Australian Government
Department of the Environment

Referral of proposed action

What is a referral?

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the matters of NES without approval from the Australian Government Environment Minister or the Minister's delegate. (Further references to 'the Minister' in this form include references to the Minister's delegate.) To obtain approval from the Environment Minister, a proposed action should be referred. The purpose of a referral is to obtain a decision on whether your proposed action will need formal assessment and approval under the EPBC Act.

Your referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be undertaken. These decisions are made within 20 business days, provided sufficient information is provided in the referral.

Who can make a referral?

Referrals may be made by or on behalf of a person proposing to take an action, the Commonwealth or a Commonwealth agency, a state or territory government, or agency, provided that the relevant government or agency has administrative responsibilities relating to the action.

When do I need to make a referral?

A referral must be made for actions that are likely to have a significant impact on the following matters protected by Part 3 of the EPBC Act:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Wetlands of international importance (sections 16 and 17B)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A)
- Protection of the environment from nuclear actions (sections 21 and 22A)
- Commonwealth marine environment (sections 23 and 24A)
- Great Barrier Reef Marine Park (sections 24B and 24C)
- A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
- The environment, if the action involves Commonwealth land (sections 26 and 27A), including:
    - actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land);
    - actions taken on Commonwealth land that may have a significant impact on the environment generally;
- The environment, if the action is taken by the Commonwealth (section 28)
- Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C)

You may still make a referral if you believe your action is not going to have a significant impact, or if you are unsure. This will provide a greater level of certainty that Commonwealth assessment requirements have been met.

To help you decide whether or not your proposed action requires approval (and therefore, if you should make a referral), the following guidance is available from the Department's website:

- the Policy Statement titled Significant Impact Guidelines 1.1 – Matters of National Environmental Significance. Additional sectoral guidelines are also available.

- the Policy Statement titled Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies.
- the Policy Statement titled Significant Impact Guidelines: Coal seam gas and large coal mining developments—Impacts on water resources.
- the interactive map tool (enter a location to obtain a report on what matters of NES may occur in that location).

Can I refer part of a larger action?

In certain circumstances, **the Minister may not accept a referral for an action that is a component of a larger action and may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (Section 74A, EPBC Act).** If you wish to make a referral for a staged or component referral, read 'Fact Sheet 6 Staged Developments/Split Referrals' and contact the Referrals Gateway (1800 803 772).

Do I need a permit?

Some activities may also require a permit under other sections of the EPBC Act or another law of the Commonwealth. Information is available on the Department's web site.

Is your action in the Great Barrier Reef Marine Park?

If your action is in the Great Barrier Reef Marine Park it may require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If a permission is required, referral of the action under the EPBC Act is deemed to be an application under the GBRMP Act (see section 37AB, GBRMP Act). This referral will be forwarded to the Great Barrier Reef Marine Park Authority (the Authority) for the Authority to commence its permit processes as required under the Great Barrier Reef Marine Park Regulations 1983. If a permission is not required under the GBRMP Act, no approval under the EPBC Act is required (see section 43, EPBC Act). The Authority can provide advice on relevant permission requirements applying to activities in the Marine Park.

The Authority is responsible for assessing applications for permissions under the GBRMP Act, GBRMP Regulations and Zoning Plan. Where assessment and approval is also required under the EPBC Act, a single integrated assessment for the purposes of both Acts will apply in most cases. Further information on environmental approval requirements applying to actions in the Great Barrier Reef Marine Park is available from http://www.gbrmpa.gov.au/ or by contacting GBRMPA's Environmental Assessment and Management Section on (07) 4750 0700.

The Authority may require a permit application assessment fee to be paid in relation to the assessment of applications for permissions required under the GBRMP Act, even if the permission is made as a referral under the EPBC Act. Further information on this is available from the Authority:

Great Barrier Reef Marine Park Authority

2-68 Flinders Street PO Box 1379
Townsville QLD 4810
AUSTRALIA

Phone: + 61 7 4750 0700
Fax: + 61 7 4772 6093

www.gbrmpa.gov.au

What information do I need to provide?

Completing all parts of this form will ensure that you submit the required information and will also assist the Department to process your referral efficiently. If a section of the referral document is not applicable to your proposal enter N/A.

You can complete your referral by entering your information into this Word file.

Instructions

Instructions are provided in blue text throughout the form.

Attachments/supporting information

The referral form should contain sufficient information to provide an adequate basis for a decision on the likely impacts of the proposed action. You should also provide supporting documentation, such as environmental reports or surveys, as attachments.

Coloured maps, figures or photographs to help explain the project and its location should also be submitted with your referral. Aerial photographs, in particular, can provide a useful perspective and context. Figures should be good quality as they may be scanned and viewed electronically as black and white documents. Maps should be of a scale that clearly shows the location of the proposed action and any environmental aspects of interest.

Please ensure any attachments are below three megabytes (3mb) as they will be published on the Department's website for public comment. To minimise file size, enclose maps and figures as separate files if necessary. If unsure, contact the Referrals Gateway (email address below) for advice. Attachments larger than three megabytes (3mb) may delay processing of your referral.

Note: the Minister may decide not to publish information that the Minister is satisfied is commercial-in-confidence.

How do I pay for my referral?

From 1 October 2014 the Australian Government commenced cost recovery arrangements for environmental assessments and some strategic assessments under the EPBC Act. If an action is referred on or after 1 October 2014, then cost recovery will apply to both the referral and any assessment activities undertaken. Further information regarding cost recovery can be found on the Department's website at: http://www.environment.gov.au/epbc/publications/cost-recovery-cris

Payment of the referral fee can be made using one of the following methods:

- **EFT Payments can be made to:**

  BSB: 092-009
  Bank Account No. 115859
  Amount: $7352
  Account Name: Department of the Environment.
  Bank: Reserve Bank of Australia
  Bank Address: 20-22 London Circuit Canberra ACT 2601
  Description: The reference number provided (see note below)

- **Cheque** - Payable to "Department of the Environment". Include the reference number provided (see note below), and if posted, address:

  The Referrals Gateway
  Environment Assessment Branch
  Department of the Environment
  GPO Box 787
  Canberra ACT 2601

- **Credit Card**

  Please contact the Collector of Public Money (CPM) directly (call (02) 6274 2930 or 6274 20260 and provide the reference number (see note below).

Note: in order to receive a reference number, submit your referral and the Referrals Gateway will email you the reference number.

How do I submit a referral?

Referrals may be submitted by mail or email.

Mail to:

Referrals Gateway
Environment Assessment Branch
Department of Environment
GPO Box 787
CANBERRA ACT 2601

- If submitting via mail, electronic copies of documentation (on CD/DVD or by email) are required.

Email to: epbc.referrals@environment.gov.au

- Clearly mark the email as a 'Referral under the EPBC Act'.
- Attach the referral as a Microsoft Word file and, if possible, a PDF file.
- **Follow up with a mailed hardcopy including copies of any attachments or supporting reports.**

What happens next?

Following receipt of a valid referral (containing all required information) you will be advised of the next steps in the process, and the referral and attachments will be published on the Department's web site for public comment.

The Department will write to you within 20 business days to advise you of the outcome of your referral and whether or not formal assessment and approval under the EPBC Act is required. There are a number of possible decisions regarding your referral:

The proposed action is NOT LIKELY to have a significant impact and does NOT NEED approval

No further consideration is required under the environmental assessment provisions of the EPBC Act and the action can proceed (subject to any other Commonwealth, state or local government requirements).

The proposed action is NOT LIKELY to have a significant impact IF undertaken in a particular manner

The action can proceed if undertaken in a particular manner (subject to any other Commonwealth, state or local government requirements). The particular manner in which you must carry out the action will be identified as part of the final decision. You must report your compliance with the particular manner to the Department.

The proposed action is LIKELY to have a significant impact and does NEED approval

If the action is likely to have a significant impact a decision will be made that it is a *controlled action*. The particular matters upon which the action may have a significant impact (such as World Heritage values or threatened species) are known as the *controlling provisions*.

The controlled action is subject to a public assessment process before a final decision can be made about whether to approve it. The assessment approach will usually be decided at the same time as the controlled action decision. (Further information about the levels of assessment and basis for deciding the approach are available on the Department's web site.)

The proposed action would have UNACCEPTABLE impacts and CANNOT proceed

The Minister may decide, on the basis of the information in the referral, that a referred action would have clearly unacceptable impacts on a protected matter and cannot proceed.

Compliance audits

If a decision is made to approve a project, the Department may audit it at any time to ensure that it is completed in accordance with the approval decision or the information provided in the referral. If the project changes, such that the likelihood of significant impacts could vary, you should write to the Department to advise of the changes. If your project is in the Great Barrier Reef Marine Park and a decision is made to approve it, the Authority may also audit it. (See "*Is your action in the Great Barrier Reef Marine Park,"* p.2, for more details).

For more information

- call the Department of the Environment Community Information Unit on 1800 803 772 or
- visit the web site http://www.environment.gov.au/epbc

All the information you need to make a referral, including documents referenced in this form, can be accessed from the above web site.

Referral of proposed action

Project title: Former Rum Jungle Mine Rehabilitation Project

1 Summary of proposed action

NOTE: You must also attach a map/plan(s) and associated geographic information system (GIS) vector (shapefile) dataset showing the location and approximate boundaries of the area in which the project is to occur. Maps in A4 size are preferred. You must also attach a map(s)/plan(s) showing the location and boundaries of the project area in respect to any features identified in 3.1 & 3.2, as well as the extent of any freehold, leasehold or other tenure identified in 3.3(i).

1.1 **Short description**

Use 2 or 3 sentences to uniquely identify the proposed action and its location.

The proposed action is the rehabilitation of the former Rum Jungle mine site (RJM), including the satellite operations of Mount Burton (MB) and Mount Fitch (MF). A preferred rehabilitation strategy has been developed for the project consistent with the views and beliefs of the traditional Aboriginal owners.

The preferred rehabilitation strategy involves backfilling one of the former mine pits at RJM, with material from the existing waste rock dumps and consolidating the remaining waste rock, and any residual contaminated soil, to a new, purpose-built waste rock dump. In addition the MB waste rock dump will be relocated to the purpose built facility at RJM, whilst the MF waste rock dump will be backfilled into the existing MF pit. Leading practice landform and cover designs will be developed and implemented for the in-filled pit and the new waste rock dump, with cover materials to be sourced from an off-site borrow pit. All covers will be revegetated with native species. Important cultural aspects of the landscape will be taken into account and wherever possible, protected or reinstated.

The project area is located near Batchelor in the Northern Territory, approximately 105 kilometres, by road, south of Darwin. Refer to Figures 1-4.

1.2 **Latitude and longitude**

Latitude and longitude details are used to accurately map the boundary of the proposed action. If these coordinates are inaccurate or insufficient it may delay the processing of your referral.

Table 1-1 Rum Jungle Mine site project area boundary coordinates

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-12	58	33.64	131	0	41.65
2	-12	58	41.38	131	1	36.73
3	-12	59	26.99	131	1	36.3
4	-12	59	31.74	131	1	29.78
5	-12	59	31.7	131	1	25.28
6	-12	59	34.8	131	1	25.5
7	-13	0	1.69	131	0	51.55
8	-13	0	1.84	131	0	43.06
9	-12	59	43.12	131	0	9.43
10	-12	59	35.7	130	59	59.46
11	-12	59	27.85	130	59	59.06
12	-12	59	26.95	131	0	2.63
13	-12	59	23.82	131	0	1.84
14	-12	59	24.54	130	59	58.81
15	-12	59	10.18	130	59	57.55
16	-12	59	10.03	130	59	54.28
17	-12	58	39.43	130	59	54.42
18	-12	58	39.43	131	0	4.86
19	-12	58	37.09	131	0	4.86

Latitude and longitude

Latitude and longitude details are used to accurately map the boundary of the proposed action. If these coordinates are inaccurate or insufficient it may delay the processing of your referral.

Table 1-2 Mt Fitch project area coordinates

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-12	57	0.25	130	57	3.89

Table 1-3 Mt Burton project area coordinates

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-12	58	44.17	130	57	56.71

Table 1-4 FRLT Borrow Area project area boundary coordinates. Borrow pits are within boundary.

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-12	58	39.84	131	4	57.64
2	-12	58	39.81	131	5	0.99
3	-12	58	33.32	131	5	0.94
4	-12	58	33.51	131	5	34.05
5	-12	58	23.89	131	5	33.97
6	-12	58	23.34	131	5	54.03
7	-12	59	44.36	131	5	53.85
8	-12	59	44.28	131	5	11.4
9	-12	58	52.43	131	5	10.97
10	-12	58	52.32	131	4	57.75

Table 1-5 Coordinates for Borrow Pit Haul Road

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-12	58	44.98	131	1	36.51
2	-12	58	48.32	131	1	39.71
3	-12	58	49.15	131	1	43.44
4	-12	58	48.53	131	1	45.85
5	-12	58	14.4	131	2	31.56
6	-12	58	12.02	131	2	34.56
7	-12	58	0.76	131	2	45.33
8	-12	57	56.18	131	2	53.11
9	-12	57	53.29	131	2	58.22
10	-12	57	52.45	131	3	1.67
11	-12	57	52.69	131	3	5.21
12	-12	57	53.62	131	3	7.8
13	-12	57	59.42	131	3	15.46
14	-12	58	2.27	131	3	18.02
15	-12	58	5.57	131	3	19.93
16	-12	58	11.35	131	3	21.7
17	-12	58	19.26	131	3	23.83
18	-12	58	22.34	131	3	25.77
19	-12	58	24.43	131	3	28.34
20	-12	58	25.73	131	3	31.8
21	-12	58	25.86	131	3	35.13
22	-12	58	24.91	131	3	41.79
23	-12	58	24.88	131	3	44.71
24	-12	58	25.75	131	3	48.49
25	-12	58	30.28	131	3	58.13
26	-12	58	30.48	131	4	1.87
27	-12	58	29.49	131	4	4.83
28	-12	58	17.01	131	4	18.19
29	-12	58	15.87	131	4	20.67
30	-12	58	15.75	131	4	22.96
31	-12	58	17.25	131	4	34.36
32	-12	58	18.91	131	4	37.86
33	-12	58	21.54	131	4	40.67
34	-12	58	32.56	131	4	48.77
35	-12	58	34.91	131	4	51.26
36	-12	58	39.83	131	4	59.17

Table 1-6 Coordinates for Site Access Road

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-13°	0'	27.33"	131°	0'	10.88"
2	-13°	0'	25.93"	131°	0'	13.10"
3	-13°	0'	23.79"	131°	0'	15.20"
4	-13°	0'	21.55"	131°	0'	17.24"
5	-13°	0'	19.34"	131°	0'	19.21"
6	-13°	0'	16.94"	131°	0'	21.38"
7	-13°	0'	14.32"	131°	0'	23.75"
8	-13°	0'	11.85"	131°	0'	25.99"
9	-13°	0'	9.34"	131°	0'	28.22"
10	-13°	0'	6.85"	131°	0'	30.49"
11	-13°	0'	4.85"	131°	0'	32.27"
12	-13°	0'	2.34"	131°	0'	33.58"
13	-12°	59'	59.83"	131°	0'	33.95"
14	-12°	59'	57.87"	131°	0'	33.71"
15	-12°	59'	56.03"	131°	0'	32.96"

The Interactive Mapping Tool may provide assistance in determining the coordinates for your project area.
If the area is less than 5 hectares, provide the location as a single pair of latitude and longitude references. If the area is greater than 5 hectares, provide bounding location points.
There should be no more than 50 sets of bounding location coordinate points per proposal area.
Bounding location coordinate points should be provided sequentially in either a clockwise or anticlockwise direction.
If the proposed action is linear (eg. a road or pipeline), provide coordinates for each turning point.
Also attach the associated GIS-compliant file that delineates the proposed referral area. If the area is less than 5 hectares, please provide the location as a point layer. If greater than 5 hectares, please provide a polygon layer. If the proposed action is linear (eg. a road or pipline) please provide a polyline layer (refer to GIS data supply guidelines at Attachment A).

