per year or members of the public are likely to receive doses arising from the mining operations in excess of 0.5 mSv per year.

The Proposed Action will be managed in accordance with an approved RMP, which will be a revised version of Att_4_Radiation Management Plan.

Managing NORM in mining and mineral processing: Guides.

Rare earth ores contain radioactive Th and U, so active radiation control is needed in these mines and processing plants.

DEMIRS co-regulates radiation safety with the Radiological Council. DEMIRS requirements for mine sites reflect the requirements under the RS Act, namely submission of an RMP and appointment of a radiation safety officer.

1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

NTU has a long history of stakeholder engagement since 2008. *Att_1F_ Figure 6 - Broader Project Stakeholder Consultation* provides a visual summary of consultation conducted for the Broader Project. The following stakeholders have been consulted to date or will be consulted with regarding the Proposed Action:

Commonwealth Government

- DCCEEW (regarding submission of this EPBC Act Referral, potential impacts on MNES); and
- Regional Development Australia – Kimberley (Department of Primary Industries and Regional Development).

State Government

- DEMIRS;
- Environmental Protection Authority (EPA);
- Department of Water and Environmental Regulation (DWER); and
- Kimberley Development Commission.

Other

- Shire of Halls Creek;
- Shire of Broome;
- Jaru Aboriginal Corporation (JAC) Registered Native Title Body Corporate (RNTBC);
- Tjurabalan Native Title Land Aboriginal Corporation (TNTLAC) RNTBC;
- Kundat Djaru (Ringer Soak) community; and
- Flora Valley (and Gordon Downs) Stations.

Issues raised and outcomes of consultation that has taken place to date related to nuclear actions are outlined in the attached Stakeholder Consultation Register (Att_5_Stakeholder Consultation Register)and summarised below.

- Six (6) consultation events from 2012 to 2014 prior to EPBC 2014/7253 determined NCA:
    - Community information forums in Halls Creek, Ringer Soak and Wyndham
    - WA government agency briefings
- Twenty-one (21) consultation events from 2014 to 2020 prior to EPBC 2019/8446 determined NCA:
    - Mostly briefings with DCCEEW and WA government agencies regarding impact assessments
    - Community information forums in Halls Creek and Ringer Soak
    - Jaru Native Title Claimants meeting
    - Pastoralist meeting
- Six (6) consultation events post EPBC 2019/8446 determination and prior to the current referral:
    - Addressed pastoralist concerns regarding potential radiation effects on grazing cattle in 2020.
    - Pre-referral engagement with DCCEEW and WA DEMIRS in 2024 and 2025.

1.3.1 Identity: Referring party

Privacy Notice:

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint.

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☑ **Confirm that you have read and understand this Privacy Notice ***

1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	61119966353
Organisation name	NORTHERN MINERALS LIMITED
Organisation address	6005 WA

Referring party details

Name	Julie Mahony
Job title	Manager Environment
Phone	0448955529
Email	jmahony@northernminerals.com.au
Address	Ground Floor, 40 Kings Park Road, West Perth, WA 6005

1.3.2 Identity: Person proposing to take the action

1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

Yes

Person proposing to take the action organisation details

ABN/ACN	61119966353
Organisation name	NORTHERN MINERALS LIMITED
Organisation address	6005 WA

Person proposing to take the action details

Name	Julie Mahony
Job title	Manager Environment
Phone	0448955529
Email	jmahony@northernminerals.com.au
Address	Ground Floor, 40 Kings Park Road, West Perth, WA 6005

1.3.2.14 Are you proposing the action as part of a Joint Venture? *

No

1.3.2.15 Are you proposing the action as part of a Trust? *

No

1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. *

The Broader Project is the first mining and processing operation conducted by NTU. NTU listed on the ASX in November 2006 with a focus on exploring for and developing heavy rare earths prospects. In 2012, NTU announced its maiden Joint Ore Reserves Committee compliant resource estimate at Browns Range and its maiden Ore Reserve estimate in June 2014 with a proposed pathway to production.

In 2018, NTU was granted regulatory approvals to develop the 10%-scale Pilot Plant which it subsequently developed and operated until 2022 when it was elected to put into care and maintenance. Exploration activities have continued throughout these periods.

Over the 17 years since NTU listed on the ASX, there have been only minor incidents which NTU has self-reported to the appropriate regulators. Under Condition 4-6 of Ministerial Statement (MS) 986, NTU is required to prepare and submit compliance reporting in accordance with an approved Compliance Assessment Plan (CAP). The current CAP (Revision 1) for the Project was approved on 5 January 2016. A Compliance Assessment Report (CAR) for the Proposal is submitted annually by NTU. One incident of non-compliance occurred in September 2017, which was identified on 2 December 2017 when a review of recently gathered survey data was undertaken. The incident involved accidental clearing of 0.0078 ha outside of the Development Envelope (along the Development Envelope boundary) at a gravel pit adjacent the mine access road. EPA Services were advised on 11 December 2017. Ground disturbance procedures were followed in this instance, however the operator failed to comply with the Ground Disturbance Permit conditions and demarcated boundaries. A full incident investigation, impact assessment and remedial actions were provided to EPA Services. After reviewing the matter DWER (EPA Services) considered the matter resolved, however NTU were required to provide an update on the rehabilitation of impacted vegetation in each CAR until January 2020. This has been complied with by NTU within each CAR from 2018 to 2020. Monitoring of the rehabilitation areas will continue, however no further formal reporting is required, and the matter is considered fully resolved. Within the subsequent years, NTU has remained compliant with all the implementation conditions set out in MS 986.

NTU manages its activities in accordance with an Environmental and Social Management System (ESMS) (Att_6_Environmental and Social Management System Manual) which in turn will form part of a company Integrated Management System (in development). NTU's Environment Policy (Att_7_Environment Policy) and Community Policy (Att_8_Community Policy) are published on NTU's website in Governance Documents (NTU, 2025).

1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

NTU has an ESMS (Att_6_Environmental and Social Management System Manual), Environment Policy (Att_7_Environment Policy) and Community Policy (Att_8_Community Policy). NTU is currently developing a company Integrated Management System, of which the ESMS will form one component.

Summary of Environment Policy

NTU is committed to contributing to a sustainable future and pursuing a high standard of environmental management throughout its operations. NTU strive for continual improvement of environmental performance, efficient use of resources, and prevention of pollution.

NTU's mining and exploration activities are undertaken with a responsibility to balance economic and operational requirements with a commitment to minimising the impact of activities on natural ecosystems and the environment.

NTU's commitment to the Environment is underpinned by values of caring for the property and environment (Respect), doing the right thing (Integrity), looking out for themselves, others and speaking up (Safety), counting on each other (Accountability), being clear and asking if unsure (Clarity) and being curious and seeking to continuously improve (Innovation).

NTU believe that through implementation of effective policies and procedures, visible leadership, clear communication, and the active involvement of all workers, NTU will achieve the best possible environmental performance.

Summary of Community Policy

NTU recognises that community endorsement is vital to the success of their business and is committed to fostering relationships and making lasting positive contributions to the communities in which they operate.

NTU's mining and exploration activities are undertaken with a responsibility to balance economic and operational requirements with a commitment to minimising the impact of activities on local communities and respecting cultural values and human rights.

NTU's commitment to Community support is underpinned by their values of caring for people (Respect), doing the right thing (Integrity), looking out for themselves, others and speaking up (Safety), counting on each other (Accountability), being clear and asking if you're unsure (Clarity) and being curious and seeking to continuously improve (Innovation).

NTU believe that through implementation of effective policies and procedures, visible leadership, clear communication, and the active involvement of all workers, NTU will achieve the best possible social performance.

Summary of ESMS Manual

The ESMS Manual describes the framework NTU will utilise to:

- Develop adequate measures and controls to minimise and mitigate the potential environmental and social risks and impacts of its products, services, and activities;
- Achieve its environmental and social objectives and targets; and
- Review, evaluate, and continuously improve its environmental and social performance.

The ESMS has been designed to align with the requirements of both the Equator Principles (EP4, 2020) and the International Standards Organisation (ISO) 14001 environmental management systems standard.

Furthermore, NTU is in the process of developing an Integrated Management System to provide the framework for managing Safety, Health, Environment and Quality aspects. The ESMS described in the Manual (Att_6_Environmental and Social Management System Manual), will form a part of the overall NTU Integrated Management System.

1.3.3 Identity: Proposed designated proponent

1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

ABN/ACN	61119966353
Organisation name	NORTHERN MINERALS LIMITED
Organisation address	6005 WA

Proposed designated proponent details

Name	Julie Mahony
Job title	Manager Environment
Phone	0448955529
Email	jmahony@northernminerals.com.au
Address	Ground Floor, 40 Kings Park Road, West Perth, WA 6005

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

ABN/ACN	61119966353
Organisation name	NORTHERN MINERALS LIMITED
Organisation address	6005 WA
Representative's name	Julie Mahony
Representative's job title	Manager Environment
Phone	0448955529
Email	jmahony@northernminerals.com.au
Address	Ground Floor, 40 Kings Park Road, West Perth, WA 6005

Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

Same as Referring party information.

Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

1.4 Payment details: Payment exemption and fee waiver

1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)?

Yes

1.4.2 Select reason for exemption

Small Business

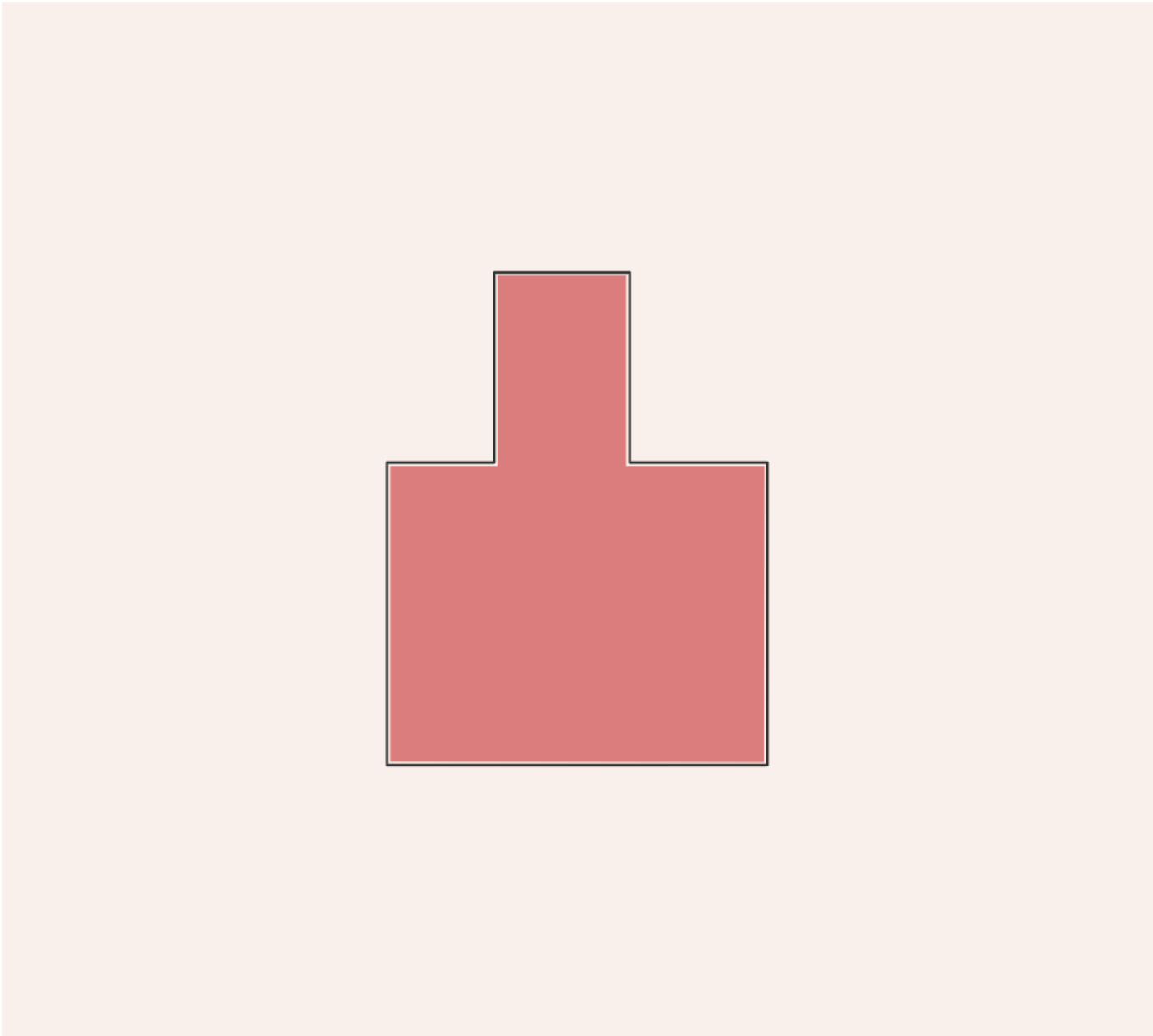
1.4 Payment details: Payment allocation

1.4.11 Who would you like to allocate as the entity responsible for payment?

Person proposing to take the action

2. Location

2.1 Project footprint



Project Area: 1.39 Ha **Disturbance Footprint:** 1.33 Ha

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

160 km southeast of Halls Creek, WA within boundary of Mining Lease M 80/627 issued under t

2.2.2 Where is the primary jurisdiction of the proposed action? *

Western Australia

2.2.3 Is there a secondary jurisdiction for this proposed action? *

No

2.2.5 What is the tenure of the action area relevant to the project area? *

The main mining operations and processing infrastructure for the Broader Project inclusive of the Proposed Action will lie within the boundaries of M 80/627 issued under the Mining Act (Att_1B_Figure 2 Project Area)

3. Existing environment

3.1 Physical description

3.1.1 Describe the current condition of the project area's environment.

Proposed Action

The Proposed Action will be developed within part of the overall process plant boundary, which will be cleared during development of the Broader Project. As a result, there will be no ecological values within the boundary of the Proposed Action. The following provides information about the surrounding environment.

Broader Project and Surrounding Area

The condition of terrestrial vegetation in the Project Area and surrounds was assessed by Mattiske Consulting Pty Ltd (Mattiske Consulting) based on the appropriate condition scale for the Eremaean and Northern Botanical Provinces (Att_9_Flora and Vegetation Assessment, page 32). The vegetation condition of the Project Area, at the time of the Mattiske Flora Surveys (undertaken between the 19th - 26th April 2023, and 7th – 14th August 2023), was considered "Excellent" across the majority of the survey area. The exceptions to this are the "Degraded" S3 community at the northern extent of the survey area, where **Cenchrus ciliaris* was prolific surrounding the abandoned homestead, and cleared areas associated with the pilot plant and accommodation facilities, and tracks and gravel pits. The **Cenchrus ciliaris* infestation around the homestead is likely a result of historical disturbances and cattle movement in the area, and constitutes approximately 0.02% of the survey area. Waste rock landforms adjacent to the pilot plant area were recorded supporting a population of **Calotropis procera* which has subsequently been controlled. This population of **Calotropis procera* had not spread into native vegetation, and did not therefore affect the surrounding vegetation condition rating.

A total of nine introduced (weed) species were recorded within the survey area (Att_9_Flora and Vegetation Assessment, pp 18). One of these, **Calotropis procera* is a declared pest organisms pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act). The remaining eight taxa are permitted under section 11 of the BAM Act. **Calotropis procera* is not assigned a control category under the BAM Act.

In determining the likely impact of the Proposed Action, each part of the definition for Environment (as outlined in Section 528 of the EPBC Act) has been assessed:

1. ecosystems and their constituent parts, including people and communities (refer to sections 3.3 and 4.1.6 of this Referral Document);
2. natural and physical resources (refer to sections 3.2, 3.3, 3.4, 4.1.3, 4.1.4, and 4.1.5 of this Referral Document);
3. the qualities and characteristics of locations, places and areas (refer to section 3.1 of this Referral Document);
4. Heritage values of places (refer to section 3.3, 4.1.1 and 4.1.2 of this Referral Document); and
5. the social, economic and cultural aspects of a thing mentioned in paragraph (a), (b), or (c) (refer to section 3.3 of this Referral Document).

3.1.2 Describe any existing or proposed uses for the project area.

Proposed Action

The Proposed Action will be developed within part of the overall process plant boundary, which will be cleared during development of the Broader Project.

Broader Project and Surrounding Area

Background tenure for the Project Area comprises Unallocated Crown Land and the Gordon Downs pastoral lease. Prior land use included pastoral land use (minor) and cultural use by local indigenous communities. Very little to no grazing activities have occurred in the Project Area historically, due to the marginal grazing quality of the land on the edge of the Tanami Desert.

3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

Proposed Action

The Proposed Action will be developed within part of the overall process plant boundary, which will be cleared during development of the Broader Project. No outstanding natural features or important or unique values will therefore occur within the boundary of the Proposed Action.

Broader Project and Surrounding Area

The closest Department of Biodiversity Conservation and Attractions (DBCA) managed lands to the Project Area include the Ord River Regeneration Reserve, located approximately 100 km north-west, and Wolfe Creek Meteorite Crater National Park, located approximately 120 km to the west-southwest. The closest proposed protected area is the Gardiner Range proposed conservation area, located south and west of the Project (no published boundary could be found).

Proximity of the Project Area from the closest RAMSAR Wetland of International Importance includes Lakes Argyle and Kununurra (250 km north) (DCCEEW, 2021). Proximity of the Project Area from the closest Wetlands of National Importance include Lake Gregory System – WA096 (200 km south-west), and Nongra Lake – NT016 (120 km north- east) (DCCEEW, 2019).

3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

Proposed Action

The Proposed Action will be developed within part of the overall process plant boundary, which will be cleared and graded during development of the Broader Project. The gradient will therefore be negligible.

Broader Project and Surrounding Area

The topography across the broader Project site is subdued, with a gentle gradient down towards the west. The surface elevation ranges between approximately 475 metres Australian Height Datum (mAHD) in the east to approximately 445 mAHD in the west. The shallow regolith within the Project Area chiefly comprises Quaternary or Tertiary sand deposits over broad plains. Colluvial deposits are present at the base of stony ridges of outcropping metamorphic rock outcrops. Recent alluvial deposits occur over limited extents, mainly along ephemeral drainage lines. The Gardiner Sandstone forms the most prominent topographic features in the locality, comprising low ridges and undulating terrain. Rocky outcrops of Browns Range Metamorphics are also present, rising to a maximum elevation of about 490 mAHD (or about 25–30 m above the surrounding plain) (Northern Minerals 2014).