Do not use AMG coordinates.

The coordinate points for Rum Jungle, Mount Fitch, Mount Burton, Finniss River Lands Trust (FRLT) Borrow Area, the Borrow Area Haul Road and the Site Access are listed above in Table 1-1 to Table 1-6. Table 1-1 is of the Main Rum Jungle site which will house all the contaminated material. A single pair of latitude and longitude reference points has also been provided in Tables 1-2 and Table 1-3, for both Mount Fitch and Mount Burton, respectively. Table 1-4 is of the coordinates for the FRLT Borrow Area. Table 1-5 and 1-6 provides coordinate points the Borrow Area Haul Road and Site Access road, respectively.

GIS shapefiles have been provided for the entire proposed disturbance.

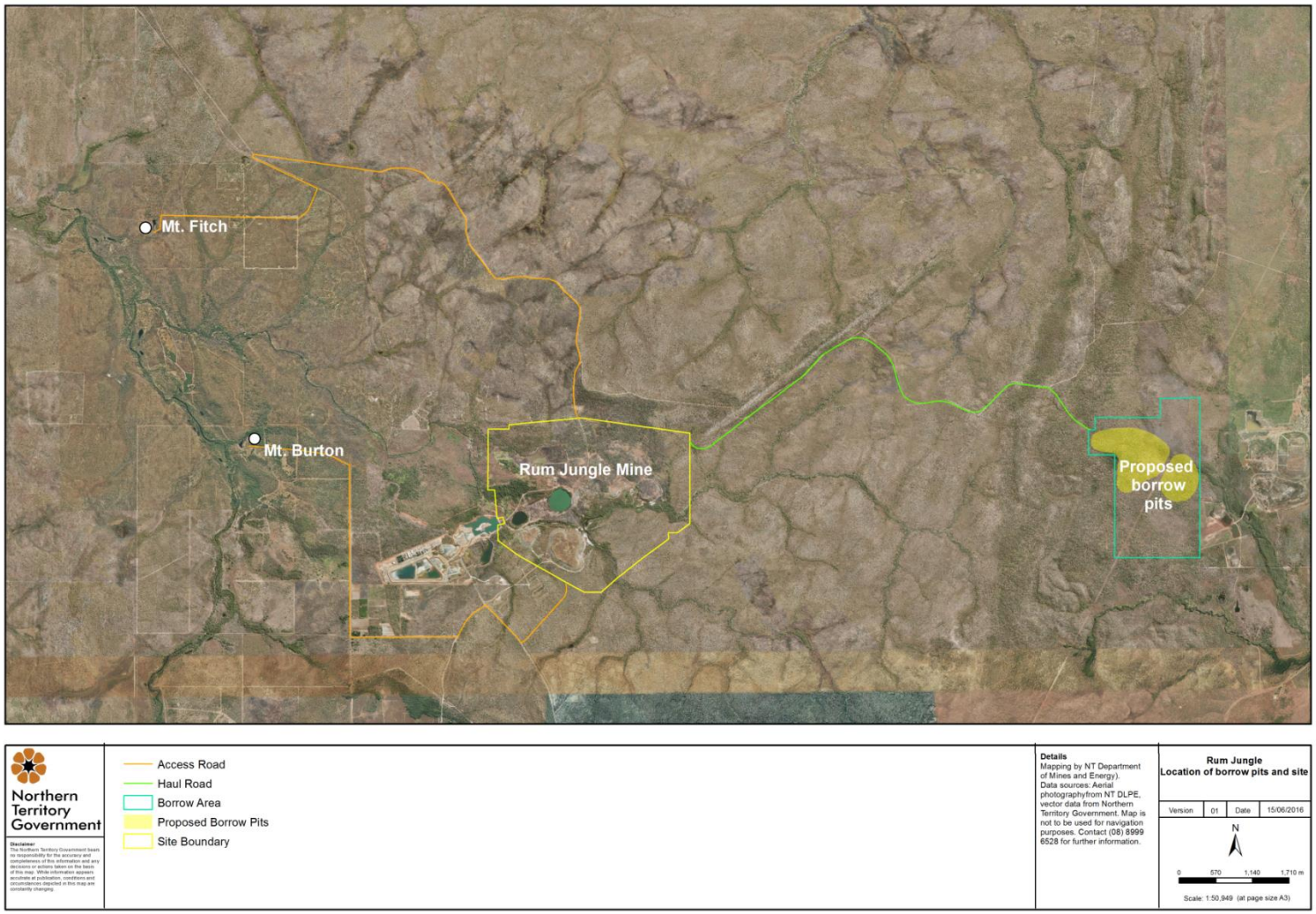

Figure 1 Project location for Rum Jungle Mine site, satellite sites of Mount Burton and Mount Fitch, proposed Borrow Area and accompanying haul roads (note: orange indicates use of existing access roads).

1.3 **Locality and property description**

Provide a brief physical description of the property on which the proposed action will take place and the project location (eg. proximity to major towns, or for off-shore projects, shortest distance to mainland).

Rum Jungle comprises approximately 650 hectares of relatively elevated ground, bisected by wet season ephemeral streams that feed into the East Branch of the Finniss River (East Branch). The East Branch joins the Finniss River about eight kilometres downstream of Rum Jungle. The Finniss River then flows west for about 60 kilometres before emptying into Fog Bay. The Rum Jungle uranium ore body was discovered in 1949. Rum Jungle was mined for uranium, copper, nickel and lead from 1954 to 1971 using open pit methods. Subsequent smaller finds included Mount Burton which was mined in 1958, with ore trucked to and processed at the main Rum Jungle mine site and the exploration site of Mount Fitch. The Commonwealth Government, under the Atomic Energy Act, engaged a contractor to undertake all mining and milling activities.

The mining and placement methods used for waste rock and process tailings during this time resulted in the generation of substantial volumes of acid and metalliferous drainage (AMD). Ongoing oxidation of sulfide minerals in the waste, followed by annual wet season leaching of soluble oxidation products released large concentrations of copper, other heavy metals and acid into the surrounding environment.

The Commonwealth Government initiated an aesthetic clean-up of the Rum Jungle mine site in 1977. The government also formed the Rum Jungle Working Group to develop rehabilitation options for the site. The outcome of this technical assessment and planning effort was a four-year rehabilitation project funding by the Commonwealth Government and undertaken from 1982-1986.

Post-rehabilitation monitoring and maintenance found that the rehabilitation objectives were achieved. However, more recent studies have documented the gradual deterioration of those works and the site does not meet contemporary water quality standards. Further, previous mining and rehabilitation was undertaken without the input of the joint traditional Aboriginal owners of the site – Kungarakan and Warai. Additional problems also arose with how to manage wildfire, weeds, feral animals, and access.

Rum Jungle currently consists of the following features (Figure 2):

- three waste rock dumps – Main, Intermediate and Dysons
- two water-filled mine pits – Main and Intermediate
- one mine pit backfilled with tailings and overlain with contaminated soil - Dysons

The AMD currently affecting the East Branch and the Finniss River downstream of the mine contains concentrations of cobalt, copper, and nickel that exceed Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guideline trigger values for the protection of aquatic ecosystems during low-flow periods in the river. Copper concentrations exceed the trigger values in the East Branch under all flow conditions. A comprehensive groundwater investigation identified localised groundwater contamination on the site.

Investigations also identified localised contamination of soil with metals that require clean up, including the operations area, the old tailings dam area, and fluvial areas. These areas may also include radiological contamination (i.e. unclaimed tailings, boulders).

The vegetation within previously rehabilitated areas at Rum Jungle is composed of mostly grass species, with significant weed infestations – predominantly gamba grass – which has restricted native vegetation re-colonisation, leading to erosion and degradation of the existing covers on the waste rock dumps.

The Mount Burton mine site is located approximately four kilometres west of the main Rum Jungle site, on the north flank of a low ridge. An open pit was mined to a depth of 35 metres between October and November 1958. The Mount Burton Mine produced 6000 tonnes of uranium–copper ore, including 2400 tonnes of bogum (below ore grade uranium material) and 1400 tonnes of copper ore. Approximately 100,000m^3 of overburden were placed in a waste rock dump located immediately east of the open pit (Figure 3), this currently occupies an area of 2.2 Ha. The pit was allowed to flood after mining ceased in 1958. The Finniss River is 200 metres west of the open pit. Overflow from the pit flows into Mount Burton Spring Creek to the north of the pit, which then flows into the Finniss River. After mining ceased, the land that Mount Burton mine is situated on was converted to private freehold in 1965 and remains occupied by the same family today. There has been no post-mining remediation of the site.

The Mount Fitch site is approximately 3.5 kilometres northwest of Mount Burton mine on a low rise east of the Finniss River. In 1966, exploration drilling was carried out to a depth of 130 metres and a small open pit was excavated for process evaluation. However, the ore was not recovered and was left in the pit (Davy, 1975). A small overburden heap, covering 0.7 Ha is located directly south of the pit (see Figure 4). The pit itself was allowed to fill with water following completion of activities in 1969. Presently, the land on which Mount Fitch is situated is held by the Northern Territory as a form of Crown Lease. There has been no post-mining remediation of this site.

1.3

Finniss River Land Claim No.39 was lodged by the Northern Land Council on behalf of claimants on 20 July 1979, under section 50(1)(a) of the *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA). Rum Jungle formed part of the area subject to the claim. An inquiry into the claim was conducted by the Aboriginal Land Commissioner, who recommended that the majority of land subject to the claim, including Rum Jungle, be granted to Aboriginal Land Trusts established under ALRA. Kungarakan and Warai people were found to be the traditional Aboriginal owners of Rum Jungle and other areas subject to claim. The majority of the land recommended for grant was vested in two Aboriginal Land Trusts. No decision on the potential grant of Rum Jungle has yet been made, pending the outcome of negotiations between the Commonwealth Government, the Northern Land Council and Kungarakan and Warai people about the future of the site, including rehabilitation.

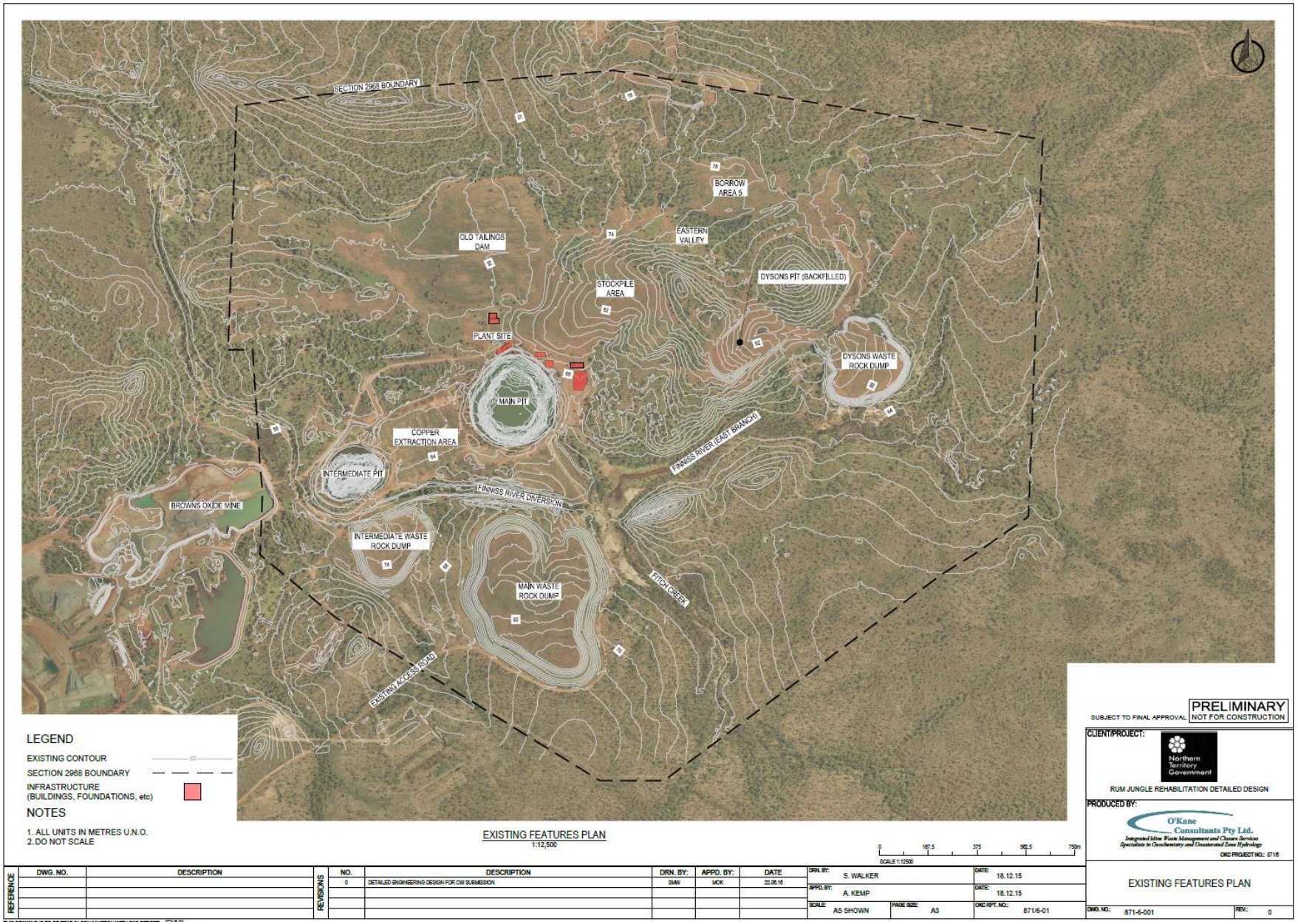

Figure 2. Map of Rum Jungle Mine site and its existing features.