3.2 Flora and fauna

3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

The Proposed Action will be developed within part of the overall process plant boundary, which will be cleared during development of the Broader Project. No flora or fauna values will therefore occur within the boundary of the Proposed Action.

The following sections provides information about the Broader Project and surrounding area.

Flora

Mattiske Consulting was commissioned by NTU in 2023 to update/verify existing data (i.e., data informed by baseline biological surveys conducted between 2014 – 2019) and to undertake detailed surveys to define the potential terrestrial flora environmental values present (Att_10_Detailed Flora and Vegetation Assessment).

No threatened flora species pursuant to section 179 of the EPBC Act were recorded during the 2023 and 2024 field surveys (Att_10_Detailed Flora and Vegetation Assessment, section 5.2.2, pages 14-15) or during previous surveys of the Browns Range Development Envelope (Att_11_Level 2 Vegetation and Flora Survey and Att_12_Mattiske 2019).

Fauna

Bamford Consulting Ecologists (Bamford Consulting) undertook a comprehensive review of databases and literature searches informed by baseline biological surveys conducted in 2014 to update/verify any new records from more recent studies and to check the current conservation listing of species (Att_13_Assessment of Fauna Values). In addition, fauna observations made during field investigations undertaken by Outback Ecology in 2012 (Att_14_Terrestrial Vertebrate Fauna Baseline Survey) and 2014 (Att_15_Targeted Vertebrate Fauna Survey), Bamford Consulting in 2017 (Att_16_Pre Clearing Survey for the Greater Bilby) and Western Wildlife in 2020 (Att_17_Dazzler Project Level 2 Vertebrate Fauna Survey) were collated (Att_13_Assessment of Fauna Values). The 2017 Bamford investigations were targeted searches for Bilby in development areas and along the access road, while the Bamford 2023 survey focussed on the access road and borefield. This results in a comprehensive species list and likely fauna assemblage for vertebrate fauna.

The vegetation in the Development Envelope has been described by Mattiske Consulting (Att_10_Detailed Flora and Vegetation Assessment) who recognised 22 vegetation types. These were grouped into five Vegetation and Substrate Associations (VSAs) which provide habitat for fauna, all of which are regionally widespread (Att_13_Assessment of Fauna Values) (Att_1B_Figure 2 - Project Area):

- VSA 1. Undulating low hills supporting acacia, grevillea and hakea tall shrublands (occasional small eucalypts) over spinifex on a soil of coarse gravel and sandy loam;
- VSA 2. Eucalypt and melaleuca woodlands over shrubs and grasses on heavy soils, in seasonally damp flats (including blacksoil plains), valleys and drainage areas;
- VSA 3. Shrublands of acacia, grevillea and hakea over triodia hummock grassland on sandy to sandy-loam plains. Scattered eucalypts and Desert Walnut;
- VSA 4. Open woodland over shrubs and hummock grassland on rocky slopes and adjacent gravelly and heavy soil flats; and
- VSA 5. Open woodland over mixed shrubs and grasses, including speargrass in some areas, on red brown sandy-loam to clayey-loam flats.

<u>Threatened Fauna</u>

While 20 MNES species were returned from the database review for the Broader Project area, many of these are considered unlikely to occur in the area regularly or in large numbers, and therefore the Broader Project area is unlikely to be important in maintaining their populations (Att_13_Assessment of Fauna Values):

- Great Desert Skink (*Liopholis kintorei*; Vulnerable; Resident);
- Oriental Plover (*Charadrius veredus*; Migratory; Vagrant);

- Common Sandpiper (*Actitis hypoleucos*; Migratory; Irregular Visitor);
- Sharp-tailed Sandpiper (*Calidris acuminata*; Migratory; Irregular Visitor);
- Curlew Sandpiper (*Calidris ferruginea*; Critically Endangered/Migratory; Irregular Visitor);
- Pectoral Sandpiper (*Calidris melanotos*; Migratory; Irregular visitor);
- Swinhoe's Snipe (*Gallinago megala*; Migratory; Irregular visitor);
- Oriental Pratincole (*Glareola maldivarum*; Migratory; Vagrant);
- Australian Painted-snipe (*Rostratula australis*; Endangered; Vagrant);
- Fork-tailed Swift (*Apus pacificus*; Migratory; Irregular Visitor);
- Glossy Ibis (*Plegadis falcinellus*; Migratory; Irregular visitor);
- Eastern Osprey (*Pandion cristatus*; Migratory; Vagrant);
- Red Goshawk (*Erythrotriorchis radiatus*; Vulnerable; Vagrant);
- Grey Falcon (*Falco hypoleucos*; Vulnerable; Irregular Visitor);
- Night Parrot (*Pezoporus occidentalis*; Endangered; Vagrant);
- Princess Parrot (*Polytelis alexandrae*; Vulnerable; Irregular Visitor);
- Gouldian Finch (*Erythrura gouldiae*; Endangered, Irregular Visitor);
- Greater Bilby (*Macrotis lagotis*; Vulnerable; Regular Visitor);
- Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*; Vulnerable; Vagrant); and
- Ghost Bat (*Macroderma gigas*; Vulnerable; Irregular Visitor).

This includes seven species considered to be vagrants, and ten species considered to be irregular visitors. Vagrants include the Night Parrot and while the Broader Project area is within the priority (but not high priority) area for surveys for this species (Att_18_Likely Presence and Habitat Usage of Night Parrot Guidelines), it lacks key environmental features likely to support the species including species rich herbfields important for foraging; although long-unburnt spinifex favoured for roosting could be present. There are also no existing watercourses identified within proximity of the Project. Sturt Creek is the closest watercourse located approximately 43 km to the northwest of the site and the nearest salt lake (Lake Gregory) is located 200 km to the southwest. The Oriental Plover was recorded by Outback Ecology (Att_15_Targeted Vertebrate Fauna Survey) in the mine area. They are biologically a migratory flat grasslands species often recorded across a wide range in small numbers and have therefore been noted as "Vagrant".

Two of the ten species considered to be irregular visitors have been recorded infrequently and in small numbers, but are expected only as irregular visitors (the Gouldian Finch and Glossy Ibis).

Two significant species are considered regular visitors or residents (the Great Desert Skink and the Greater Bilby). The Great Desert Skink is expected to be a resident but has not been found after multiple surveys. It remains possible that it is present at a low density, when it would be very difficult to detect. The Greater Bilby has been recorded with evidence (typically foraging signs) at several locations along the access route and around the mine. Bilbies are mobile and will move in response to changing conditions, such as fire and time since fire.

Condition 6 of MS 986 requires NTU to develop and implement a Conservation Significant Fauna Management Plan (CSFMP) to the requirements of the DBCA. The plan has been reviewed by DBCA and approved by the Department of Water and Environmental Regulation (DWER) and will be utilised during the clearing of the process plant area where the Proposed Action will be located.

3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

Soil

Soil information is unchanged from that presented in previous referrals under the EPBC Act.

The Study Area has been mapped as part of the Kimberley land region of WA (Att_11_Level 2 Vegetation and Flora Survey, section 2.3, pp 9-10) from numerous rangeland resource surveys conducted since the 1940s. These have contributed to a comprehensive description of biophysical resources present within the Kimberley region, including the condition of soil and vegetation (Att_11_Level 2 Vegetation and Flora Survey, section 2.3, pp 9-10). The Broader Project Area contains two land systems:

- **Coolindie Land System:** Gently undulating red desert sandplains and dunes supporting *Acacia* shrublands, *Eucalyptus* woodlands and soft spinifex (*Triodia pungens*) grasslands. These grasslands are subject to frequent fires that cause short-term changes in floristic composition and abundance. Drainage lines are shallow, widely spaced and infrequent, and erosion is minimal; and
- **Winecke Land System:** Stony hills and lowlands associated with red desert sands that support *Acacia* and *Eucalyptus* woodlands and soft spinifex (*Triodia pungens*) grasslands. These grasslands are subject to frequent fires that cause short-term changes in floristic composition and abundance. Intensive parallel drainage lines occur on upper slopes, while widely spaced angular drainage lines occur on lower slopes and terminate at the base of hills. Erosion is generally minimal, though some drainage floors are moderately susceptible.

Two soil-landform associations were identified in the area of the Proposed Action and are summarised as follows (Att_19_Baseline Soil and Landform Assessment, section 4.2.1, pp 40):

- Deep Sandy Plains:
    - Wide gently sloping sandy plains and generally unchannelled valley floors;
    - Deep soil profiles dominated by structureless sand, often massive at depth;
- Colluvium Gravelly Soils:
    - Gravelly sand soil profiles, often found on the slopes of the hills or as low rises throughout the plains; and
    - Sometimes massive (uniformly dense consistence) at depth.

<u>Soil properties</u>

Deep Sandy Plains: The ‘deep sandy plains’ soil-landform association describes soils with very little coarse material (<10%), very deep soil depth extending to 2 m, with weak to negligible structure, sand to sandy loam texture, non-saline, neutral pH, non-hardsetting, low plant available nutrient status and a moderate water holding capacity. The characteristics of this soil-landform association are consistent with the description of gently sloping plains within the Coolindie land system (Att_19_Baseline Soil and Landform Assessment, section 7.1, pp 69).

Colluvium Gravelly Soils: The ‘colluvium gravelly soils’ soil-landform association was generally located on the slopes leading to outcropping rock. The surface soil was typically shallow with moderate amounts of coarse material (>20%), non-saline, non-sodic, non-hardsetting at surface, increasing to hardsetting at depth and had a low plant available nutrient status. The soil was ‘slightly acidic’, with a loamy sand to sandy clay loam texture, and a moderate water holding capacity decreasing to low with depth (Att_19_Baseline Soil and Landform Assessment, section 7.1, pp 69).

Vegetation

The Proposed Action will be developed within part of the overall process plant boundary, which will be cleared during development of the Broader Project. No vegetation will therefore occur within the boundary of the Proposed Action.

The following section provides information about the Broader Project and surrounding area.

Mattiske Consulting was commissioned by NTU in 2023 to update/verify existing vegetation data (i.e., data informed by baseline biological surveys conducted between 2014 – 2019) and to undertake detailed vegetation surveys of an updated survey area (Att_10_Detailed Flora and Vegetation Assessment).

Threatened Ecological Communities (TECs)

No TECs as listed by DCCEEW (2025) were recorded during the 2023 and 2024 field surveys (Att_10_Detailed Flora and Vegetation Assessment, section 5.2.4, pp 18), during previous surveys of the Broader Project Development Envelope (Att_11_Level 2 Vegetation and Flora Survey and Att_12_Mattiske 2019), or identified in a desktop assessment undertaken by Mattiske Consulting in 2025 (Att_20_Desktop Flora and Vegetation Assessment).

Vegetation Communities

A total of 22 vegetation communities and one mosaic community were delineated in the Broader Project Development Envelope. The vegetation communities were, in broad terms, open *Eucalyptus* or *Corymbia* woodlands over hummock grasslands, typical of the Tanami IBRA region. Mattiske Consulting recorded the following vegetation community within the location of the Proposed Action (Att_10_Detailed Flora and Vegetation Assessment, section 5.3.1, pp 19-21):

- **G2:** *Corymbia opaca*, *Eucalyptus brevifolia*, *Eucalyptus pruinosa* mid open woodland over *Gossypium australe*, *Acacia sericophylla*, *Halgania solanacea* var. *solanaceaover Aristida inaequiglumis*, *Eulalia aurea*, *Eriachne obtusa*, *Triodia epactia* mid open hummock grassland on orange sandplains (Att_1G_Figure 7 - Vegetation Mapping).

Apart from areas recently affected by bushfires and mineral exploration activities, the condition of terrestrial vegetation in the Broader Project Area, at the time of the Mattiske Flora Survey, was considered “Excellent” across the majority of the survey area (Att_9_Flora and Vegetation Assessment, pp 32). The exceptions to this are the “Degraded” S3 community at the northern extent of the survey area, where **Cenchrus ciliaris* was prolific surrounding the abandoned homestead, and cleared areas associated with the pilot plant and accommodation facilities, and tracks and gravel pits.

Baseline flora and vegetation surveys undertaken by Outback Ecology in 2014 did not identify any obligate phreatophyte species or Groundwater Dependent Ecosystems (GDEs) in the Broader Project locality (Att_11_Level 2 Vegetation and Flora Survey, section 4.4.7, pp 89-90). The closest GDE in proximity to the Project is Sturt Creek, located approximately 43 km to the northwest (Att_21_Surface Water Management Plan, section 2.3, pp 3). Drainage lines in the Broader Project area are ephemeral and support characteristic vegetation assemblages.

3.3 Heritage

3.3.1 Describe any Commonwealth Heritage Places Overseas or other places recognised as having heritage values that apply to the project area.

There are no Commonwealth Heritage places or other places recognised as having heritage values relevant to the Proposed Action. The nearest Commonwealth Heritage Listed site is Mermaid Reef Rowley Shoals located approximately 300 km off the coast of Broome. Broome is over 700 km west of the Proposed Action.

3.3.2 Describe any Indigenous heritage values that apply to the project area.

Aboriginal Heritage Management

The Proposed Action lies entirely within the registered Jaru Native Title Determination Area (WAD45/2012) held by the Jaru People. Kundat Djaru Aboriginal Reserve and community (also known as Ringer Soak) is 35 km west of the Proposed Action, within the Tjurabalan Native Title Determination Area (WC95/74; WAS160/97). The surrounding region is used for cultural purposes such as hunting.

NTU continues to work closely with the Jaru Native Title Holders and implements a Heritage Impact Assessment (HIA) process under which NTU engages with the Traditional Owners to seek consent to undertake works on Aboriginal lands and to ensure that any cultural and heritage sites are identified and not impacted by Project activities.

Since 2010, NTU has conducted ten heritage surveys with the Jaru Group. Note that the survey reports received by NTU do not provide detailed information on the nature of any specific site identified through the various surveys. Detailed information is collected and held by the relevant Traditional Owner groups.

Survey findings (consents and non-consents) are complied with, supported by GIS databases and Ground Disturbance Procedures.

Proposed Action

The closest recorded Aboriginal Heritage site to the Proposed Action is a quarry approximately 100 m to the northwest, which will be avoided by the Broader Project.

3.4 Hydrology

3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

The Proposed Action location has warm dry winters with little rainfall expected. Monthly rainfall distributions show a distinct seasonal pattern with about 80% of the rainfall occurring during the months of December through to March associated with tropical monsoonal activity or the passage of cyclones (Att_21_Surface Water Management Plan, section 3.1, pp 5). Average annual rainfall (from July to June, which is defined as the water year) for the period 1970 - 2022 was 531.7 mm with annual rainfall showing a relatively high level of inter annual variability ranging from a minimum of 173 mm (1989 - 1990) to a maximum of 1,048 mm (2000 - 2001). The Proposed Action is located on the edge of the Tanami desert and is semi-arid with temperatures ranging from an average 27.3°C July minimum to an average 38.3°C November maximum (Att_21_Surface Water Management Plan, section 3.1, pp 6).

There are no existing watercourses identified within proximity of the Proposed Action; however, ephemeral creeks do establish within the Broader Project following large rainfall events. Sturt Creek is the closest watercourse and is located approximately 43 km to the northwest of the Proposed Action. The site is only affected by overland runoff which flows from the top of catchment (i.e., east) towards the northwest and southwest direction (Att_21_Surface Water Management Plan, section 2.3, pp 4). Runoff from the overall Sturt Creek system ultimately flows into Lake Gregory (Paruku), 280 km downstream of the Project Area (measured along the Sturt Creek drainage line) (Att_1H_Figure 8 - Regional Hydrology).

The Lake Gregory System is a wetland of national significance under several criteria of the Directory of Important Wetlands in Australia (DCCEEW, 2019). The system is a significant site for both domestic and migratory waterbird species, some of which are recognised as being of conservation significance at a national and international level. Lake Gregory is of high importance to local Aboriginal people. It is part of the Paruku Indigenous Protected Area, which was declared in 2001 (NIAA, 2023).

Three natural springs (one perennial and two ephemeral) have been identified within the vicinity of the Proposed Action (Att_22_ Stage 2 – Hydrogeological Test Drilling, Aquifer Testing and Assessment, section 4.2.2, pp 18-19):

- Banana Springs (perennial); and
- Two unnamed ephemeral gnamma holes.

Banana Springs is considered a site of cultural significance to the Kundat Djaru community and is located approximately 12 km to the west of the Proposed Action:

- The surface expression of the spring is represented by a localised, internal draining wetland;
- The majority of the spring flow is evaporated or used for stock watering; and
- The groundwater sourcing this spring is hosted by the Gardiner Sandstone (based on the 1:250,000 Geological Series Map - Gordon Downs (Sheet SE52-10)).

NTU continues to work with the relevant Traditional Owners to identify and protect water sources such as Banana Springs. Protective measures specifically in respect of Banana Springs include a 2 km buffer around the spring and the drilling of monitoring bores to determine any impact upon the spring from water abstraction for the Broader Project.

Sampling at site showed water flowing in surface drainage systems during seasonal flow events has very low salinity. The surface water has a near-neutral pH and variable suspended solid concentrations. Concentrations of dissolved metals are low.

4. Impacts and mitigation

4.1 Impact details

Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.

EPBC Act section	Controlling provision	Impacted	Reviewed
S12	World Heritage	No	Yes
S15B	National Heritage	No	Yes
S16	Ramsar Wetland	No	Yes
S18	Threatened Species and Ecological Communities	No	Yes
S20	Migratory Species	No	Yes
S21	Nuclear	Yes	Yes
S23	Commonwealth Marine Area	No	Yes
S24B	Great Barrier Reef	No	Yes
S24D	Water resource in relation to large coal mining development or coal seam gas	No	Yes
S26	Commonwealth Land	No	Yes
S27B	Commonwealth Heritage Places Overseas	No	Yes
S28	Commonwealth or Commonwealth Agency	No	Yes

4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No World Heritage sites occur within or in proximity to the Project Area. The nearest World Heritage site is Purnululu National Park, approximately 150 km to the north of the Proposed Action therefore no direct or indirect impacts are reasonably foreseen.