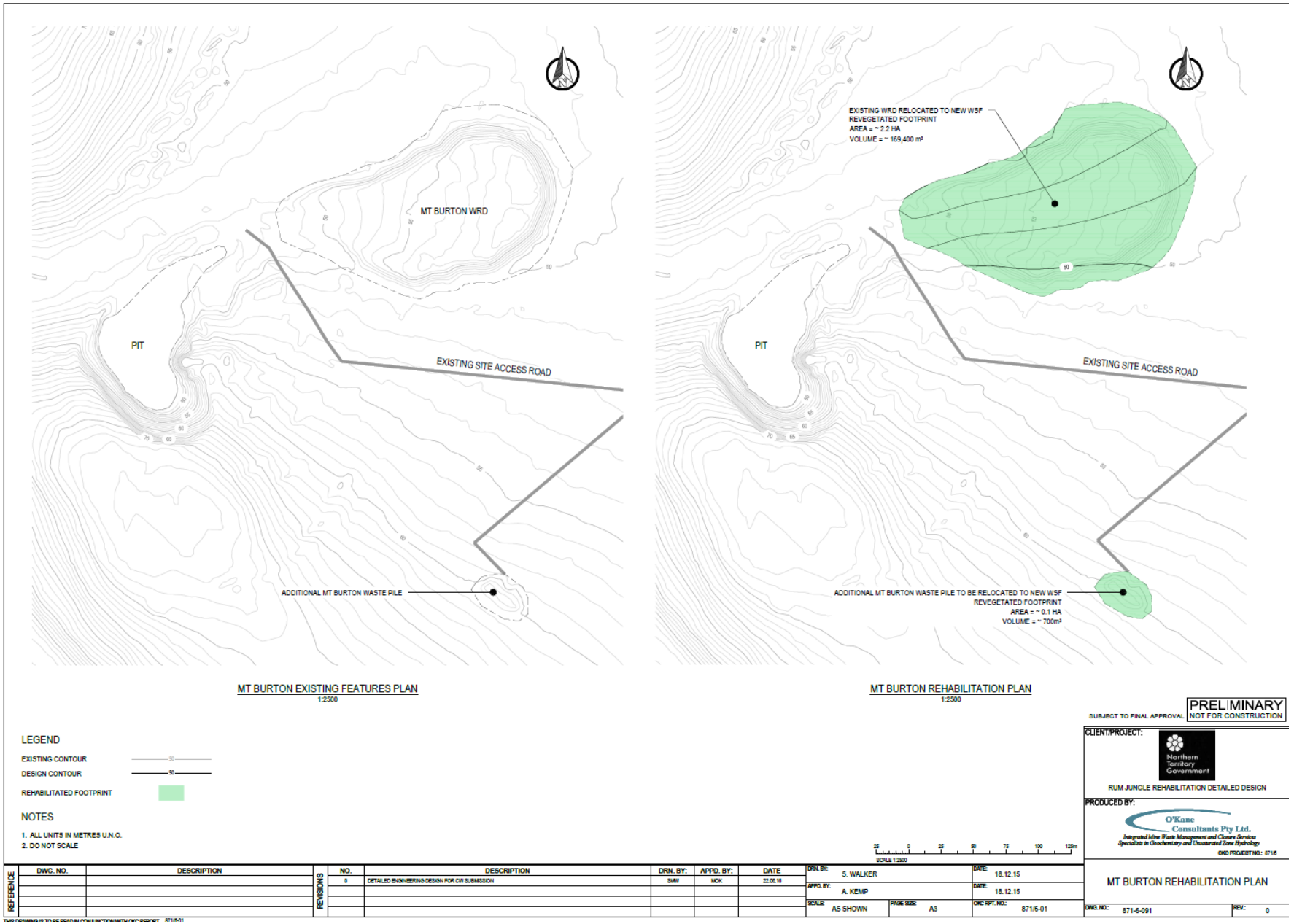

Figure 3. Mount Burton features and proposed rehabilitation plan map.

Figure 4. Mount Fitch features and proposed rehabilitation plan map.

1.4 **Size of the development footprint or work area (hectares)**

The proposed disturbance footprint including the existing areas on the Rum Jungle site, the widening of existing roads and the creation of new sections of haul road, the offsite borrow pit area on the Finniss River Land trust east of Rum Jungle mine and the removal of material at both Mount Fitch and Mount Burton.

Total disturbance area is 242 hectares.

1.5 **Street address of the site**

- Rum Jungle Mine Site: 847 Rum Jungle Road, Batchelor, NT 0845
- Mount Burton: 397 White Road, Rum Jungle, NT 0822.
- Mount Fitch: 1580 Litchfield Park Road, Charlotte, NT 0822.
- FRLT Borrow Area: 710 Batchelor Road, Rum Jungle, NT 0822.

1.6 **Lot description**

Describe the lot numbers and title description, if known.

The tenure designation of:

a) Rum Jungle is Section 2968 Hundred of Goyder, held as vacant Northern Territory Crown Land; refer to Figure 5

b) Mount Burton is Section 981 Hundred of Goyder, held as freehold land; refer to Figure 5

c) Mount Fitch is Northern Territory Portion 3283, held as Crown Lease in perpetuity 862, refer to Figure 5

d) Finniss River Lands Trust Borrow Area is Section 2940 Hundred of Goyder, held as Aboriginal Freehold in the possession of the Finniss River Lands Trust, refer to Figure 5.

1.7 **Local Government Area and Council contact (if known)**

If the project is subject to local government planning approval, provide the name of the relevant council contact officer.

Rum Jungle, Mount Burton, Mount Fitch and the Finniss River Lands Trust Borrow Area are all located within the Coomalie Shire, an area governed by the Coomalie Community Government Council.

1.8 **Time frame**

Specify the time frame in which the action will be taken including the estimated start date of construction/operation.

The earliest possible start date for the proposed action is May 2017 (Dry Season 2017). The proposed works will likely be undertaken over a 8 year period, with majority of the construction and operational works to be carried out during the dry season. The proposed action is subject to the provision of future capital works funding, currently being sought by the Commonwealth Department of Industry, Innovation and Science.

1.9	**Alternatives to proposed action** Were any feasible alternatives to taking the proposed action (including not taking the action) considered but are not proposed?		No
		✓	Yes, you must also complete section 2.2

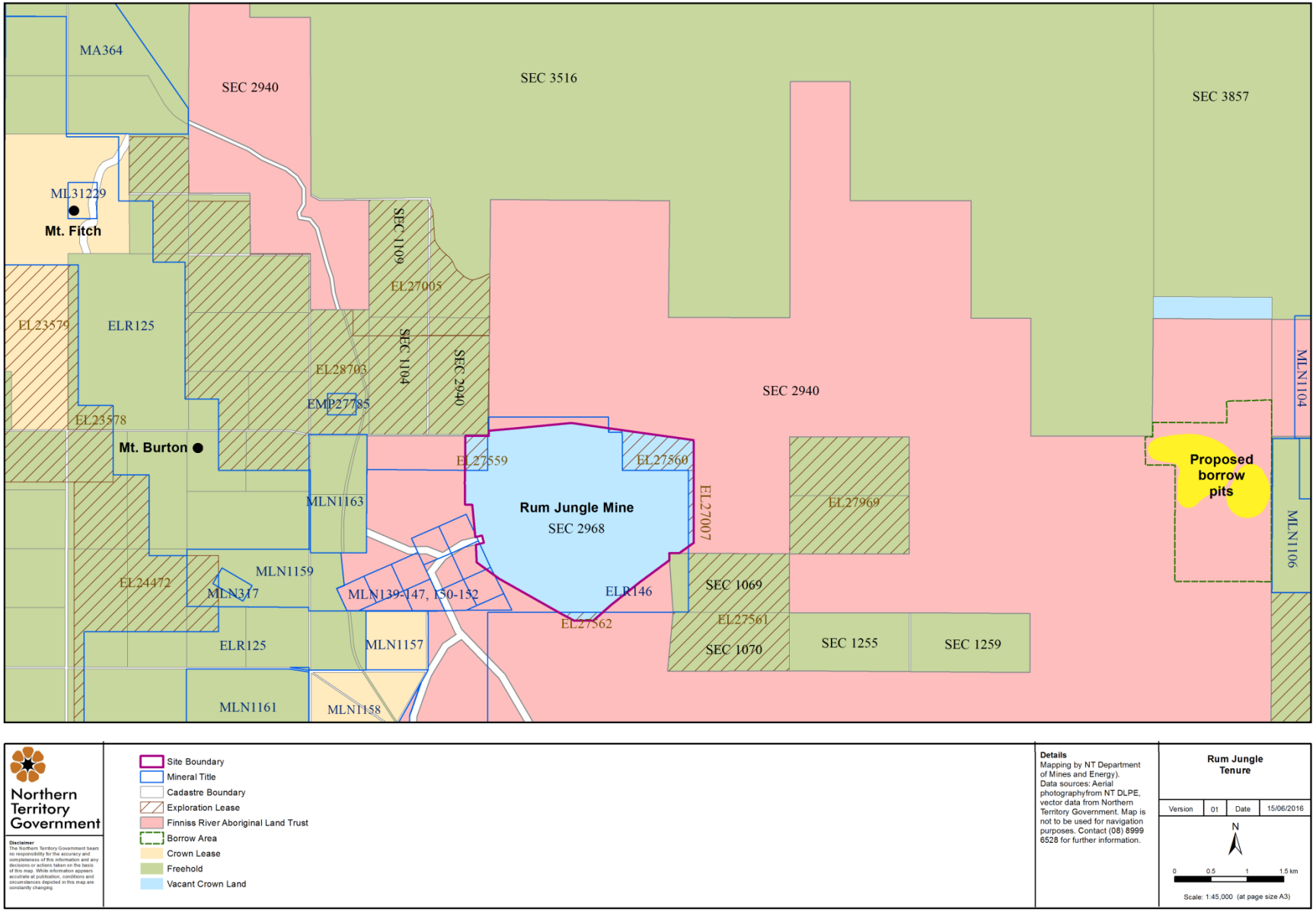

Figure 5. Tenure Map

1.10	**Alternative time frames etc** Does the proposed action include alternative time frames, locations or activities?		No
		✓	Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment** Is the action subject to a state or territory environmental impact assessment?		No
		✓	Yes, you must also complete Section 2.5
1.12	**Component of larger action** Is the proposed action a component of a larger action?	✓	No
			Yes, you must also complete Section 2.7
1.13	**Related actions/proposals** Is the proposed action related to other actions or proposals in the region (if known)?	✓	No
			Yes, provide details:
1.14	**Australian Government funding** Has the person proposing to take the action received any Australian Government grant funding to undertake this project?	✓	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park** Is the proposed action inside the Great Barrier Reef Marine Park?	✓	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

NOTE: It is important that the description is complete and includes all components and activities associated with the action. If certain related components are not intended to be included within the scope of the referral, this should be clearly explained in section 2.7.

2.1 Description of proposed action

This should be a detailed description outlining all activities and aspects of the proposed action and should reference figures and/or attachments, as appropriate.

Rum Jungle is a highly disturbed landscape, not only from past mining activities but also from the rehabilitation process in the 1980's when substantial borrow pits were created in order to create covers on the waste rock dumps and Dysons backfilled pit.

The proposed action (rehabilitation of Rum Jungle) aims to address the long-term environmental legacy issues at the Rum Jungle and the satellite sites of Mount Fitch and Mount Burton. The proposed rehabilitation action addresses the rehabilitation objectives which were developed in consultation with stakeholders during the National Partnership Agreement (2009-2013) (Attachment A), see also section 2.4 and 2.6.

The rehabilitation objectives aim to create a landscape that:

- Is safe for people and wildlife
- Is chemically, radiologically and physically stable
- Has a significantly reduced contaminant load (associated with AMD) travelling beyond the boundaries of the site
- Supports sustainable land uses by traditional Aboriginal owners of the area with few, if any, limitations
- Encourages beneficial alternative post-rehabilitation land uses.

The Kungarakan and Warai are recognised as joint traditional owners of the Rum Jungle site. Their objectives for rehabilitation and post-rehabilitation land use are summed up in their vision for the site. As they do not differentiate between environment and culture, their vision is largely drawn from their cultural and social principles:

> *Kungarakan and Warai desire that Rum Jungle will be returned to a natural, living environment that also provides for a return to traditional ceremony, culture and subsistence use of natural resources. In modern society, this may include development of commercial operations that are managed according to Kungarakan and Warai traditional principles.*

The post-mining landform must be returned as close as possible to the landform that existed before mining, with no detrimental impacts on the downstream environment or on the neighbours of Kungarakan and Warai who live downstream.

To Kungarakan and Warai, rehabilitation of the physical landscape will allow spiritual healing of the country. The following outcomes are required for their vision and for the healing process to be achieved:

- culturally appropriate preservation of Aboriginal cultural heritage
- re-establishment of the original landform as far as achieving the best outcomes allows
- removing or neutralising pollution sources
- removing any risk of radiological hazard
- remediating polluted groundwater
- stopping surface water from being polluted
- restoring flora and fauna species endemic to the site and its immediate surrounds
- maximising employment and business opportunities throughout the rehabilitation process.

The rehabilitation is focussed on relocating the most-reactive (AMD forming) waste to the Main pit void, with residual waste (less reactive) being relocated to a new purpose built Waste Rock Dump (WRD) to the north. Approximately thirty percent of the total volume of waste material currently stored on site will be used to refill Main pit, significantly reducing the current above ground waste at Rum Jungle. The northern location was primarily selected for the above-ground WRD as it is positioned away from sacred sites and is not significantly affected by flood. Leading practice cover and landform designs will be developed for the WRD to prevent AMD and all previously disturbed areas will be revegetated with native species.

Specifically, the rehabilitation works will involve:

- Dewatering of Main pit during the Wet Season. Surface and groundwater flows and quality will be monitored closely during dewatering. It is anticipated that contaminated water will be encountered at depth and this water will be treated through a water treatment system and released during the wet season when the river is flowing to provide maximum dilution.
- Dredging of historic tailings currently located at the base ofMain pit. Tailings will be filter pressed, temporarily (short-term) stockpiled and consolidated to a new purpose built WRD in the northern location on site.
- Waste material from Dyson's backfilled Pit (to grade), Intermediate WRD and a portion of Main WRD (most reactive waste) will be relocated to Main pit following de-watering and dredging of tailings.
- Residual waste from Main WRD, Dysons WRD and contaminated soils (including from fluvial areas) will be consolidated to the new WSF.
- All waste will be mixed with lime prior to being relocated to either Main pit or the new WSF.
- Leading practice cover and landforms designs will be utilised in the construction of covers over the Main pit, Dysons pit and new WRD. This will comprise of clays, soils and growth mediums and be revegetated with locally collected native tree species. The design of the Main pit cover will include the reinstatement of East Branch of the Finniss River to as far as practicable, its pre-mining course.
- A seepage collection system will be constructed to collect any seepage encountered beneath the new WSF. This seepage will be directed to Intermediate pit to be passively treated.
- Borrow pits will be excavated to extract necessary material for the cover construction. Borrow pits has been carefully selected and a Fauna and Flora assessment of the area has been carried out (See Attachment B, Borrow pit and haul road investigation).
- The Mount Burton WRD will be excavated and transported to Rum Jungle for long-term disposal in the WSF at Rum Jungle.
- The small overburden heap at Mount Fitch, located directly south of the pit and some surface disturbance is evident to the west, will be relocated into the Mount Fitch Pit.
- Landform design and revegetation will be undertaken on disturbed areas following rehabilitation works, including WRD footprint areas, old tailing dam area, old borrow pits, haul roads etc.
- Weed and fire management programs will be implemented to assist in the successful establishment of native vegetation (see Attachment C for Weed Management Plan).
- Intermediate pit will remain as a water-filled void for use as a passive water treatment system. Intermediate pit will act as a flow through system, similar to the current site configuration, to provide annual flushing of the pit during the Wet Season in order to meet water quality targets..
- Important cultural aspects of the landscape will continue to be taken into account and wherever possible, actions to protect or reinstate them will be incorporated into the final design.
- Access tracks will be upgraded to ensure the rehabilitation works are implemented in a safe and timely manner, this includes construction of haul roads and a bridge to provide all weather access during construction.