4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No National Heritage sites occur within or in proximity to the Project Area. The nearest National Heritage area Mermaid Reef – Rowley Shoals - is over 1,000 km away, 300 km offshore from Broome therefore no direct or indirect impacts are reasonably foreseen.

4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No Ramsar Wetlands occur within or in proximity to the Proposed Action. The nearest Ramsar Wetland is Lake Argyle, located over 250 km to the north.

4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Threatened species

Direct impact	Indirect impact	Species	Common name
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Erythrotriorchis radiatus	Red Goshawk
No	No	Falco hypoleucos	Grey Falcon
No	No	Liopholis kintorei	Great Desert Skink, Tjakura, Warrarna, Mulyamiji
No	No	Macroderma gigas	Ghost Bat
No	No	Macrotis lagotis	Greater Bilby
No	No	Polytelis alexandrae	Princess Parrot, Alexandra's Parrot
No	No	Rostratula australis	Australian Painted Snipe

Ecological communities

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4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.4.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Proposed Action is a component of the Broader Project that was twice determined to be not a controlled action. Clearing of native vegetation, earthworks and developing and operating a heavy rare earths processing plant are therefore not considered in this referral. The scope of this referral relates to the nuclear action.

NTU commissioned Resources Health and Safety Services (RHSS) to undertake a radiation impact assessment (RIA) of the proposed HRE Concentrate (Att_23_Radiation Impact Assessment). The study aimed to evaluate potential impacts to non-human biota from bagging and storage of HRE Concentrate. Due to the location of the bagging plant and HRE concentrate storage facility, operational activities, material turnover, and human presence, it is not foreseen that vegetation would establish or that animals would be present at such facilities during the operational phase. The study identified that HRE Concentrate distributed into the surrounding environment during operations, and remaining post closure of the site, could however impact fauna and flora. This is considered an extremely conservative scenario as operational practices of bagging HRE Concentrate; spill management / cleanup; and rehabilitation practices prior to closure will prevent remnant HRE Concentrate from remaining in the environment (Att_4_Radiation Management Plan).

RHSS used Tier 2 Environmental Risks from Ionising Contaminants Assessment (ERICA) modelling to estimate radiation dosages to reference flora and fauna against the screening dose rate of 10 micro-Gray per hour (µGy/h) (ARPANSA, 2015). The 10 µGy/h benchmark represents the dose rate at which approximately 95% of the species in the ecosystem are expected to be protected, with an additional safety factor incorporated to account for limitations in the initial data (Att_23_Radiation Impact Assessment, section B.6, pp 47).

To simulate potential distribution of HRE concentrate into the environment (wind, water run-off, vehicle tracking etc), it was assumed that HRE would remain as a uniform surface layer of 0.5 cm on top of background soils over an area of 1 ha to be consistent with the human health impact assessment. The ERICA terrestrial model default considers contamination up to a depth of 50 cm for burrowing species, and 10 cm for on-soil and in-air occupancies. A mixing dilution into the top 10 cm was therefore assumed and conservatively further extended down to 50 cm for all burrowing species' occupancy below surface (Att_23_Radiation Impact Assessment, section B.7, pp 48).

Dose rates to most of the organisms modelled below the screening level value of 10 µGy/h, despite the very conservative model assumptions. All vegetative species, except for trees, returned dose rates above the screening level dose rate level. This, however, does not mean that populations of species or even individual specimens would be impacted. The key aim is to ensure maintenance of robust wildlife populations. The modelled dose rates were therefore further compared to derived concentration reference levels (DCRLs) (individual members of a species) and environmental reference levels (ERLs) (population effects) for species with dose rates above the screening level. Only Lichen and Bryophytes and Shrubs modelled dose rates to be within DCRL range, but well below the effects range (Att_23_Radiation Impact Assessment, section B.10, pp 51 - 53). Due to climatic conditions (hot wet season) and habitat type (mid open woodland over grassland on sandplain), it is very unlikely the taxa of lichen and bryophytes could be directly or indirectly impacted by radiation from the Proposed Action. The likelihood that lichen or bryophytes could establish in the bagging facility or HRE concentrate storage area during operations is extremely low.

The modelling results therefore indicate population effects are unlikely for all modelled terrestrial organisms exposed to HRE concentrate distributed into the environment under highly conservative scenarios, even if such organisms are present at the contamination location for 100% of the time, which is an inherently conservative approach within the ERICA model (Att_23_Radiation Impact Assessment, section B.10, pp 51 - 53).

4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Species	Common name
No	No	Actitis hypoleucos	Common Sandpiper
No	No	Apus pacificus	Fork-tailed Swift
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Calidris melanotos	Pectoral Sandpiper
No	No	Charadrius veredus	Oriental Plover, Oriental Dotterel
No	No	Glareola maldivarum	Oriental Pratincole
No	No	Hirundo rustica	Barn Swallow
No	No	Motacilla cinerea	Grey Wagtail
No	No	Motacilla flava	Yellow Wagtail

4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.5.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

Ten Migratory bird species were returned from a database review undertaken by Bamford Consulting in 2023 for the Broader Project, however, many of these are considered unlikely to occur in the area regularly or in large numbers, and therefore the Proposed Action and Broader Project are unlikely to be important in maintaining their populations (Att_13_Assessment of Fauna Values):

- Oriental Plover (*Charadrius veredus*; Migratory; Vagrant);
- Common Sandpiper (*Actitis hypoleucos*; Migratory; Irregular Visitor);
- Sharp-tailed Sandpiper (*Calidris acuminata*; Migratory; Irregular Visitor);
- Curlew Sandpiper (*Calidris ferruginea*; Critically Endangered/Migratory; Irregular Visitor);
- Pectoral Sandpiper (*Calidris melanotos*; Migratory; Irregular visitor);
- Swinhoe's Snipe (*Gallinago megala*; Migratory; Irregular visitor);
- Oriental Pratincole (*Glareola maldivarum*; Migratory; Vagrant);
- Fork-tailed Swift (*Apus pacificus*; Migratory; Irregular Visitor);
- Glossy Ibis (*Plegadis falcinellus*; Migratory; Irregular visitor); and
- Eastern Osprey (*Pandion cristatus*; Migratory; Vagrant).

No Migratory species have been recorded in the location of the Proposed Action. A single sighting of the Oriental Plover was recorded by Outback Ecology in 2014 (Att_15_Targeted Vertebrate Fauna Survey, section 4.3, pp 26) from a location approximately 460 m north-east of the Proposed Action. They are biologically a migratory flat grasslands species often recorded across a wide range in small numbers and have therefore been noted as "Vagrant". The Glossy Ibis has also been recorded infrequently and in small numbers and is considered to be an "Irregular Visitor". The fauna sightings register implemented at the Broader Project suggests no further migratory species sightings since the Broader Project commenced records in 2017.

Radiation impact assessment modelling results undertaken by RHSS also indicate population effects are unlikely for all modelled terrestrial organisms exposed to HRE concentrate distributed into the environment under highly conservative scenarios, even if such organisms are present at the contamination location for 100% of the time (Att_23_Radiation Impact Assessment, section B.10, pp 51 - 53).

4.1.6 Nuclear

4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

Yes

4.1.6.2 Briefly describe why your action has a direct and/or indirect impact on this protected matter. *

Section 22(1)(g) of the EPBC Act states that a nuclear action can be prescribed by the regulations, where the regulations state:

2.01 Nuclear action (Act s 22(1)) *For paragraph (g) of the definition of nuclear action in Subsection 22(1) of the Act, a nuclear action includes establishing, significantly modifying, decommissioning or rehabilitating a facility where radioactive materials at or above the activity level mentioned in regulation 2.02 are, were, or are proposed to be used or stored.*

The processing plant will beneficiate ore that contains naturally occurring radioactive material (NORM) to produce a heavy rare earth (HRE) concentrate. The processing plant is estimated to operate for ten years. The potential impacts on the environment (as defined in s 528 of the EPBC Act) from radiation from the proposed action, in the absence of controls, are summarised in Table 1. NTU notes that the proposed action is designed with inherent engineering controls and will be operated with environmental management controls for radiation that are regulated under WA State legislation, hence the likelihood of environmental impacts is very low (see section 4.1.6.6).

DCCEEW advised that the calculated radiation activity concentration (14.8 Bq/g) (Att_24_Aurora Environmental 2023) coupled with the amount of HRE concentrate proposed to be stored at the proposed action prior to transport (worst-case up to 10,000 tonnes for up to five months), trigger the mandatory requirement for referral under the EPBC Act.

The following section considers the potential impacts to the environment as defined in EPBC Act Section 528, including the social, economic and cultural aspects.

a) Ecosystems and their components, including people and communities

Radiation in high doses can cause genetic mutations and damage to physiological processes resulting in poor health and alterations in species composition. The proposed action is estimated to emit radiation levels well below the dose rate that could cause human health effects or environmental population impacts (see section 4.1.6.6)

In the absence of controls, the proposed action could result in the discharge of dust containing relatively low-level radioactive material and cause localised soil and water contamination whilst HRE Concentrate is being produced and/or stored (estimated to be up to 10 years).

No social, economic or cultural aspects are likely to be impacted by radiation, as radiation levels are well below the dose rate that could cause human health effects or environmental population impacts (see section 4.1.6.6).

The ecosystem and its components hold cultural significance to Aboriginal Traditional Owners (TO). TO's intermittently use the natural environment as a source for food, water and recreation/culture, however the localised low-level radiation present in some soils are unlikely to affect Aboriginal cultural heritage values in the area.

b) Natural and physical resources

Radioactive substances can be deposited on and absorbed by plants and animals, potentially making them inedible for people and animals.

In the absence of controls, discharge of low-level radioactive substances from the proposed action can contaminate local soils and leach into surface water and groundwater resources, however the radiation levels are unlikely to result in a potential hazard to the surrounding ecosystem. This could occur during operations (approximately 10 years) and post-closure of the Broader Project.

The social, economic or cultural aspects are as described for #1 above.

c) Characteristics of locations, places, and areas

The location of the proposed action is largely undeveloped, hence it is characterised by the quality of the natural environment. See above for the potential impacts outlined in a) and b).

Kundat Djaru (Ringer Soak) community is approximately 30 km (as the crow flies) from the proposed action and community members may intermittently gather food from the surrounding area. The localised low-level radiation present in some soils are however unlikely to affect Aboriginal cultural heritage values in the area.

d) Heritage values of places

The land surrounding the area of the proposed action contains Aboriginal cultural value in the natural environment.

Aboriginal artefacts have been recorded within the Broader Project Development Envelope. There is no evidence that radiation emissions at levels expected from the proposed action could impact artefacts and the localised low-level radiation present in some soils are unlikely to affect Aboriginal cultural heritage values in the area.

Radiation levels are predicted to be low and will be managed to ensure that aspects that are important in Aboriginal culture are not impacted, such as the locally important Boab tree located near the process plant (noting the process plant was previously considered under EPBC 2014/7253).

4.1.6.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.6.6 Describe why you do not consider this to be a Significant Impact. *

The Proposed Action is a component of the Broader Project which was referred to the DCCEEW under the EPBC Act and was determined to be “not a controlled action” (EPBC 2014/7253 and EPBC 2019/8446). At the time of these referrals, the processing method that was proposed to be used at the Broader Project generated a product estimated to contain less than 1 Bq/g radioactivity whilst tailings to be disposed onsite were estimated to have a radiation activity concentration of 2 - 3 Bq/g.

NTU has since entered into a partnership with a third party resulting in a change to the mineral processing method to be employed at the Broader Project. The process plant will no longer include a hydrometallurgical component, resulting in increased radioactivity of the HRE concentrate product that will be bagged and stored prior to being transported. Radiation levels in the product generated from the revised processing methodology are estimated to contain up to 14.8 Bq/g, with a subsequent reduction in tailings radioactivity

Routinely, up to 90 t of HRE concentrate will be in transit onsite at any one time. In the event that the access road is cut off for export trucking, the HRE concentrate will be temporarily stored on site until the road re-opens. The Proposed Action includes the temporary storage of up to 10,000 tonnes of HRE concentrate in sealed bags within a controlled area of the process plant for up to five months before it is exported offsite.

Radiation Impact Assessment

NTU commissioned RHSS to undertake a radiation impact assessment (RIA) to evaluate potential radiological impacts of the Project to human receptors (workers and members of the public) during operational and post-closure scenarios (Att_23_Radiation Impact Assessment). The scope of the RIA included HRE concentrate handling; bagging; and storage practices (exposure to workers) as well as HRE concentrate that could potentially distribute into and remain within the environment during operations and post closure of the site (exposure to members of the public and non-human biota). To simulate distribution into the environment (wind, water run-off, vehicle tracking etc), it was assumed that HRE concentrate would be present and remain as a uniform surface layer of 0.5 cm on top of 1 ha of background soils, and diluted through natural blending with the top layer of the soil to a depth of 10 cm (Att_23_Radiation Impact Assessment, Annex A, pp 21). This was further extended down to 50 cm for all burrowing species’ occupancy below surface (Att_23_Radiation Impact Assessment, Annex B, pp 48). Calytrix Consulting Pty Ltd (Calytrix Consulting) conducted an independent peer review of the RIA, providing recommendation comments and track change edits on an earlier draft. RHSS addressed the peer review in the final RIA (Att_25_RIA Peer Review Response Summary Table). In general, Calytrix Consulting found that the modelling and assumptions used in the RIA were very conservative. Despite the conservative modelling, the results indicate a very low radiation risk.

Human Health RIA of the Proposed HRE Concentrate Bagging and Storage Facility

For the human health impact assessment, the RESidual RADioactivity (RESRAD) ‘Onsite’ code (version 7.2) was used to simulate dose rates to workers in the HRE concentrate bagging plant (bagging scenario); HRE concentrate beneficiation plant (bulk handling scenario – a scenario that has since been removed as an option); at the HRE concentrate storage location; and in the administration building adjacent to the HRE concentrate storage area. No members of the public live within 10 km of the Proposed Action, and the nearest community is Ringer Soak, located approximately 40 km away by road, or 26 km direct. For members of the public, expected final land-use scenarios including pastoral use (light grazing), cultural use by Traditional Owners and occasional visitors were simulated for exposure to HRE concentrate distributed within the environment (conservative assumption) (Att_23_Radiation Impact Assessment, Annex A, pp 25-30).

All dose rates are predicted to be well within radiation safety limits required by DEMIRS and well below ARPANSA health effects levels (Att_23_Radiation Impact Assessment, Annex A, Table 8, pp 37), despite using extremely conservative modelling scenarios that assumed worst-case management practices (which will not occur). Modelled results indicated that workers in the bagging plant (under conservative exposure

assumptions) will receive the largest annual dose rate at 3.1 mSv/y (well below the occupational dose derived average limit of 20 mSv/y) from all the modelling scenarios, with mainly external gamma exposure and dust inhalation contributing most of the dose. The remainder of the worker groups dose rates modelled below 1 mSv/y and are hence classified as “non-radiation workers” in accordance with the ARPANSA Codes limits. Modelling results for members of the public indicate that none of the scenarios selected give rise to dose rates larger than the public dose limit of 1 mSv/year, even under very conservative assumptions of HRE concentrate distributed and remaining within the environment post closure of the site (Att_23_Radiation Impact Assessment, Annex A, pp 36-38).

Non-human Biota Radiological Assessment of the Proposed HRE Concentrate Bagging and Storage Facility

For the non-human biota impact assessment, the ERICA software system (version 1.2) was employed at Tier 2 level for the terrestrial ecosystem, with focus on State-listed flora taxa and significant fauna identified at the Broader Project. Additionally, more common species such as Kangaroo; Emu; and Sand Goanna were added to the assessment to estimate potential doses to human receptors from the ingestion of bush tucker potentially collected from the area. Cattle were also evaluated for pastoral land-use post closure (Att_23_Radiation Impact Assessment, Annex B, pp 41).

Dose rates to most of the organisms modelled below the screening level value of 10 µGy/h, despite the very conservative model assumptions. The sand goanna, as well as vegetative species, returned dose rates above the screening level dose, but below DCRL ranges as well as below ERL for population effects. The modelling therefore indicate population effects are unlikely for all modelled terrestrial organisms (Att_23_Radiation Impact Assessment, Annex B, pp 41-42).

To determine dose rates to human receptors consuming bush tucker collected from the area, three main factors were considered: food consumption rates, concentration factors into foods, and radionuclide concentrations present in the environment. Consumption rates assume a diet that consists of an intake of 155 kg/y of plant material and 125 kg/y of animal material based on the food consumption rates of traditional owners of the Maralinga lands (AAEC, 1985). Conservatively assuming 5% of the annual diet to consist of bush tucker collected at the site where HRE concentrate remains, this equates to 7.75 kg/year of vegetation and 6.25 kg per year from animals. A total accumulated dose rate of 0.16 mSv/y was estimated, which is well below the dose limit of 1 mSv/year for members of the public (Att_23_Radiation Impact Assessment, Annex B, pp 53-55).

Radiation Management Plan

NTU will continue to manage the Proposed Action and the Broader Project in accordance with the requirements of the Radiation Site Registration under the RS Act (registration number RS 73/2012 22222 and RX 76/2018 29487).

A RMP has been developed for the Pilot Plant and Care and Maintenance phases of the Broader Project and both have been approved by the Radiological Council and DEMIRS under the RS Act. The RMP’s detail controls to minimise spillage; prevent release into the surrounding environment; as well as spillage recovery practices (Att_4_Radiation Management Plan).

NTU is currently revising the RMP to include the Broader Project ; to reflect the changed processing method and resultant reduced radiological risk profile for tailings to be managed on site and elevated radiation levels in HRE concentrate product that leaves site.

Radioactive Waste Management Plan

A RWMP has been developed for the Pilot Plant and approved by the Radiological Council and DEMIRS under the RS Act. The RWMP details how radioactive waste generated by the Pilot Plant will be managed during all phases of the Project (Att_3_Radioactive Waste Management Plan).

NTU is revising the RWMP to include the Broader Project and reflect the changed processing method and resultant reduced radiological risk profile for tailings to be managed on site.