The Main pit has a total volume of 3.1 Mm^3 below RL 58.5 m (following dredging of tailings), and will be filled to 58.5m RL with PAF-I t and PAF-2 type material below the saturated zone of the pit. The primary sources and volumes of waste rock materials destined for the backfill Main Pit is outlined in Table 2-1.

Volumes of material which will be managed during this rehabilitation project are summarised in Table 2-1.

Table 2-1 Total Main Pit waste backfill components (O'Kanes, 2016; Detailed Design Report)

Source of Waste to Main Pit	Volume (m^3)
Main WRD	1,324,180
Intermediate WRD	781,150
Dysons Pit Backfill	511,500
Dysons WRD (Coarse)	150,000
Lime Addition	29,540
Main Pit Ramp	20,570
Total to RL 58.5	**2,816,940**

The WSF will be located in the northern location (refer to Figure 6). The WSF has been specifically designed to provide a long-term containment of all materials types with the exception of material classed as PAF I waste, which will be relocated to Main pit. Waste allocated to the WSF includes dewatered tailings from Main Pit, waste from Main, Main North and Dysons WRD, waste from Mount Burton, and contaminated soils from the copper extraction area, Old Tailings Dam area, Old Stockpile area, material from fluvial areas and from miscellaneous salt-affected soils across site (Table 2-2).

Table 2-2: Total Waste to New WSF.

Source of Waste to New WSF	Volume (m^3)
Main WRD	3,328,090
Main North WRD	151,800
Dysons WRD	1,112,985
Copper Extraction Area	144,000
Old Tailings Area	264,000
Finniss River new excavation	226,600
Pit Levees	144,500
Dried Tailings	574,934
Mt Burton	169,400
Old Stockpile Area	396,000
Drill Rig Site	34,200
Eastern Valley	13,000
Salt affected soils - Dysons	58,500
Salt affected soils - Finniss	65,250
Salt affected soils - West	13,000
Lime addition	15,906
Total	**6,712,165**

The predicted site layout after the implementation of the preferred rehabilitation strategy is shown in Figure 6. Sections 2.2 and 2.3 below outline the alternatives considered prior to arriving at this preferred strategy.

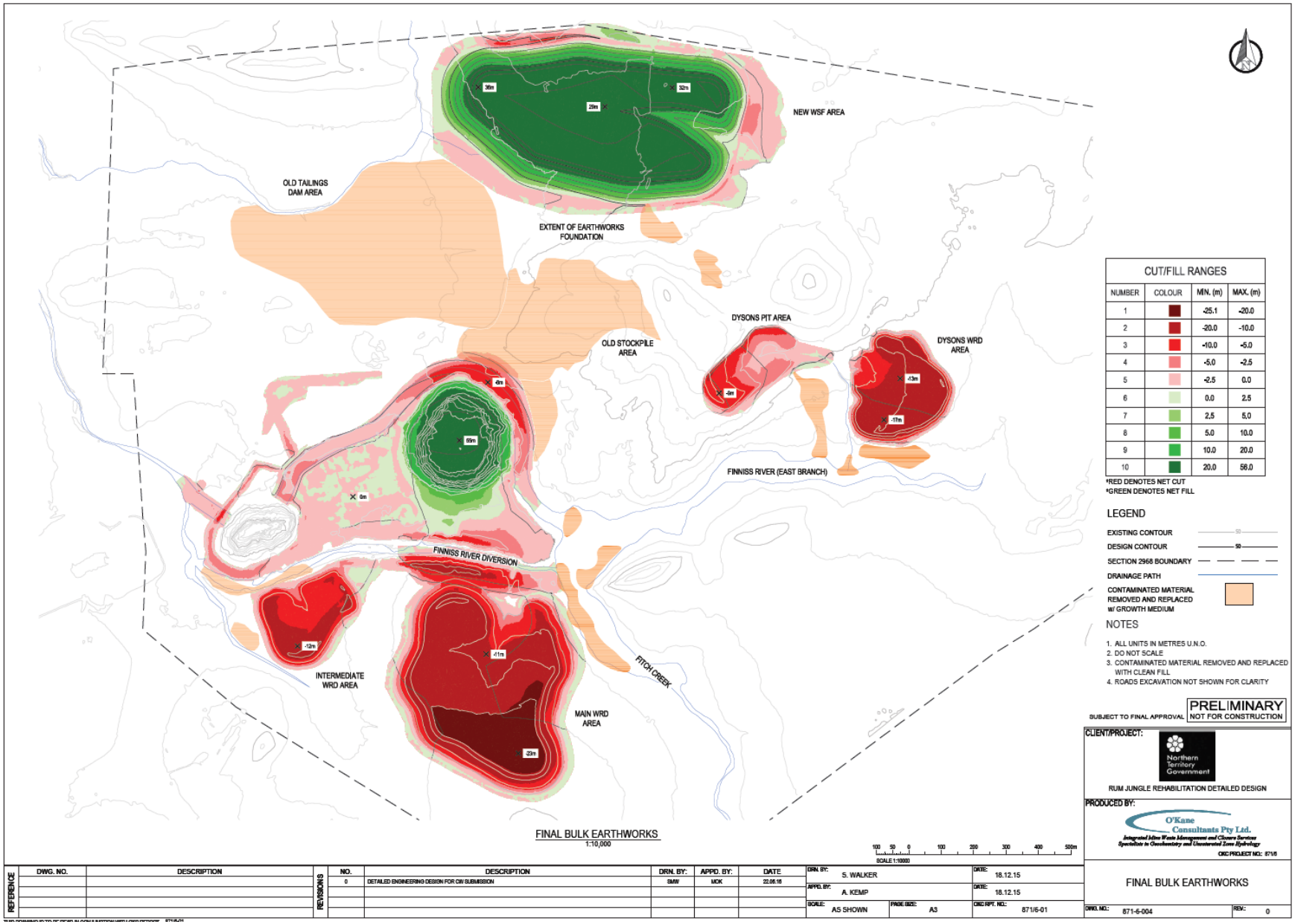

Figure 6 Predicted Rum Jungle site features after implementation of the preferred rehabilitation strategy.

2.2 Alternatives to taking the proposed action

This should be a detailed description outlining any feasible alternatives to taking the proposed action (including not taking the action) that were considered but are not proposed (note, this is distinct from any proposed alternatives relating to location, time frames, or activities – see section 2.3).

The do nothing scenario, while discussed in the context of rehabilitation planning, was not included in the rehabilitation scenarios for consideration during the technical expert and stakeholder options ranking process (see section 2.3). This is because it does not address the environmental, Commonwealth Government and traditional Aboriginal owner objectives, nor standards for radiological and environmental protection which are relevant to a former mine site. Rum Jungle in its current condition, if left un-rehabilitated, will continue to generate pollution and limit land use/access and provide a source of conflict with traditional Aboriginal owners. The onsite pollution and resulting environmental impacts downstream of Rum Jungle will worsen over time as soil covers further degrade and weathering processes accelerate the rate of acid and metalliferous drainage from waste rock and tailings. Other areas of *in situ* contamination which were not rehabilitated in the 1980's will continue to interact with, and contaminate, surface and groundwater. There is no evidence to demonstrate that this contamination will be naturally attenuated or exhausted in the short or long term, so mitigation measures are essential if environmental impacts are to be addressed.

If sites are left un-rehabilitated they will inevitably lead to increasing liability over time. As a developed nation, within the Asia-Pacific region there are additional reputational risks for Australia if no action were to be taken. Through the Department of Foreign Affairs and Trade (DFAT) (formerly AusAID) Australia promotes leading practice mining methods to developing countries via its Leading Practice Sustainable Development in Mining series, so effective rehabilitation and closure of Rum Jungle provides an ideal opportunity for the Commonwealth Government to demonstrate the application of this leading practice knowledge. Implementation and communication of this case study will further elevate the reputation of the Commonwealth Government in the region.

2.3 Alternative locations, time frames or activities that form part of the referred action

If you have identified that the proposed action includes alternative time frames, locations or activities (in section 1.10) you must complete this section. Describe any alternatives related to the physical location of the action, time frames within which the action is to be taken and alternative methods or activities for undertaking the action. For each alternative location, time frame or activity identified, you must also complete (where relevant) the details in sections 1.2-1.9, 2.4-2.7, 3.3 and 4. Please note, if the action that you propose to take is determined to be a controlled action, any alternative locations, time frames or activities that are identified here may be subject to environmental assessment and a decision on whether to approve the alternative.

Five potential rehabilitation scenarios were developed and assessed to evaluate how each scenario addressed the rehabilitation objectives (see Section 2.1). As stated previously, these objectives were developed through consultation with stakeholders, including the two traditional Aboriginal owner groups.

The five scenarios evaluated included;

Scenario 1—Re-cover waste rock dumps *in situ*

This scenario focused on constructing new cover systems over the existing waste landforms and did not involve any major relocation of waste materials. It also included clean-up of contaminated land.

Scenario 2—Backfill Intermediate and Main pits then consolidate remaining waste rock into the Main waste rock dump

This scenario involved backfilling the Main and Intermediate pits and consolidating and re-covering all residual waste rock into the Main waste rock dump. This would substantially reduce the amount of waste rock stored at the surface.

Scenario 3—Backfill the Intermediate and Main pits and consolidate remaining waste rock into Dysons waste rock dump

This scenario involved backfilling the Main and Intermediate pits and consolidating all remaining waste rock into Dysons waste rock dump and constructing a cover system over the waste rock dump. This approach is similar to Scenario 2; however, in Scenario 3, waste material from the Main waste rock dump is moved and consolidated into the Dysons waste rock dump, which moves the waste away from its close proximity to drainage, however it creates a larger landform to be covered, rehabilitated and managed and is close to culturally sensitive sites.

Scenario 4—Backfill Main and Intermediate pits and consolidate the remaining waste rock to a new facility in the former tailings dam area

The preferred rehabilitation strategy is based on a modification of Scenario 4, as outlined in the Conceptual Rehabilitation Plan, 2013. This involves:

- The construction of a new purpose built WSF in an area sited above selected flood levels, on the northern boundary of the Rum Jungle (see Figure 6), and is comprised of excess waste material which cannot be

accommodated in the Main Pit void; this includes excess materials from Dysons, Main and Main North WRDs, and other site contaminated materials;

- Utilise Intermediate Pit as a water detention/dilution reservoir. Main Pit will be dewatered (and backfilled). A refinement of the rehabilitation strategy (from that outlined in the CRP) is to retain Intermediate Pit in its current open state, rather than dewater and backfill. This is to provide strategic flexibility (storage/treatment capacity) utilising Intermediate Pit as a surface water storage reservoir and long term surface water buffer;
- Dewatering Main Pit and if required treating the water to meet applicable discharge requirements;
- Backfilling Main Pit with waste rock considered to have the highest potential to produce Acid and Metalliferous Drainage. The material is to be selectively sourced from Dysons backfilled pit area, Intermediate WRD and Main WRD. Lime will be incorporated into the waste as it is backfilled into the pit;
- Construction of a cover system over the Main and Dysons Pit and the new WSF; and
- Construction of other features for water treatment, potentially including wetlands or reactive barriers.

Scenario 5—Backfill Main Pit and leave the Intermediate pit as a lake.

This scenario involved backfilling the Main pit, leaving Intermediate pit as a lake and consolidating residual waste rock to the Main waste rock dump. More waste material would remain above ground however the Intermediate pit lake would provide some buffering of water quality under this scenario.

These rehabilitation scenarios are documented in detail in the Conceptual Rehabilitation Plan, (DME, 2013).

2.4 Context, planning framework and state/local government requirements

Explain the context in which the action is proposed, including any relevant planning framework at the state and/or local government level (e.g. within scope of a management plan, planning initiative or policy framework). Describe any Commonwealth or state legislation or policies under which approvals are required or will be considered against.

As part of the 2009-10 budget, the Commonwealth Government committed over $7 million over a four-year period for the environmental management of Rum Jungle (Commonwealth Government, 2009). In order to manage this commitment, the Northern Territory and Commonwealth Governments entered into a four-year National Partnership Agreement (Attachment A) on the management of the former Rum Jungle mine site (NPA). The objectives of the NPA were to improve site maintenance and environmental monitoring activities and to develop an improved rehabilitation strategy for the site consistent with the views and interests of stakeholders particularly the joint traditional Aboriginal owners of the site – Kungarakan and Warai. The NPA has been driven by the Northern Territory Department of Mines and Energy (DME), with technical oversight from the Rum Jungle Working Group, comprised of Northern Territory and Commonwealth Government agencies and the Northern Land Council.

The NPA was completed on schedule and on budget on 30 June 2013 including the submission of the Conceptual Rehabilitation Plan which was endorsed by the sites traditional Aboriginal owners and accepted by the former Commonwealth Minister for Resources Energy and Tourism and Commonwealth Cabinet. In August 2013 a new Project Agreement (Attachment D) for Stage 2 (due to completed by 30 June 2016) was signed between the Commonwealth and Northern Territory Government. The activities under this new agreement include: preparation of a detailed engineering design (including supporting investigations); scheduling arrangements (project management); preparation of detailed procurement packages; stakeholder engagement; and ongoing site monitoring and maintenance. These tasks are necessary to allow for costing the preferred rehabilitation strategy to a satisfactory level of accuracy to support the Commonwealth in its development of a Detailed Business Case to seek funding under the Two Stage Capital Works Approval Process.

In the 2016 Federal budget a further $10.048 million was committed to Rum Jungle in FY2016-17 as part of Stage 2.5. Stage 2.5 is an interim project that ensures continuity in a number of critical areas including environmental monitoring, site maintenance and stakeholder consultation. It provides funds for repairs and maintenance works to the existing cover system at Rum Jungle Creek South, which is another satellite area that is neither part of the Stage 3 agreement nor this referral. The works at Rum Jungle Creek South will provide significant capacity building opportunities for traditional owners and local business which should translate into enhanced opportunities for them to fully participate in the subsequent and far more substantial rehabilitation works at Rum Jungle (Stage 3). In addition, DME will undertake verification works to optimise rehabilitation design and continue to support the Commonwealth in its development of the Detailed Business Case to seek capital works funding for Stage 3 under the Commonwealth's Two Stage Capital Works Approval Process.

The submission of this referral fulfils the requirement of relevant environmental approvals for the Stage 3 implementation works for this project.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

If you have identified that the proposed action will be or has been subject to a state or territory environmental impact statement (in section 1.11) you must complete this section. Describe any environmental assessment of the relevant impacts of the project that has been, is being, or will be carried out under state or territory legislation. Specify the type and nature of the assessment, the relevant legislation and the current status of any assessments or approvals. Where possible, provide contact details for the state/territory assessment contact officer.

A Notice of Intent (NOI) will be prepared as part of the Northern Territory environmental impact assessment process, under the Northern Territory *Environmental Assessment Act*. This document will detail the potential on and off site environmental impacts of the proposed rehabilitation, as well as the proposed management actions and requirements to prevent, minimise or mitigate these impacts.

Describe or summarise any public consultation undertaken, or to be undertaken, during the assessment. Attach copies of relevant assessment documentation and outcomes of public consultations (if available).

Refer to section 2.6

2.6 Public consultation (including with Indigenous stakeholders)

Your referral must include a description of any public consultation that has been, or is being, undertaken. Where Indigenous stakeholders are likely to be affected by your proposed action, your referral should describe any consultations undertaken with Indigenous stakeholders. Identify the relevant stakeholders and the status of consultations at the time of the referral. Where appropriate include copies of documents recording the outcomes of any consultations.

Since the commencement of the National Partnership Agreement in 2009, significant consultation has been undertaken as part of the rehabilitation planning for Rum Jungle through a Communication Strategy developed by DME (formerly the Department of Resources), refer to Attachment E. Prior to 2009 limited consultation occurred with traditional Aboriginal owners and as a result DME had to invest significant resources in creating relationships and trust with traditional Aboriginal owners which are now very strong.

The objectives of the communication strategy are to achieve the outcomes of the NPA (2009) and the more recent PA (2013) by:

- Generating and maintaining stakeholder interest, support and ownership towards the project;
- Maximising opportunities for community and indigenous involvement in the project;
- Increasing awareness and understanding among audiences of the commitment by the Commonwealth and NT Governments to improve the management of the site and develop rehabilitation options in consultation with stakeholders;
- Ensuring stakeholders have access to information regarding the rehabilitation project through regular, factual and transparent information exchanges; and
- Applying targeted communication methodologies that best suit the intended audience.

Table 2-3 provides a summary of the stakeholders consulted since 2009. The key stakeholder groups consist of the traditional Aboriginal owners of the site, Kungarakan and Warai, and the Rum Jungle Working Group. Since 2009 quarterly meetings have been held with traditional Aboriginal owner groups, the Northern Land Council (NLC), NT DME and Commonwealth Department of Industry, Innovation and Science (DIIS). In addition, quarterly meetings have been held with the Rum Jungle Working Group, a committee comprising technical experts tasked with providing oversight to the project and includes NT DME, Commonwealth DIIS, Commonwealth Environmental Research Institute of the Supervising Scientist (ERISS), NLC and the NT Environment Protection Authority (EPA) (formerly the NT Department of Natural Resources, Environment, the Arts and Sport).

In February 2013 several workshops were held with these key stakeholders to rigorously evaluate the five rehabilitation scenarios for Rum Jungle. The outcome of the workshops was the selection of a preferred rehabilitation strategy for the site which best met environmental, technical, cultural and cost considerations at a conceptual level. For further details on the selection of the preferred rehabilitation strategy see section 2.3. The then Commonwealth Minister for Resources and Energy accepted the Conceptual Rehabilitation Plan in June 2013 endorsing the preferred rehabilitation strategy for the site. NT DME and Commonwealth DIIS will continue to engage with relevant stakeholders during the current Project Agreement.

The current preferred strategy is a product of continual refinement, incorporating the outcomes of further investigations, including flood modelling and an engineering design workshop that assed the strategy using a Failure Modes Effects Analysis (FMEA). This current agreed rehabilitation plan has been endorsed by both traditional owner groups of the Kungarakan and Warai.

Table 2-3 Summary of stakeholder consultation to date

Stakeholder	Frequency of communication	Matters discussed/context	Current status and stakeholder position
Key Stakeholders			
Joint Traditional Aboriginal Owners of the site – Kungarakan and Warai	• Quarterly meetings • Full information briefings • Rehabilitation Planning Meetings (February 2013) • Other meetings as required (e.g. for specific projects)	Discuss upcoming site investigation projects, environmental monitoring programs, site maintenance activities, rehabilitation options for the site, and explore opportunities for employment. The traditional owners were heavily involved in workshops to select a preferred option from five rehabilitation scenarios for the site.	The Kungarakan and Warai endorsed the preferred rehabilitation strategy identified in the Conceptual Rehabilitation Plan (2013). The strategy best met their needs from a cultural and social perspective. Discussions are continuing with the traditional owners to keep them informed of progress under Stage 2. Commonwealth DIIS has been tasked with building capacity amongst traditional owners through the Stage 2 project.
Rum Jungle Working Group (RJWG)	Quarterly RJWG meetings and ad-hoc (e.g. reviewing documents outside of meetings)	Provide technical rigour and oversight to the project through expert advice and input, reviewing documents, authoring sections of the rehabilitation plan, and evaluating the rehabilitation options.	The RJWG had significant involvement in both the development and evaluation of rehabilitation options and have endorsed the Conceptual Rehabilitation Plan.
Other stakeholders			
Traditional Owners in areas downstream of the mine site, along the Finniss River system	Bi-annually	Informed of activities occurring at Rum Jungle, conceptual rehabilitation plan, water quality conditions at the site and in areas downstream, aquatic ecosystem health particularly for bush foods and species of cultural significance.	Traditional owners located in downstream areas are concerned about potential water quality impacts, aquatic ecosystem health and spread of aquatic weeds. They are supportive of the rehabilitation project.
Commonwealth Minister for Resources and Energy	As required	Portfolio responsibility for Rum Jungle	In June 2013 the then Minister for Resources, Energy and Tourism endorsed the Conceptual Rehabilitation Plan including the preferred rehabilitation strategy.
NT Minister for Mines and Energy	As required	Portfolio responsibility for NT Mines and Energy, oversight of the PA	Minister is well-briefed on the subject and is very supportive of the project.
Affected landowners downstream (other than the traditional owners identified above)	As required	Information on the activities being undertaken as part of rehabilitation planning and the conceptual rehabilitation plan.	Downstream landowners are supportive of the rehabilitation project as it aims to improve water quality conditions in areas downstream of the site.
Rum Jungle Stakeholder Advisory Group	Bi-annually	Provide an open forum to discuss the activities being undertaken for rehabilitation planning,	Being a diverse group there are different views regarding Rum Jungle. Most stakeholders are

		provide input to the project and to inform its respective stakeholders of the work being undertaken.	concerned about the ongoing contamination from the site but also acknowledge that detailed site characterisation and planning is required to ensure robust rehabilitation works are designed.
Compass Operations Limited (formerly HNC (Australia) Resources Pty Ltd)[1]	As required	Operate the Browns Oxide leases located adjacent to Rum Jungle and have a number of exploration licences around Batchelor including over the Rum Jungle site.	HAR has been well briefed on the activities being undertaken and the rehabilitation strategy proposed.
Coomalie Community Government Council (Batchelor Council)	As required	CCGC is the title holder of Rum Jungle Creek South (RJCS). Significant consultation occurred with the Council regarding a radiological assessment by *eriss* in 2012[2] and recent assessment of the RJCS WRD cover system.	Council noted the radiological assessment at Rum Jungle Creek South. The site continues to be used as a recreational reserve. Council is supportive of the rehabilitation plan for Rum Jungle.
Australian and International Publications and Conference Presentations	• Presentations at the Annual Acid and Metalliferous Drainage Conference[3] • Articles in the Australasian Institute of Mining and Metallurgy (AusIMM)[4] • Presentation and articles at the AusIMM Uranium Conference[5] • Presentation at the Annual BC-MEND ML/ARD Workshop[6]	DME has invested significant amount of time in preparing material for uranium and mine rehabilitation related publications and has presented at national and international conferences. DME has also lead a number of site visits with conference delegates.	Informed of the rehabilitation planning at Rum Jungle and are supportive of the project.

1. Established to capture any stakeholders that were not previously captured by either the RJWG or Liaison Committee and comprises; DME, DoIS, Amateur Fisherman's Association of the NT (AFANT), HNC (Australia) Resources Pty Ltd, Rum Jungle Action Group, NT Seafood Council, Kungarakan and Warai traditional owners, Environment Centre NT, Minerals Council of Australia (NT Branch), Environmental Defenders Office, Northern Land Council, NT EPA, Territory Resource Management Group, Coomalie Community Government Council.
2. Bollhofer, A., Doering, C., Fox, G., Pfitzner, J., & Medley, P. 2012. Assessment of the radiological exposure pathways at Rum Jungle Creek South (Rum Jungle Lake Reserve) – Batchelor. Environmental Research Institute of the Supervising Scientist, Department of Sustainability, Environment, Water, Population and Communities, Darwin, NT.
3. Presentation at the 8th Annual Acid and Metalliferous Drainage Conference, Adelaide, April 2014.
4. Fawcett, M. N. R. and Rider, M. C. 2010. The Rum Jungle Project. AusIMM Bulletin. Issue no. 2, April 2011, pp. 16-19. Laurencont, T. The Rum Jungle rehabilitation project – a progress report. AusIMM bulletin. Issue no. 2, April 2014, pp 50-52.
5. Fawcett, M. & Waggitt, P. Uranium in the Northern Territory – The History of Rum Jungle 1949 – 2009. Ferguson, P. Wels, C. & Laurencont, T. Evaluation of alternative rehabilitation scenarious for Rum Jungle via a Multiple Accounts Analysis. Laurencont, T. & Rider, M. The Rum Jungle National Partnership Agreement. Articles and presentations during the AusIMM International Uranium Conference 2013, 11-12 June 2013, Darwin NT.
6. Presentation at the 20th Annual British Columbia (BC) MEND ML/Acid R

2.7 A staged development or component of a larger project

If you have identified that the proposed action is a component of a larger action (in section 1.12) you must complete this section. Provide information about the larger action and details of any interdependency between the stages/components and the larger action. You may also provide justification as to why you believe it is reasonable for the referred action to be considered separately from the larger proposal (eg. the referred action is 'stand-alone' and viable in its own right, there are separate responsibilities for component actions or approvals have been split in a similar way at the state or local government levels).

The proposed action is not a staged development or a component of a larger project.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest.

Your assessment of likely impacts should refer to the following resources (available from the Department's web site):

- specific values of individual World Heritage properties and National Heritage places and the ecological character of Ramsar wetlands;
- profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;
- *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*; and
- associated sectoral and species policy statements available on the web site, as relevant.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The Minister has prepared four marine bioregional plans (MBP) in accordance with section 176. It is likely that the MBP's will be more commonly relevant where listed threatened species, listed migratory species or a Commonwealth marine area is considered.

Note that even if your proposal will not be taken in a World Heritage area, Ramsar wetland, Commonwealth marine area, the Great Barrier Reef Marine Park or on Commonwealth land, it could still impact upon these areas (for example, through downstream impacts). Consideration of likely impacts should include both direct and indirect impacts.

3.1 (a) World Heritage Properties

Description

There are no World Heritage Properties in or near the project area.

Nature and extent of likely impact

Address any impacts on the World Heritage values of any World Heritage property.

There will be no impact on the World Heritage values of any World Heritage Property as a result of the proposed action.

3.1 (b) National Heritage Places

Description

There are no National Heritage Places in or near the project area.

Nature and extent of likely impact

Address any impacts on the National Heritage values of any National Heritage place.

There will be no impact on the National Heritage values of any National Heritage place as a result of the proposed action.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

There are no Wetlands of International Importance in or near the project area.

Nature and extent of likely impact

Address any impacts on the ecological character of any Ramsar wetlands.

There will be no impact on the ecological character of any Ramsar wetlands as a result of the proposed action.

3.1 (d) Listed threatened species and ecological communities Description

Rum Jungle and site access

According to the EPBC Act Matters of National Environmental Significance search tool 15 listed threatened species potentially occur at Rum Jungle, these species are shown in Table 3-1, Attachment G and Attachment H. The search included a buffer of 1km around Rum Jungle. No listed threatened ecological communities were identified as potentially occurring at Rum Jungle or within the 1km buffer.

The likelihood of the 15 listed threatened species actually occurring at Rum Jungle was determined by Eco Logical (2014) (Attachment I), when only 11 threatened species were identified. This assessment was based on ecological characteristics of the species as determined from threatened species information sheets, field guides, and other published information. The results of the likelihood assessment are provided below in Table 3-1 and Figure 9.

FRLT Borrow Area and Haul Road

The EPBC Protected Matters Search revealed 10 birds, 13 terrestrial mammals, three terrestrial reptiles and seven plants species. An assessment of likelihood was made for each of these species based upon their ecology and known distribution and population trends (Table 3-1). This assessment considered the Partridge Pigeon and Black-footed Tree-rat as likely to occur in the project area.

An additional nine species were considered to possibly occur in the region. The birds, Red Goshawk, Gouldian Finch, Masked Owl, mammals Fawn Antechinus, Northern Brush Tailed Phascogale and Bare-rumped Sheathtail Bat and the plants *Acacia praetermissa, Atalaya brevilata, Helicteres macrothrix* as possibly occurring in the area.

The likelihood of the thirty-three listed threatened species actually occurring at the FRLT Borrow Area and along the haul road was determined by EcOz Environmental Consultants (2016), see Attachment B. This assessment was based on:

- An EPBC Protect Matters Search of the Pine Creek bioregion (accessed on 27/5/2016). The project area lies in the Pine Creek Bioregion which covers an area of 28 520 km^2. Land types are mainly hilly to rugged ridges with undulating plains. Vegetation communities include eucalypt woodlands, with patches of monsoon forests. A search on the entire bioregion was used as it provides a comprehensive list of matters protected under the EPBC.
- A search of the NT Flora and Fauna Atlas Databases for all listed (EPBC and TPWC) threatened species recorded within 10 km of the project area.
- Consideration of literature on the distribution and habitat of threatened species identified in the database searches to assess the likelihood of these species occurring in the project area.
- An examination of aerial imagery of the project area with vegetation communities delineated at a 1:10,000 scale.
- A ground-truthing of vegetation communities and consideration of threatened species habitat was undertaken by a qualified ecologist and botanist between 17 and 18 May 2016. This involved:
    - visiting all of the vegetation communities identified from aerial photography, describing the vegetation and making an assessment of habitat quality considering the threatened species that are known or likely to occur in the area
    - active searching for threatened flora species in appropriate habitat in the project area.
- An assessment was then made of the likely impact upon threatened species from the proposed clearing for borrow and the haul road.

Mt Fitch

According to the EPBC Act Matters of National Environmental Significance search tool fifteen listed threatened species potentially occur at Mt Fitch, these species are shown in Table 3-1 and Attachment J. The search included a buffer of 1km around the proposed work area at Mt Fitch. No listed threatened ecological communities were identified as potentially occurring at Mt Fitch or within the 1km buffer.

Mt Burton

According to the EPBC Act Matters of National Environmental Significance search tool sixteen listed threatened species potentially occur at Mt Burton, these species are shown in Table 3-1 and Attachment K. The search included a buffer of 1km around the proposed work area at Mt Burton. No listed threatened ecological communities were identified as potentially occurring at Mt Burton or within the 1km buffer.

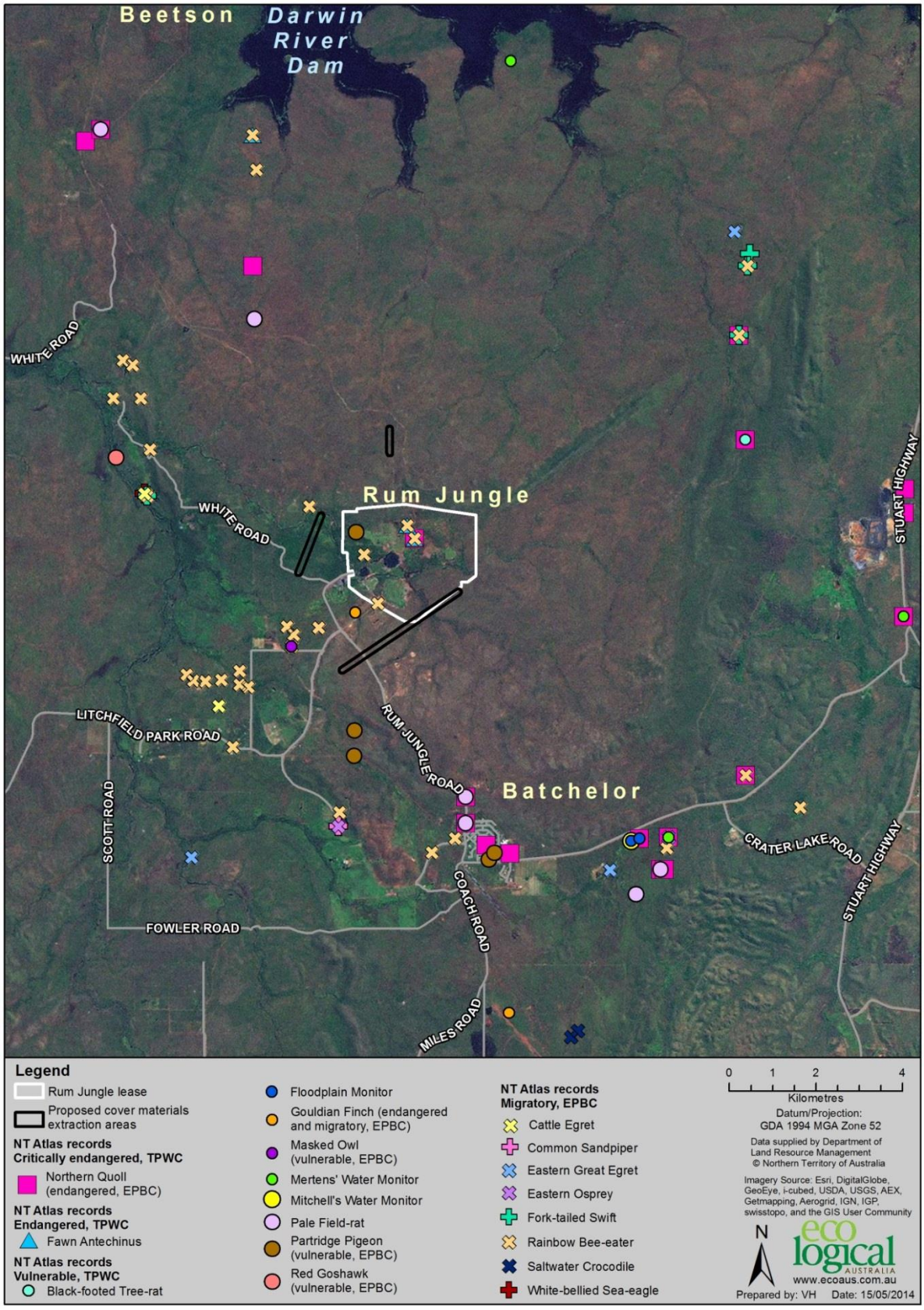

Figure 9 Listed threatened and migratory species records within 10 km of Rum Jungle covering the areas of Mt Burton, Mt Fitch, Haul Road and Borrow Area. (Eco Logical Australia 2014)

Table 3-1. Likelihood Analyses for EPBC Listed Threatened Species within the Rum Jungle project area.

Common Name	EPBC Status	EPBC Protected Matters Results#	Likelihood of Occurrence*				Reasoning
			1. Rum Jungle Mine**	2. Borrow Pit and Haul Roads	3. Mt Burton	4. Mt Fitch	
Birds							
Red Goshawk *Erythrotriorchis radiatus*	Vulnerable	Species or species habitat known to occur within area	May	May	May	May	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016, EcOz, 2016). Most recent records are from the adjacent Browns Oxide Site (Tidemann 2002; EMS 2005).
Gouldian Finch *Erythrura gouldiae*	Endangered	Species or species habitat known to occur within area	Unlikely	May	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016; EcOz, 2016).
Partridge Pigeon (eastern) *Geophaps smithii smithii*	Vulnerable	Species or species habitat known to occur within area	Known	May	Unlikely	Unlikely	Records of this species were obtained during the recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016) and adjacent Browns Oxide surveys (Tidemann 2002; EMS 2005).
Australian Painted Snipe *Rostratula australis*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). No suitable habitat (EcOz, 2016).
Masked Owl (northern) *Tyto novaehollandiae kimberli*	Vulnerable	Species or species habitat Known to occur within area	Unlikely	May	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
White-throated Grasswren *Amytornis woodwardi*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (EcOz, 2016)

Yellow Chat (Alligator River) *Epthianura crocea tunneyi*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (Ecoz, 2016)
Northern Shrike-tit *Falcunculus frontatus whitei*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No records in the Coomalie region (EcOz, 2016)
Mammals							
Fawn Antechinus *Antechinus bellus*	Vulnerable	Species or species habitat known to occur within area	May	May	May	May	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). Most recent records are from the adjacent Browns Oxide Site (EMS 2005).
Brush-tailed Rabbit-rat, Brush-tailed Tree-rat *Conilurus penicillatus*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). Outside current known range (EcOz, 2016).
Northern Quoll *Dasyurus hallucatus*	Endangered	Species or species habitat known to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). Most recent records are from the adjacent Browns Oxide Site (EMS 2005). Broad-scale declines of this species have been documented across the entire top end (Brathwaite & Griffiths 1994), especially in conjunction with the introduction of the Cane Toad (*Rhinella marinus*) (Woinarski et al. 2010). Presumed regionally extinct (EcOz, 2016).
Arnhem Leaf-nosed Bat *Hipposideros (diadema) inornata*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable roosting habitat (EcOz, 2016).

Ghost bat *Macroderma gigas*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Black-footed Tree-rat *Mesembriomys gouldii gouldii*	Endangered	Species or species habitat known to occur within area	May	May	May	May	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). Most recent records are from the adjacent Browns Oxide Site (EMS 2005). Evidence sited during recent fauna survey (EcOz, 2016).
Golden-backed Tree-rat *Mesembriomys macrurus*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Presumed regionally extinct (EcOz, 2016).
Northern Hopping-Mouse *Notomys aquilo*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Outside known range (EcOz, 2016).
Narbalek (Top End) *Petrogale concinna canescens*	Endangered	Species or species habitat likely to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). No suitable habitat (EcOz, 2016).
Northern Brush-tailed Phascogale *Phascogale pirata*	Vulnerable	Species or species habitat likely to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). Most recent records are from the adjacent Browns Oxide Site (EMS 2005).
Bare-rumped Sheathtail Bat *Saccolaimus saccolaimus nudicluniatus*	Critically Endangered	Species or species habitat likely to occur within area	Unlikely	May	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).

Water Mouse (False Water-rat) *Xeromys myoides*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (EcOz, 2016).
Arnhem Rock-rat	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (EcOz, 2016).
Reptiles							
Plains Death Adder, *Acanthophis hawkei*	Vulnerable	Species or species habitat known to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). No suitable habitat (EcOz, 2016).
Arnhem land Skink, *Bellatorias obiri*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (EcOz, 2016).
Gulf snapping turtle, *Elseya lavarackorum*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (EcOz, 2016).
Yellow snouted gecko, *Lucasium occultum*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Outside known range (EcOz, 2016).
Fish							
Freshwater Sawfish, *Pristis pristis*	Vulnerable	Species or species habitat likely to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Hydrobiology 2014; 2015).

Plants							
Helicteres macrothrix (also known as Helicteres sp. Glenluckie Creek)	Endangered	Species or species habitat known to occur within area	Unlikely	May	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Hydrobiology 2013; Ecological 2014).
Acacia praetermissa	Vulnerable	Species or species habitat may occur within area	Unlikely	May	Unlikely	Unlikely	No evidence found during recent Flora report (EcoLogical, 2014; EcOz, 2016))
Atalaya brevialata	Critically Endangered	Species or species habitat may occur within area	Unlikely	May	Unlikely	Unlikely	No evidence found during recent Flora report (EcoLogical, 2014; EcOz, 2016))
Eleocharis retroflexa	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence found during recent Flora report (EcoLogical, 2014; EcOz, 2016))
Goodenia quadrifida	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No suitable habitat (EcOz, 2016).
Brennan's native Hibiscus, *Hibiscus brennanii*	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Outside known range (EcOz, 2016).
Trigger plant, *Stylidium ensatum*	Endangered	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Outside known range (EcOz, 2016).

According to the EPBC Act Matters of National Environmental Significance search tool.
*Likelihood of occurrence within Rum Jungle. Definitions: 'Known' = the species has been recorded within the lease within recent fauna surveys. 'May' = the species has been recorded historically, or good habitat exists for the species. 'Unlikely' = a very low to low probability that a species uses the lease. The species may or may not occur locally or regionally, however based on the known habitat requirements of the species, and habitat available within the site, the site is considered unlikely to be suitable or marginal at best. Based on the known habitat requirements of the species, the lease lacks the required habitat.
**Includes general site access.

Nature and extent of likely impact

Address any impacts on the members of any listened threatened species (except a conservation dependent species) or any threatened ecological community, or their habitat.

The majority of the disturbance undertaken as part of the proposed action at Rum Jungle mine will occur in areas previously disturbed by historic mining activities and subsequent rehabilitation efforts. The likely impact resulting from the proposed action on listed threatened species will be limited to animal behaviour and confined to the disturbance footprint of the proposed action.

As for the FRLT Borrow Area the significant threat identified to populations of threatened species is the proposed construction of the section of the haul road between the existing track and the proposed borrow pit. In particular this area is considered likely to support a population of the endangered Black-footed Tree-rat. EcOz highlighted this during in the threatened species likelihood analysis (EcOz, 2016), this has led to the realignment of this section of haul road mitigating against this impact. The threat to other species possibly in the area not considered significant at a population level as the disturbance will be of a relatively small scale in regionally common habitat that in the project area is heavily infested with Gamba Grass.

An important population criteria assessment was conducted for all 'may' or 'likely' occurrences (Table 3-2 to Table 3-12) and an assessment of significant impacts on critically endangered, endangered or vulnerable species is shown in Table 3-13 to Table 3-22. The assessment was based on available data and undertaken in accordance with the Significant Impact Guidelines 1.1, Significant Impact Criteria. The proposed action is unlikely to have significant impact on any critically endangered, endangered and vulnerable species.

For more information on threatened species refer to the Department of Land Resource Management information sheets.

Table 3-2. Important Population Criteria for Red Goshawks.	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Red Goshawks if still present are not considered to be key source populations. It is assumed the key source population is probably within Litchfield National Park. The Tiwi Island population is considered to be the most important population in the Northern Territory (Woinarksi 2006; Garnett et al. 2011).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Red Goshawks if present are not considered to be necessary for maintaining genetic diversity as the key source population is probably within Litchfield National Park. The Tiwi Island population is considered to be the most important population in the Northern Territory (Woinarksi 2006; Garnett et al. 2011).
• populations that are near the limit of the species range.	**Unlikely** – The Red Goshawks if present would be well within the known current range.

Table 1-3. Important Population Criteria for Partridge Pigeons	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Partridge Pigeons present are not considered to be key source populations. It is assumed they key source population is probably within Litchfield National Park. The Tiwi Island and Kakadu National Park populations have been considered to be important populations (Woinarski 2004).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Partridge Pigeons present are not considered to be necessary for maintaining genetic diversity as the key source population is probably within Litchfield National Park. The Tiwi Island and Kakadu National Park populations have been considered to be important populations (Woinarski 2004).
• populations that are near the limit of the species range.	**Unlikely** – The Partridge Pigeons present are well within the known current range.

Table 2-4. Important Population Criteria for Gouldian Finch	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Gouldian Finch was not observed during fauna surveys. The largest known population is in the Yinberrie Hills (about 40 km north of Katherine), estimated to support 150 to 250 birds (O'Malley, 2006).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Gouldian Finch population is not considered to be necessary for maintaining genetic diversity as the key local source population is probably within Kakadu National Park, which is estimated to support 50-150 adult birds (O'Malley, 2006).
• populations that are near the limit of the species range.	**Unlikely** – The Gouldian Finch at present is well within the known current range.

Table 3-5. Important Population Criteria for Masked Owl (Northern)	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Masked Owls (Northern) if present are not considered to be a key source population. Occurs mainly in eucalypt tall open forests (especially those dominated by *Eucalyptus miniata* and *E. tetrodonta*) located to the north of the borrow area, but also roosts in monsoon rainforests, and forages in more open vegetation types, including grasslands (Woinarski & Ward 2006).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The masked owl population if present are not considered to be necessary to maintain genetic diversity of the species, as the key source population is probably within Kakadu National Park, where they have been reported (Woinarski & Ward 2006).
• populations that are near the limit of the species range.	**Unlikely** – The masked owl (northern) at present is well within its known current range.

Table 3-6. Important Population Criteria for Fawn Antechinus	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Fawn Antechinus if present are not considered to be key source populations. It is assumed that the closest key source population is probably within Litchfield National Park. There is no currently listed important population of this species (Young 2012).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Fawn Antechinus if present are not considered to be necessary for maintaining genetic diversity as the key source population is probably within Litchfield National Park. There is no currently listed important population of this species (Young 2012).
• populations that are near the limit of the species range.	**Unlikely** – The Fawn Antechinus if present would be well within the known current range

Table 3-7. Important Population Criteria for Black-footed Tree-rat	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Black-footed Tree-rat if present are not considered to be key source populations. Occurs in the Top End of the NT, the Kimberley in Western Australia and Cape York Peninsula south to Townsville in Queensland (Hill 2012). Black-footed Tree-rat has remained relatively abundant in the Darwin rural area (Price et al. 2005).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Black-footed Tree-rat population is not considered to be necessary for maintain genetic diversity as the key source population is probably within Kakadu National Park (Woinarski 2004).
• populations that are near the limit of the species range.	**Unlikely** – The Black-footed Tree-rat if present would be within the known current range

Table 3-8. Important Population Criteria for Northern Brush tailed Phascogale	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Northern Brush tailed Phascogale if present are not considered to be key source populations. Although very few records exist, it is assumed that the closest key source population is probably within Litchfield and Kakadu National Parks. It has only been recorded in Kakadu, Coburg Peninsula and the Tiwi Islands throughout the last 10 years (Woinarski, et.al, 2012).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Northern Brush tailed Phascogale if present are not considered to be necessary for maintaining genetic diversity as the key source population is probably within Kakadu National Park.
• populations that are near the limit of the species range.	**Unlikely** – The Northern Brush tailed Phascogale if present would be well within the known current range

Table 3-9. Important Population Criteria for Bare-rumped Sheathtail Bat	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – The Bare-rumped Sheathtail Bat if present are not considered to be a key source population. It is widely distributed from India through south-eastern Asia to the Solomon Islands including north-eastern Queensland and the Northern Territory. It is assumed that the nearest key source population, which is also the only confirmed record of the species in the NT, is in Kakadu National Park (Thomson 1991; Woinarski & Milne 2002).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – The Bare-rumped Sheathtail Bat if present, are not considered to be necessary to maintain genetic diversity as the key source population is most likely within Kakadu National Park, where the only confirmed record of the species in the exists for the NT (Thomson 1991; Woinarski & Milne 2002).
• populations that are near the limit of the species range.	**Unlikely** – The Bare-rumped Sheathtail Bat if present would be well within the known current range

Table 3-10. Important Population Criteria for ***Helicteres macrothrix***	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – *Helicteres macrothrix* if present are not considered to be key source populations. It is assumed that the closest key source population is at Glenluckie Creek and Lake Bennet which has a population of at least 200,000 plants spread over an area of 10 hectares. Other significant populations occur near Mt Bundey. (Cowie et al. 2012; Holtze 2004). There is a high degree of confidence that this species is restricted to its current general area (Cowie et al. 2012). This species was not recorded during targeted searches (EcOz, 2016).
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – *Helicteres macrothrix* if present are not considered to be necessary to maintain genetic diversity, as the key source population is probably Glenluckie Creek and Lake Bennet. This species has a fragmented yet restricted distribution (Cowie et al. 2012).
• populations that are near the limit of the species range.	**Unlikely** – The *Helicteres macrothrix* if present would be well within the known current range.

Table 3-11. Important Population Criteria for *Acacia praetermissa*	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – *Acacia praetermissa* if present are not considered to be a key source population. It is assumed that the closest key source population is probably near Emerald Springs and Hayes Creek (Dunlop *et al.* 1995)
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – *Acacia praetermissa* if present are not considered to be necessary to maintain genetic diversity, as the key source population is likely near Emerald Springs and Hayes Creek (Dunlop *et al.* 1995).
• populations that are near the limit of the species range.	**Unlikely** –*Acacia praetermissa* if present would be at the edge of the current range. It is known from restricted areas further south and was not recorded during targeted surveys (EcOz, 2016).

Table 3-12. Important Population Criteria for *Atalaya brevialata*	
Importance Criteria	**Response**
• key source populations either for breeding or dispersal	**Unlikely** – *Atalaya brevialata* if present are not considered to be a key source population. It is assumed that the closest key source population is probably along the Elizabeth River at Virginia and its tributary Amys Creek just to the south of Darwin, N.T. (Cowie 2014)
• populations that are necessary for maintaining genetic diversity, and/or	**Unlikely** – *Atalaya brevialata* if present is not considered to be necessary for maintaining genetic diversity. The species is endemic to the Northern Territory and is known from five places near the Elizabeth River at Virginia and its tributary Amys Creek just to the south of Darwin, N.T. (Cowie 2014)
• populations that are near the limit of the species range.	**Unlikely** – *Atalaya brevialata* if present would be on the edge of the known current range

Table 3-13. Significant Impact Criteria for Proposed disturbance in relation to Red Goshawks at the Rum Jungle Mine site, borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –** The Red Goshawks if present are not considered an important population. The Tiwi Island population is considered to be the most important population in the Northern Territory (Woinarksi 2006; Garnett et al. 2011).
• Reduce the area of occupancy of an important population	**Unlikely –** The Red Goshawks if present are not considered an important population. The Tiwi Island population is considered to be the most important population in the Northern Territory (Woinarksi 2006; Garnett et al. 2011).
• Fragment an existing important population into two or more populations	**Unlikely –** The Red Goshawks if present are not considered an important population. The Tiwi Island population is considered to be the most important population in the Northern Territory (Woinarksi 2006; Garnett et al. 2011). The entire proposed waste rock dump, mine site, borrow pit and haul road is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –**The proposed work will remove 267.7 ha of habitat, which will eventually be rehabilitated back to free draining landforms with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** The Red Goshawks if present are not considered an important population. The Tiwi Island population is considered to be the most important population in the Northern Territory (Woinarksi 2006; Garnett et al. 2011).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Assuming a predicted area of occupancy of 29,000,000 ha (Garnett et al. 2011), the removal of 267.7 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-14. Significant Impact Criteria for Proposed disturbance in relation to Gouldian Finch at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –**The Gouldian Finch was not observed during fauna surveys. The Gouldian Finch if present are not considered an important population. The important population is in the Yinberrie Hills (about 40 km north of Katherine), estimated to support 150 to 250 birds (O'Malley, 2006).
• Reduce the area of occupancy of an important population	**Unlikely –** The Gouldian Finch if present are not considered an important population. The most important population in the Territory is in the Yinberrie Hills (about 40 km north of Katherine), estimated to support 150 to 250 birds (O'Malley, 2006).
• Fragment an existing important population into two or more populations	**Unlikely –** The Gouldian Finch if present are not considered an important population. The most important population in the Territory is in the Yinberrie Hills (about 40 km north of Katherine), estimated to support 150 to 250 birds (O'Malley, 2006). The entire proposed, borrow pit and haul road is surrounded by open Eucalypt forest types and low open woodland, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –** The haul road and borrow pit will potentially remove 163.3 ha of habitat, the borrow area will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** The Gouldian Finch if present are not considered an important population. The most important population in the Territory is in the Yinberrie Hills (about 40 km north of Katherine), estimated to support 150 to 250 birds (O'Malley, 2006).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** The Gouldian Finch can be found across the tropical Savannah of northern Australia with the most important population found in the Yinberrie Hills (about 40 km north of Katherine) (O'Malley, 2006). The removal of 163.3 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** Given the nature of the works in the area, it is unlikely that it will lead to the introduction of a new disease that will affect the species, let alone one that will cause the species as a whole to decline in number.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-15. Significant Impact Criteria for Proposed disturbance in relation to Partridge Pigeons at both the Rum Jungle Mine site borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –** The Partridge Pigeons present are not considered an important population. The Tiwi Island and Kakadu National Park populations have been considered to be important populations (Woinarski 2004).
• Reduce the area of occupancy of an important population	**Unlikely –** The Partridge Pigeons present are not considered an important population. The Tiwi Island and Kakadu National Park populations have been considered to be important populations (Woinarski 2004).
• Fragment an existing important population into two or more populations	**Unlikely –** The Partridge Pigeons present are not considered an important population. The Tiwi Island and Kakadu National Park populations have been considered to be important populations (Woinarski 2004). The entire proposed waste rock dump, mine site, borrow pit and haul road is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –** The proposed work will remove 267.7 ha of habitat, which will be rehabilitated with a similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** The Partridge Pigeons present are not considered an important population. The Tiwi Island and Kakadu National Park populations have been considered to be important populations (Woinarski 2004).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Assuming a predicted area of occupancy of 600000 ha (Garnett et al. 2011), the removal of 267.7 ha of available habitat will slightly decrease the availability of habitat at the present time. Disturbances will be rehabilitated to a similar vegetative composition to the surrounding area. It is unlikely this will lead to further declines in this species. The borrow area showed no evidence of fine scale burning favoured by the species and gamba grass was prevalent in the borrow pit area.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, i.e. cats and changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-16. Significant Impact Criteria for Proposed disturbance in relation to Masked Owl (Northern) at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –** The Masked Owls (Northern) if present are not considered an important population. The nearest important population is probably within Kakadu National Park, where they have been reported (Woinarski & Ward 2006).
• Reduce the area of occupancy of an important population	**Unlikely –** The Masked Owls (Northern) if present are not considered an important population. The nearest important population is probably within Kakadu National Park, where they have been reported (Woinarski & Ward 2006).
• Fragment an existing important population into two or more populations	**Unlikely –** The Masked Owls (Northern) if present are not considered an important population. The nearest important population is probably within Kakadu National Park, where they have been reported (Woinarski & Ward 2006).The proposed haul road and borrow area is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –** The haul road and borrow pit will remove 163.3 ha of habitat (i.e. *Eucalyptus miniata* woodland/open forest), which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** The Masked Owls (Northern) if present are not considered an important population. The nearest important population is probably within Kakadu National Park, where they have been reported (Woinarski & Ward 2006).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** The removal of 163.3 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, changed fire regime, and vegetation change are already happening throughout the species range. A national recovery plan for the mainland masked owl, has recently been established (Woinarski 2004). The proposed action is unlikely to interfere with this or any recovery effort for this species.

Table 3-17. Significant Impact Criteria for Proposed disturbance in relation to Fawn Antechinus at the Rum Jungle Mine Site, borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –** The Fawn Antechinus if present are not considered an important population. There is no currently listed important population of this species (Young 2012).
• Reduce the area of occupancy of an important population	The Fawn Antechinus if present are not considered an important population. There is no currently listed important population of this species (Young 2012).
• Fragment an existing important population into two or more populations	**Unlikely –** The Fawn Antechinus if present are not considered an important population. There is no currently listed important population of this species (Young 2012). The entire proposed waste rock dump, mine site, borrow pit and haul road is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –** The waste rock dump will remove 32.2 ha of available Fawn Antechinus habitat that will not be rehabilitated to available habitat for this species (i.e. Open Eucalypt Forest). The haul road and borrow pit will remove 163.3 ha of habitat, which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** The Fawn Antechinus if present are not considered an important population. There is no currently listed important population of this species (Young 2012).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Assuming a predicted area of occupancy of 48,800 ha (Woinarski et al. 2014), the removal of 195.5 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, i.e. cats and changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-18. Significant Impact Criteria for Proposed Borrow pit in relation to Black-footed Tree-rat at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of a population	**Unlikely –** The Black-Footed Tree-Rats if present are not considered an important population. The proposed work will avoid an area of open forest to the north of the Borrow haul road. Black-footed Tree-rat has remained relatively abundant in the Darwin rural area (Price et al. 2005).
• Reduce the area of occupancy of the species	**Unlikely –** The Black-Footed Tree-Rats if present are not considered an important population. This species is found in tropical woodlands and open forests (Hill, 2012)
• Fragment an existing population into two or more populations	**Unlikely –** The Black-Footed Tree-Rats if present are not considered an important population. The entire proposed waste rock dump, mine site, borrow pit and haul road is surrounded by open Eucalypt forest types, thus the population cannot be split into two. The proposed haul road leading to the borrow area has been re-aligned to avoid fragmenting the open Eucalypt woodland where this species is likely to reside.
• Adversely affect habitat critical to the survival of a species	**May –**The haul road and borrow pit will remove 163.3 ha of habitat, which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of a population	**Unlikely –** The Black-Footed Tree-Rats if present are not considered an important population.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Assuming a predicted area of occupancy of 60,400 ha (Woinarski et al. 2011), the removal of 163.3 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, i.e. cats and changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-19. Significant Impact Criteria for Proposed Borrow pit in relation to Bare-rumped Sheathtail Bat at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of a population	**Unlikely –** The Bare-rumped Sheathtail Bat if present are not considered an important population. It is widely distributed from India through south-eastern Asia to the Solomon Islands including north-eastern Queensland and the Northern Territory, with the confirmed record of the species in the NT, being in the floodplain area of Kakadu National Park (McKean et al. 1981, Thomson 1991; Woinarski & Milne 2002).
• Reduce the area of occupancy of the species	**Unlikely –** The Bare-rumped Sheathtail Bat if present are not considered an important population. The important population is likely to live in nearby Kakadu National Park, where the only sightings in the NT have been recorded (McKean et al. 1981, Thomson 1991; Woinarski & Milne 2002).
• Fragment an existing population into two or more populations	**Unlikely –** The Bare-rumped Sheathtail Bat if present are not considered an important population. The entire proposed borrow pit and haul road is surrounded by open Eucalypt forest types, thus the population cannot be split into two. The proposed haul road leading to the borrow area has been re-aligned to avoid fragmenting the open Eucalypt woodland where this species may reside.
• Adversely affect habitat critical to the survival of a species	**May –**The borrow pit will remove 163.3 ha of potentially suitable habitat, which will eventually be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of a population	**Unlikely –** The Bare-rumped Sheathtail Bat if present are not considered an important population.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Disturbance will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** Currently the impact of diseases on the Bare-rumped Sheathtail Bat is unknown (Schulz & Thomson 2007). It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, i.e. competition for hollows and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-20. Significant Impact Criteria for Proposed Borrow pit in relation to *Helictres macrothrix* at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of a population	**Unlikely –** *Helictres macrothrix* if present are not considered an important population. The proposed work will avoid an area of open forest to the north of the Borrow haul road.
• Reduce the area of occupancy of the species	**Unlikely –** *Helictres macrothrix* if present is not considered an important population. It is assumed that the closest key source population is at Glenluckie Creek and Lake Bennet which has a population of at least 200,000 plants spread over an area of 10 hectares (Cowie et al. 2012; Holtze 2004).
• Fragment an existing population into two or more populations	**Unlikely –** *Helictres macrothrix* if present is not considered an important population. The entire proposed borrow pit is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –**The borrow pit will remove 163.3 ha of habitat, which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of a population	**Unlikely –** *Helictres macrothrix* if present are not considered an important population.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Assuming a predicted area of occupancy of 91,500ha (Cowie, I., R. Kerrigan & B. Stuckey (2012), the removal of 163.3 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as Gamba grass (*Andropogon gayanus)* are already present in the area (EcOz, 2016).
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Invasive weed species such as Gamba and Mission grasses have altered fire regimes severely impacting this species (Cowie et al. 2012). Threatening process, i.e. land clearing and changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-21. Significant Impact Criteria for Proposed disturbance in relation to *Acacia praetermissa* at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –** *Acacia praetermissa* if present are not considered an important population. The nearest important population is probably near Emerald Springs and Hayes Creek (Dunlop *et al.* 1995)
• Reduce the area of occupancy of an important population	**Unlikely –** *Acacia praetermissa* if present are not considered an important population. The nearest important population is probably near Emerald Springs and Hayes Creek (Dunlop *et al.* 1995)
• Fragment an existing important population into two or more populations	**Unlikely –** *Acacia praetermissa* if present are not considered an important population. The nearest important population is probably near Emerald Springs and Hayes Creek (Dunlop *et al.* 1995). *Acacia praetermissa* was not recorded during targeted searches (EcOz, 2016). *Acacia praetermissa* is known from 17 collections and is not considered severely fragmented (DoE, 2016). The entire proposed borrow pit is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –**The haul road and borrow pit will remove 163.3 ha of habitat, which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** *Acacia praetermissa* if present are not considered an important population. The nearest important population is likely near Emerald Springs and Hayes Creek (Dunlop *et al.* 1995).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** Assuming a predicted area of occupancy of 5200 ha (DoE, 2016), the removal of 163.3 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species, one of the major threats, Gamba grass (*Andropogon gayanus*), already exists in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, changed fire regime, and vegetation distrubance are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-22. Significant Impact Criteria for Proposed disturbance in relation to *Atalaya brevialata* at the borrow area and associated haul road.

Impact Criteria	Response
• Lead to a long-term decrease in the size of an important population of a species	**Unlikely –** *Atalaya brevialata* if present is not considered an important population. The species is known from only five places near the Elizabeth River at Virginia and its tributary Amys Creek just to the south of Darwin, N.T. (Cowie 2014).
• Reduce the area of occupancy of an important population	**Unlikely –** *Atalaya brevialata* if present are not considered an important population. The species is known from only five places near the Elizabeth River at Virginia and its tributary Amys Creek just to the south of Darwin, N.T. (Cowie 2014).
• Fragment an existing important population into two or more populations	**Unlikely –** *Atalaya brevialata* if present are not considered an important population. The species is known from only five places near the Elizabeth River at Virginia and its tributary Amys Creek just to the south of Darwin, N.T. (Cowie 2014).The entire proposed borrow pit and haul road is surrounded by open Eucalypt forest types, thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**May –**The haul road and borrow pit will remove 163.3 ha of suitable habitat, including low open woodland and open forest, which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, but will affect the individuals whose home range may be in parts of the clearing.
• Disrupt the breeding cycle of an important population	**Unlikely –** *Atalaya brevialata* if present is not considered an important population. The species is known from only five places near the Elizabeth River at Virginia and its tributary Amys Creek just to the south of Darwin, N.T. (Cowie 2014).
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** The geographic distribution of *Atalaya brevialata* appears to be very restricted, with an estimated extent of occurrence of 760 ha (DoE, 2013), occurring in approximately 13 subpopulations in five locations (NT DNREAS, 2013). It is unlikely the proposed works will lead to further declines in this species.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as gamba grass (*Andropogon gayanus*) and other invasive weeds are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening process, development for housing and other urban uses, changed fire regime, and vegetation change are already happening throughout the species range. The proposed action is unlikely to interfere with any recovery effort for this species.

3.1 (e) Listed migratory species

Description

Prior to designing the rehabilitation planning, an EPBC Protected Matter Search showed that that sixteen EPBC Listed Migratory species could potentially occur in the proposed areas (**Error! Reference source not found.**).

The Department of Mines and Energy reviewed existing fauna and flora records from the NT Fauna and Flora Atlas and commissioned the following terrestrial fauna surveys in order to investigate the possibility of EPBC listed threatened species on site and downstream of the mine;

- Flora and fauna surveys of the former Rum Jungle mine site (Ecological 2014)
- Finniss River Terrestrial Fauna Survey (EcOz 2014)
- Aquatic Reptile Survey of the Finniss River (EcOz 2014)
- Rum Jungle Aquatic Ecosystem Survey 2014 (Hydrobiology (2014)
- Rum Jungle Impact Assessment Survey (Hydrobiology 2015)
- Threatened Monitor Lizard and Bat Survey of the Finniss River (EcOz 2015)
- Partridge Pigeon Survey of the proposed waste rock dump at the former Rum Jungle Mine (Department of Mines and Energy 2016)
- Borrow Area and Haul Road Survey (EcOz, 2016)

From this information a likelihood analysis was determined based on ecological characteristics of the species from migratory listed species information sheets, field guides, and other published information. These analyses showed that three listed migratory bird species are currently **Known** to inhabit the Rum Jungle Site. One listed migratory bird **May** possibly still occur. All other species highlighted in the EPBC Protected matters search are considered **Unlikely** to occur based on current survey findings, habitat preferences, and observed document declines.

Table 3-23 Listed migratory species potentially occurring at Rum Jungle and results of the likelihood assessment

Common Name	EPBC Status	EPBC Protected Matters Results#	Likelihood of Occurrence*				Reasoning
			1. Rum Jungle Mine**	2. Borrow Pit and Haul Roads	3. Mt Burton	4. Mt Fitch	
Migratory Marine Birds							
Fork-tailed Swift *Apus pacificus*	Migratory	Species or species habitat likely to occur within area	Known	May	May	May	Records of this species were obtained during the recent fauna surveys (Ecological 2014)
Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely. No evidence of this species found during surveys; no suitable habitat.
Migratory Marine Species							
Salt-water Crocodile *Crocodylus porosus*	Vulnerable	Species or species habitat likely to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely. Not recorded from previous targeted surveys (EcOz, 2014b);
Freshwater Sawfish, *Pristis pristis*	Vulnerable	Species or species habitat likely to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys.
Migratory Terrestrial Species							
Red-rumped Swallow *Cecropis daurica*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Oriental Cuckoo *Cuculus optatus*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).

Barn Swallow *Hirundo rustica*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Rainbow Bee-eater *Merops ornatus*	Migratory	Species or species habitat may occur within area	Known	Known	Known	Known	Records of this species were obtained during the recent fauna surveys (Ecological 2014; EcOz 2014a; 2015; DME 2016).
Grey Wagtail *Motacilla cinerea*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Yellow Wagtail *Motacila flava*	Migratory	Species or species habitat likely to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Rufouse Fantail *Rhipidura rufifrons*	Migratory	Species or species habitat known to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Migratory Wetland Species							
Oriental Reed-Warbler *Acrocephalus orientalis*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Great Egret *Ardea alba*	Migratory	Species or species habitat likely to occur within area	Known	May	Unlikely	May	Records of this species were obtained during the fauna surveys (Ecological 2014; EcOz 2014a).
Cattle Egret *Ardea ibis*	Migratory	Species or species habitat may occur within area	May	May	Unlikely	May	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016). Most recent records are from the adjacent Browns Oxide Site (EMS 2005).

Oriental Plover, *Charadrius veredus*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Oriental Pratincole *Glareola maldivarum*	Migratory	Species or species habitat may occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).
Osprey *Pandion haliaetus*	Migratory	Species or species habitat known to occur within area	Unlikely	Unlikely	Unlikely	Unlikely	No evidence of this species found during recent fauna surveys (Ecological 2014; EcOz 2015; DME 2016).

According to the EPBC Act Matters of National Environmental Significance search tool.
*Likelihood of occurrence within Rum Jungle. Definitions: 'Known' = = the species has been recorded within the lease within recent fauna surveys. 'May' = the species has been recorded historically, or good habitat exists for the species. 'Unlikely' = a very low to low probability that a species uses the lease. The species may or may not occur locally or regionally, however based on the known habitat requirements of the species, and habitat available within the site, the site is considered unlikely to be suitable or marginal at best. Based on the known habitat requirements of the species, the lease lacks the required habitat.
**Includes general site access.

Nature and extent of likely impact

Address any impacts on the members of any listed migratory species, or their habitat.

The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds. The impact
expected to be limited to passing infrequent individuals who may alter their path to avoid the disturbance. There is no expected impact u
or breeding.

Table 3-24. Important Habitat Criteria for Fork-tailed Swift at the Rum Jungle Mine site, borrow area, associated haul roads, Mt Fitch and Mt Burton	
Importance Criteria	**Response**
• habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	**Unlikely** – The habitat within this project is unlikely to support an ecologically significant proportion of the population as this species is widespread across all of Australia. In the Northern Territory this species is widespread with scattered records throughout the North (DOE 2016a).
• habitat that is of critical importance to the species at particular life-cycle stages, and/or	**Unlikely** – The habitat that is present and will be cleared is not considered to be important habitats as Fork-tailed Swifts do not breed in Australia; therefore there is no habitat present that is of critical importance to this species.
• habitat utilised by a migratory species which is at the limit of the species range, and/or	**Unlikely** – The habitats that will be cleared are well within the Fork-tailed Swifts known current range.
• habitat within an area where the species is declining.	**Unlikely** – The habitats that will be cleared are not considered important as there are currently no significant threats to the Fork-tailed Swift in Australia (DOE 2016a).

Table 3-25. Important Habitat Criteria for Salt-water Crocodile at the Rum Jungle Mine site.	
Importance Criteria	**Response**
• habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	**Unlikely** – There are no important habitats that will be cleared that are utilised occasionally within a region that supports an ecologically significant proportion of the population of the species.
• habitat that is of critical importance to the species at particular life-cycle stages, and/or	**Unlikely** – There are no important habitats that will be cleared that are of critical importance to the species at particular life-cycle stages.
• habitat utilised by a migratory species which is at the limit of the species range, and/or	**Unlikely** – There are no important habitats that will be cleared that are at the limit of the species ranges as the Saltwater Crocodile occurs throughout Northern Australia.
•habitat within an area where the species is declining.	**Unlikely –** There are no important habitats that will be cleared that are at in an area where the species is declining.

Table 3-26. Important Habitat Criteria for Rainbow Bee Eater at the Rum Jungle Mine site, borrow area, associated haul roads, Mt Fitch and Mt Burton	
Importance Criteria	**Response**
• habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	**Unlikely** – The habitat that will be cleared and is utilised by Rainbow Bee Eaters is not important in the support of an ecologically significant proportion of the population of these species as it is wide ranging throughout Australia, especially in the tropical north (DOE 2016b).
• habitat that is of critical importance to the species at particular life-cycle stages, and/or	**Unlikely** – The habitat that will be cleared and is utilised by Rainbow Bee Eaters is not of critical importance to the species at particular life-cycle stages at it is wide ranging throughout Australia, especially in the tropical north (DOE 2016b).
• habitat utilised by a migratory species which is at the limit of the species range, and/or	**Unlikely** – The habitat that will be cleared and is utilised by Rainbow Bee Eaters is well within the known range of the species.
•habitat within an area where the species is declining.	**Unlikely** - The habitats that will be cleared are not considered important as there are currently no significant threats to the Rainbow Bee Eater in Australia (DOE 2016b).

Table 3-27. Important Habitat Criteria for Great Egret at the Rum Jungle Mine site, borrow area and associated haul road, and Mt Fitch	
Importance Criteria	**Response**
• habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	**Unlikely** – There are no important habitats that will be cleared that are utilised occasionally within a region that supports an ecologically significant proportion of the population of the species
• habitat that is of critical importance to the species at particular life-cycle stages, and/or	**Unlikely** – There are no important habitats that will be cleared that are of critical importance to the species at particular life-cycle stages.
• habitat utilised by a migratory species which is at the limit of the species range, and/or	**Unlikely** – There are no important habitats that will be cleared that are at the limit of the species ranges as the Great Egret occurs throughout Australia (DOE 2016c).
•habitat within an area where the species is declining.	**Unlikely –** There are no important habitats that will be cleared that are at in an area where the species is declining as there are no documented declines in the Northern Territory (DOE 2016c).

Table 3-28. Important Habitat Criteria for Cattle Egret at the Rum Jungle Mine site, borrow area and associated haul road and Mt Fitch.	
Importance Criteria	**Response**
• habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	**Unlikely** – There are no important habitats that will be cleared that are utilised occasionally within a region that supports an ecologically significant proportion of the population of the species
• habitat that is of critical importance to the species at particular life-cycle stages, and/or	**Unlikely** – There are no important habitats that will be cleared that are of critical importance to the species at particular life-cycle stages.
• habitat utilised by a migratory species which is at the limit of the species range, and/or	**Unlikely** – There are no important habitats that will be cleared that are at the limit of the species ranges as the Great Egret occurs throughout Australia (DOE 2016d).
•habitat within an area where the species is declining.	**Unlikely –** There are no important habitats that will be cleared that are at in an area where the species is declining as there are no documented declines in the Northern Territory (DOE 2016d).

Table 3-29. Significant Impact Criteria for the proposed work at the Rum Jungle Mine site, borrow area, associated haul roads, Mt Fitch and Mt Burton in relation to the Fork-tailed Swift

Impact Criteria	Response
• Lead to a long-term decrease in the size of a population	**Unlikely –** The Fork-tailed Swift if present is not considered an important population. In the Northern Territory this species is widespread with scattered records throughout the North (DOE 2016a).
• Reduce the area of occupancy of the species	**Unlikely –** The Fork-tailed Swift if present is not considered an important population. In the Northern Territory this species is widespread with scattered records throughout the North (DOE 2016a).
• Fragment an existing population into two or more populations	**Unlikely –** The Fork-tailed Swift if present are not considered an important population. The habitat that is present and will be cleared is not considered to be important habitats as Fork-tailed Swifts do not breed in Australia; thus the population cannot be split into two.
• Adversely affect habitat critical to the survival of a species	**Unlikely –** The proposed work will remove 102.1 ha of habitat, which will be rehabilitated back to a free draining landform with similar vegetative composition to the surrounding area. It is not expected to adversely affect the survival of species as a whole, as there are currently no significant threats to the Fork-tailed Swift in Australia (DOE 2016a).
• Disrupt the breeding cycle of a population	**Unlikely –** The Fork-tailed Swift if present are not considered an important population.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** The habitat that is present and will be cleared is not considered to be important habitats as Fork-tailed Swifts do not breed in Australia; therefore there is no habitat present that is of critical importance to this species. The removal of 102.1 ha of available habitat will slightly decrease the availability of habitat at the present time. It is unlikely this will lead to further declines in this species.
• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as feral cats are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are affecting this species. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** The proposed action is unlikely to interfere with any recovery effort for this species.

Table 3-30. Significant Impact Criteria for the proposed disturbance at the Rum Jungle Mine site in relation to the Salt-water Crocodile	
Impact Criteria	**Response**
• Lead to a long-term decrease in the size of a population	**Unlikely –** In the unlikely event salt-water crocodiles exist in the area of concern, it is not considered an important population in this area as they are widespread across Northern Australia.
• Reduce the area of occupancy of the species	**Unlikely –** Salt-water Crocodiles were not found in the East Branch Finniss River despite targeted surveys. Aside from the Finniss River the species is also found in other rivers of the Northern Territory, including Mary, Adelaide, Daly, Moyle, Victoria/Baines, Wildman, West Alligator, East Alligator, South Alligator, Liverpool, Blyth, Glyde, Habgood, Baralminar/Gobalpa, Goromuru, Cato and Peter John Rivers (Fukuda et al. 2007).
• Fragment an existing population into two or more populations	**Unlikely –** Salt-water Crocodiles were not found in the East Branch Finniss River despite targeted surveys.
• Adversely affect habitat critical to the survival of a species	**Unlikely –** Salt-water Crocodiles were not found in the East Branch Finniss River despite targeted surveys. The proposed action will not disturb the East Branch Finniss River channel and thus have no impact on the species habitat.
• Disrupt the breeding cycle of a population	**Unlikely –** The Salt-water Crocodile if present are not considered an important population.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely –** The Salt-water crocodile is found from Rockhampton in Queensland (Miller 1993; Taplin 1987) throughout coastal Northern Territory (McNamara & Wyre 1993; Webb et al. 1987) to King Sound (near Broome) in Western Australia (Burbidge 1987; McNamara & Wyre 1993), as well as occurring through India, South-East Asia, the Philippines and Papua New Guinea (Groombridge 1987; Ross 1998).
• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	**Unlikely** – The proposed action is unlikely to result in the introduction of invasive species as buffalo (*Bubalus bubalis*) (Webb et al. 1984, 1987) are already present in the area.
• Introduce disease that may cause the species to decline, or	**Unlikely –** There is currently no known diseases that are causing this species to decline. It is unlikely the proposed action will result in the introduction of a new disease.
• Interfere substantially with the recovery of the species.	**Unlikely –** Threatening processes, i.e. Buffalo (*Bubalus bubalis*) increasing drainage and reducing vegetation and general habitat destruction, mortality in fishing nets and habitat destruction are already present or occurring throughout the species range (Taplin, 1987 and Webb *et al.* 1984, 1987). The proposed action is unlikely to interfere with any recovery effort for this species.