4.1.6.7 Do you think your proposed action is a controlled action? *

No

4.1.6.9 Please elaborate why you do not think your proposed action is a controlled action. *

The Proposed Action triggers the mandatory EPBC Act nuclear action referral requirement due to the radioactivity concentration and volumes of HRE concentrate in transit/stored onsite during operations, however, no significant impact to human health or the environment is foreseen from the handling and temporary storage of HRE concentrate (Att_23_Radiation Impact Assessment).

NTU considers the Proposed Action not to be a controlled action because:

- The Proposed Action does not involve nuclear or radioactive waste;
- The action is not related to uranium mining;
- Clause 69 of Explanatory Memorandum to the EPBC Act clarified that nuclear actions do not include operations for the recovery of mineral sands or rare earths. This Proposed Action relates to the bagging and storage of recovered HRE concentrate;
- The risk to the environment (see Section 4.1.4) and workers/community (see Section 4.1.6.6) from radioactivity of HRE concentrate is very low as demonstrated by the RIA (Att_23_Radiation Impact Assessment); and
- Independent peer review of the RIA found that the modelling and assumptions used were very conservative. Despite the conservative modelling, the results indicate a very low radiation risk.

Strong radioactivity management controls that minimise the potential for emissions and discharges are engineered into the Proposed Action design and will be verified using a comprehensive monitoring program committed to within in the RMP (Att_4_Radiation Management Plan). The RMP will be revised in consultation with and approved by the Radiological Council and DEMIRS under the RS Act.

4.1.6.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

Mitigation

NTU will continue to use suitably qualified and experienced radiation safety professionals to assist during the design, commissioning and operational phases.

The RMP (Att_4_Radiation Management Plan) and RWMP (Att_3_Radioactive Waste Management Plan) were developed for the pilot plant which operated off and on from 2017to 2022. These plans were approved by DEMIRS and the Radiological Council and support the site Registration under the RS Act.

With the change in processing methodology, the RMP and RWMP will be revised to reflect reduced radiation levels in the tailings to be disposed to the tailings storage facility on site, the increased radiation levels in the HRE concentrate, and HRE concentrate bagging and storage. The updated plans must be approved by DEMIRS and the Radiological Council prior to operations commencing.

NTU will implement all recommendations by RHSS (Att_23_Radiation Impact Assessment) for radiation management, which are included in the controls for the Proposed Action, listed below.

Design Controls:

1. Browns Range is located in a remote area. Access will be further restricted with security gates and signage;
2. Bagging facility is/has:
    1. Fully enclosed;
    2. A concrete floor and self-contained drainage;
    3. Air extraction and filtration;
3. HRE concentrate transit/storage area has been designed with a 25 m separation distance to the nearest adjacent worker building;
4. HRE concentrate product will be in sealed, waterproof bags instead of in bulk stockpiles;
5. Transit/storage facility will have engineered pavement; and
6. Bootwash at bagging facility and rumble strip/wheel wash for vehicles leaving controlled areas.

Management Controls:

1. The Bagging Facility and HRE Concentrate Storage Areas will be designated restricted access areas with clear demarcation and signage;
2. Training and inductions to describe radiation risks, controls and restricted areas;
3. Bagging Facility workers will have:
    1. Mandatory use of Purified Air Powered Respirators;
    2. Personal exposure monitoring;
4. Monitor gamma dose rates in closest building to the HRE concentrate storage area;
5. Regular inspections and vacuuming in bagging and HRE concentrate storage area:
6. Appropriate personal protective equipment to be worn in bagging plant and intensive sampling (monitoring) to validate modelled doses;
7. Permit to work for maintenance activities in bagging facility;
8. Management controls will be documented in management plans in accordance with RS Act registration.

4.1.6.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

No offsets are proposed.

4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No marine or coastal activity is included as part of the Proposed Action. The nearest Commonwealth Marine Area to the Proposed Action is Joseph Bonaparte Gulf Commonwealth Marine Reserve near Wyndam, approximately 450 km to the north.

4.1.8 Great Barrier Reef

4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Proposed Action is in Western Australia.

4.1.9 Water resource in relation to large coal mining development or coal seam gas

4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Proposed Action is not a coal mining or coal seam gas development.

4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Proposed Action will not occur within Commonwealth Land. The closest Commonwealth Land to the Proposed Action is Australian Government Property Register (AGPR) ID 4460, approximately 345 km to the north.

4.1.11 Commonwealth Heritage Places Overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No activity is being proposed in any places overseas.

4.1.12 Commonwealth or Commonwealth Agency

4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? *

No

4.2 Impact summary

Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

None

Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Threatened Species and Ecological Communities (S18)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth Heritage Places Overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

4.3 Alternatives

4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

4.3.8 Describe why alternatives for your proposed action were not possible. *

An alternative to the Proposed Action could have been to make no change to the action that was determined to be “not a controlled action” in previous EPBC Act assessments. The change that was made to the Broader Project, that resulted in this referral, was the removal of the hydrometallurgical process in the process plant. This change was found to be necessary following the pilot plant operations. The hydrometallurgical process had high water and electricity requirements, which could not be supplied in the remote Browns Range location.

The partnership between NTU and Iluka Resources has meant that the high energy / water consumption hydrometallurgical processing stage can be carried out at Iluka’s existing refinery in Eneabba.

As a result of the change in processing method at Browns Range, the HRE concentrate product has a higher radiation activity concentration that cannot be avoided but can be safely managed.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_1A_Figure 1 - Regional Location.pdf Figure 1 Regional location	22/04/2025	No	High
#2.	Document	Att_1B_Figure 2 - Project Area.pdf Figure 2 Project Area	22/04/2025	No	High
#3.	Document	Att_1C_Figure 3 - Project Process Flow Diagram.pdf Figure 3 Process flow	22/04/2025	No	High
#4.	Document	Att_1D_Figure 4 - Concentrate Drying Bagging Facility.pdf Figure 4 bagging facility	22/04/2025	No	High
#5.	Document	Att_1E_Figure 5 - Pallet Example.pdf Figure 5 Pallet	22/04/2025	No	High
#6.	Document	Att_2_Radionuclide Deportment Assessment.pdf ANSTO 2014 Radionuclide Deportment	01/06/2014	No	High
#7.	Link	National Directory for Radiation Protection – 2nd Edition. https://www.arpansa.gov.au/sites/default/files/n..			High

1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_24_Aurora Environmental 2023.pdf Aurora product transport advice	04/07/2023	No	High
#2.	Document	Att_4_Radiation Management Plan_v5.pdf Radiation Management Plan Pilot Plant	19/10/2021	No	High
#3.	Link	Matters of National Environmental Significance, Significant Impact Guidelines 1.1, Environmental Pro https://www.dcceew.gov.au/sites/default/files/do..			High

1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_1F_Figure 6 - Broader Project Stakeholder Consultation.pdf Figure 6 Broader stakeholder consult	22/04/2025	Yes	High
#2.	Document	Att_5_Stakeholder Consultation Register - Rad.pdf	14/04/2025	Yes	High

Broader Project stakeholder consultation relating to radiation					
#3.	Document	Att_5_Stakeholder Consultation Register - Rad_Redacted.pdf Attachment 5 Stakeholder register, agency staff names redacted	29/04/2025	No	High

1.3.2.17 (Person proposing to take the action) Proposer's history of responsible environmental management

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_6_Environmental and Social Management System Manual.pdf Sterling ESMS Manual	16/08/2023	No	High
#2.	Document	Att_7_Environment Policy.pdf NTU Environment Policy	14/04/2025	No	High
#3.	Document	Att_8_Community Policy.pdf NTU Community Policy	14/04/2025	No	High
#4.	Link	About Northern Minerals https://northernminerals.com.au/about-us/#corpor..			High

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_6_Environmental and Social Management System Manual.pdf Sterling ESMS Manual	15/08/2023	No	High
#2.	Document	Att_7_Environment Policy.pdf NTU Environment Policy	13/04/2025	No	High
#3.	Document	Att_8_Community Policy.pdf NTU Community Policy	13/04/2025		High
#4.	Link	Equator Principles EP4. https://equator-principles.com/app/uploads/The-E..			High

2.2.5 Tenure of the action area relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_1B_Figure 2 - Project Area.pdf Figure of Project area	22/04/2025	No	High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_9_Flora and Vegetation Assessment.pdf Mattiske flora and vegetation November 2023 - COMPLETE	22/11/2023	Yes	High
#2.	Document	Att_9_Flora and Vegetation Assessment_Redacted.pdf Attachment 9 with Priority flora locations redacted	29/04/2025	No	High

3.1.3 Natural features, important or unique values that applies to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	About the Australian Wetlands Database https://www.dcceew.gov.au/water/wetlands/austral..			High
#2.	Link	Directory of Important Wetlands https://www.environment.gov.au/cgi-bin/wetlands/..			High

3.1.4 Gradient relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Browns Range Rare Earths Project Draft Mine Rehabilitation and Closure Plan. Appendix P1 to the Brow https://www.epa.wa.gov.au/sites/default/files/AP..			High

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_10_Detailed Flora and Vegetation Assessment.pdf Mattiske 2025 BR mapping updated with alternative road corridor survey - COMPLETE	07/02/2025	Yes	High
#2.	Document	Att_10_Detailed Flora and Vegetation Assessment_Redacted.pdf Attachment 10 redacted priority flora locations	29/04/2025	No	High

#3.	Document	Att_11_Level 2 Vegetation and Flora Survey.pdf Outback Ecology 2014 L2 Vegetation and Flora survey impact assessment - COMPLETE	13/06/2014	Yes	High
#4.	Document	Att_11_Level 2 Vegetation and Flora Survey_Appendices_Redacted.pdf Attachment 11 Appendices to Mattiske report - Redacted	22/04/2025	No	High
#5.	Document	Att_11_Level 2 Vegetation and Flora Survey_Redacted.pdf Attachment 11 main report without appendices. Redacted	22/04/2025	No	High
#6.	Document	Att_12_Mattiske 2019.pdf Mattiske 2019 Dazzler and Access Road surveys - COMPLETE	01/06/2020	Yes	High
#7.	Document	Att_12_Mattiske 2019_Redacted.pdf Attachment 12 Figures 7 and 8 and App E page redacted	29/04/2025	No	High
#8.	Document	Att_13_Assessment of Fauna Values.pdf Bamford 2023 Assessment of changes to development envelope and footprint - COMPLETE	10/12/2023	Yes	High
#9.	Document	Att_13_Assessment of Fauna Values_Redacted.pdf Attachment 13 Figure 16 and App 6 redacted	29/04/2025	No	High
#10.	Document	Att_14_Terrestrial Vertebrate Fauna Baseline Survey.pdf Outback Ecology 2012 Vertebrate baseline survey - COMPLETE	17/10/2012	Yes	High
#11.	Document	Att_14_Terrestrial Vertebrate Fauna Baseline Survey_Redacted.pdf Attachment 14 Figure 15 and App H redacted	29/04/2025	No	High
#12.	Document	Att_15_Targeted Vertebrate Fauna Survey.pdf Outback Ecology 2014 Targeted Cons Sig fauna	21/02/2014	No	High
#13.	Document	Att_16_Pre-Clearing Survey for the Greater Bilby.docx Bamford Bilby Pre-clearing survey - COMPLETE	09/06/2017	Yes	High
#14.	Document	Att_16_Pre-Clearing Survey for the Greater Bilby_Redacted.pdf	29/04/2025	No	High

Attachment 16 Figure 1 and Apendix 1 redacted					
#15.	Document	Att_17_Dazzler Project Level 2 Vertebrate Fauna Survey.pdf Western Wildlife Dazzler and Access Road - COMPLETE	01/12/2020	Yes	High
#16.	Document	Att_17_Dazzler Project Level 2 Vertebrate Fauna Survey_Redacted.pdf Attachment 17 Figures 9 and 10 redacted	29/04/2025	No	High
#17.	Document	Att_18_Likely Presence and Habitat Usage of Night Parrot Guidelines.pdf DBCA Night Parrot survey guideline	01/03/2024	No	High
#18.	Document	Att_1B_Figure 2 - Project Area.pdf Figure of Project area	21/04/2025	No	High

3.2.2 Vegetation within the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_10_Detailed Flora and Vegetation Assessment.pdf Mattiske 2025 BR mapping updated with alternative road corridor survey	06/02/2025		High
#2.	Document	Att_11_Level 2 Vegetation and Flora Survey.pdf Outback Ecology 2014 L2 Vegetation and Flora survey impact assessment	12/06/2014		High
#3.	Document	Att_12_Mattiske 2019.pdf Mattiske 2019 Dazzler and Access Road surveys	31/05/2020		High
#4.	Document	Att_19_Baseline Soil and Landform Assessment.pdf Outback Ecology Baseline soil and landform	10/06/2014	No	High
#5.	Document	Att_1G_Figure 7 - Sheet 1 of 4_Redacted.pdf Figure 7 Vegetation Mapping 1 of 4. Excluding sensitive species	29/04/2025	No	High
#6.	Document	Att_1G_Figure 7 - Sheet 2 of 4_Redacted.pdf Figure 7 Vegetation Mapping 2 of 4. Excluding sensitive species	29/04/2025	No	High
#7.	Document	Att_1G_Figure 7 - Sheet 3 of 4_Redacted.pdf Figure 7 Vegetation Mapping 3 of 4. Excluding sensitive species	29/04/2025	No	High

#8.	Document	Att_1G_Figure 7 - Sheet 4 of 4_Redacted.pdf Figure 7 Vegetation Mapping 4 of 4. Excluding sensitive species	29/04/2025	No	High
#9.	Document	Att_1G_Figure 7 - Vegetation Mapping Sheets 1 to 4.pdf Attachment 1G Mattiske consolidated veg map with priority flora Sheets 1-4	22/04/2025	Yes	High
#10.	Document	Att_20_Desktop Flora and Vegetation Assessment.pdf Mattiske desktop including proposed alternative road corridor - COMPLETE	17/02/2025	Yes	High
#11.	Document	Att_20_Desktop Flora and Vegetation Assessment_Redacted.pdf Attachment 20 Figure 7 redacted	29/04/2025	No	High
#12.	Document	Att_21_Surface Water Management Plan.pdf WSP WP1-EW-PL-0100-001	19/09/2023	No	High
#13.	Document	Att_9_Flora and Vegetation Assessment.pdf Mattiske flora and vegetation November 2023	22/11/2023	No	High

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_1H_Figure 8 - Regional Hydrology.pdf Regional surface hydrology features	29/04/2025	No	High
#2.	Document	Att_21_Surface Water Management Plan.pdf WSP WP1-EW-PL-0100-001	18/09/2023		High
#3.	Document	Att_22_Stage 2 – Hydrogeological Test Drilling, Aquifer Testing and Assessment.pdf KCB Baseline condition Resource and Impacts	11/06/2014	No	High

4.1.4.3 (Threatened Species and Ecological Communities) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_23_Radiation Impact Assessment.pdf Resources Health and Safety Services Concentrate Bagging and Storage facilities	06/03/2025	No	High

#2.	Document	Att_4_Radiation Management Plan_v5.pdf Radiation Management Plan Pilot Plant	19/10/2021	No	High

4.1.5.3 (Migratory Species) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_13_Assessment of Fauna Values.pdf Bamford 2023 Assessment of changes to development envelope and footprint	09/12/2023		High
#2.	Document	Att_15_Targeted Vertebrate Fauna Survey.pdf Outback Ecology 2014 Targeted Cons Sig fauna	20/02/2014		High
#3.	Document	Att_23_Radiation Impact Assessment.pdf Resources Health and Safety Services Concentrate Bagging and Storage facilities	05/03/2025		High

4.1.6.2 (Nuclear) Why your action has a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_24_Aurora Environmental 2023.pdf Aurora product transport advice	13/04/2025	No	High

4.1.6.6 (Nuclear) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_23_Radiation Impact Assessment.pdf Resources Health and Safety Services Concentrate Bagging and Storage facilities	05/03/2025	No	High
#2.	Document	Att_25_RIA Peer Review Response Summary Table.pdf NTU summary of Calytrix peer review and outcomes	14/04/2025	No	High
#3.	Document	Att_3_Radioactive Waste Management Plan.pdf NTU et al RWMP for site registration	19/12/2019	No	High
#4.	Document	Att_4_Radiation Management Plan_v5.pdf Radiation Management Plan Pilot Plant	19/10/2021	No	High
#5.	Link				

		Lucas Heights Research Laboratories options for clean-up of the Maralinga Test Site. https://inis.iaea.org/records/3vx9r-2je36/previe..		High
#6.	Link	Radiation Protection of the Environment Guide G-1 https://Guide for Radiation Protection of the En..		High

4.1.6.9 (Nuclear) Why you do not think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_23_Radiation Impact Assessment.pdf Resources Health and Safety Services Concentrate Bagging and Storage facilities	05/03/2025	No	High
#2.	Document	Att_4_Radiation Management Plan_v5.pdf Radiation Management Plan Pilot Plant	13/04/2025	No	High

4.1.6.10 (Nuclear) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att_23_Radiation Impact Assessment.pdf Resources Health and Safety Services Concentrate Bagging and Storage facilities	05/03/2025		High
#2.	Document	Att_3_Radioactive Waste Management Plan.pdf NTU et al RWMP for site registration	18/12/2019	No	High
#3.	Document	Att_4_Radiation Management Plan_v5.pdf Radiation Management Plan Pilot Plant	13/04/2025	No	High

5.2 Declarations

Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

ABN/ACN	61119966353
Organisation name	NORTHERN MINERALS LIMITED
Organisation address	6005 WA
Representative's name	Julie Mahony
Representative's job title	Manager Environment
Phone	0448955529
Email	jmahony@northernminerals.com.au
Address	Ground Floor, 40 Kings Park Road, West Perth, WA 6005

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ By checking this box, I, **Julie Mahony of NORTHERN MINERALS LIMITED**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

Same as Referring party information.

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Julie Mahony of NORTHERN MINERALS LIMITED**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

☑ I, **Julie Mahony of NORTHERN MINERALS LIMITED**, the Person proposing the action, consent to the designation of **Julie Mahony of NORTHERN MINERALS LIMITED** as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

✔ Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Julie Mahony of NORTHERN MINERALS LIMITED**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *